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THE

CYCLOPÆDIA;

OR,

Universal Dictionary

OF

ARTS, SCIENCES, AND LITERATURE.

VOL. XXX.

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THE

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OR,

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OF

Arts, Sciences, and Literature.

BY

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ARTS and SCIENCES.

REPUBLIC.

REPUBLIC, Respublica, *commonwealth*, a popular ſtate or government; or a nation where the body, or only a part of the people, have the government in their own hands.

When the body of the people is poſſeſſed of the ſupreme power, this is called a *democracy*. When the ſupreme power is lodged in the hands of a part of the people, it is then an *ariſtocracy*. See Aristocracy and Democracy.

The celebrated republics of antiquity are thoſe of Athens, Sparta, Rome, and Carthage. At preſent, there is ſcarcely any ſuch thing as a real republic, *i.e.* a ſtrictly popular ſtate. Indeed, the Venetians and Genoeſe have called their ſtates republics; but their government was apparently *oligarchic*.

The Dutch, in their former ſtate, came the neareſt to the character of a republic; yet they were very defective, at leaſt in the ſenſe and ſeverity with which Rome, Carthage, &c. were republics. See States-*General*.

It is a remark of M. St. Evremont, that if the Dutch love the republican form, it is more for the ſake of their trade than of their liberty.

Holland, which was compoſed of about fifty republics, all different from one another, might be conſidered as a confederate republic; or a convention by which ſeveral petty ſtates agree to become members of a larger one, which they intend to eſtabliſh. When ſeveral ſovereign and independent ſtates unite themſelves together by a perpetual confederacy, whilſt each of them continues to be a perfect ſtate, they will form together a federal republic: the deliberations in common will offer no violence to the ſovereignty of each member, though they may, in certain reſpects, put ſome conſtraint on the exerciſe of it, in virtue of voluntary engagements. A perſon does not ceaſe to be free and independent when he is obliged to fulfil the engagements into which he has very willingly entered. In this view, Germany, which conſiſted of free cities, and of petty ſtates, ſubject to different princes, and the Swiſs cantons, were conſidered in Europe as perpetual republics.

Of this kind were formerly the cities of Greece; and in later times were the ſeven United Provinces of the Netherlands; and ſuch, as we have juſt ſaid, were the members of the Helvetic body. To this claſs we may likewiſe refer the federal government of the United States of America. See Government.

Baron de Monteſquieu, in his "Spirit of Laws," enumerates the following diſtinctive properties of a republic. It ſhould have a ſmall territory; otherwiſe it cannot long ſubſiſt. In a large republic there are men of large fortunes, and conſequently of leſs moderation; there are too great depoſits to intruſt into the hands of a ſingle ſubject; intereſts are divided; an ambitious perſon ſoon becomes ſenſible that he may be happy, great, and glorious, by oppreſſing his fellow-citizens; and that he might raiſe himſelf to grandeur on the ruins of his country.

In a large republic, the public good is ſacrificed to a thouſand views; it is ſubordinate to exceptions; and depends on accidents. In a ſmall one, the intereſt of the public is eaſier perceived, better underſtood, and more within the reach of every citizen; abuſes have a leſſer extent, and of courſe are leſs protected.

The long duration of the republic of Sparta was owing to its having always continued with the ſame extent of territory after all its wars. The ſole aim of Sparta was liberty; and the ſole advantage of its liberty, glory.

It was the ſpirit of the Greek republics to be as contented with their territories, as with their laws. Athens was firſt fired with ambition, and gave it to Lacedæmon; but it was an ambition rather of commanding a free people, than of governing

governing ſlaves; rather of directing than of breaking the union. All was loſt upon the ſtarting up of monarchy, a government whoſe ſpirit is more turned to increaſe and advancement.

Excepting particular circumſtances, as when a petty ſovereign ſupports himſelf betwixt two great powers by means of their mutual jealouſy, it is difficult for any other than a republican government to ſubſiſt long in a ſingle town. A prince of ſo petty a ſtate would naturally endeavour to oppreſs, becauſe his power would be great, while the means of enjoying it, or of cauſing it to be reſpected, would be very inconſiderable. The conſequence of this would be, that he would trample upon his people. On the other hand, ſuch a prince might be eaſily cruſhed by a foreign, or even a domeſtic force; the people might every inſtant unite and riſe up againſt him. Now, as ſoon as a prince of a ſingle town is expelled, the quarrel is over; but if he has many towns, it only begins.

Republic *of Letters*, is a phraſe uſed in ſpeaking collectively of the whole body of the people of ſtudy and learning.

There is a journal, begun in Holland, by M. Bayle, and continued by M. Bernard, conſiſting of extracts of books, printed in the courſe of the year, called "Nouvelles de la Republique des Lettres," News from the Republic of Letters. See Journal.

REPUBLICATION *of a Will*. See Will.

REPUDIATION, Repudium, in the *Civil Law*, the act of divorcing. See Divorce.

REPULSE Bay, in *Geography*, a bay on the N.E. coaſt of New Holland, in the South Pacific ocean. S. lat. 20° 36'. W. long. 148° 33'.—Alſo, a bay on the coaſt of Kerguelen's land.—Alſo, a bay on the W. coaſt of America. N. lat. 66° 40'. W. long. 85°.

REPULSION, Repulsio, in *Phyſics*, the act of a repelling power, by which bodies, under certain circumſtances, naturally fly from each other.

Repulſion is the counter part to *attraction*. Attraction only reaches to a little diſtance; where that terminates, there repulſion commences. See Air and Compression.

Indeed, we meet with many obvious inſtances of repulſion among bodies, as between water and oil, and, in general, between water and all unctuous bodies; between mercury and iron, as alſo between the particles of duſt, &c.

Thus, if a fat body, lighter than water, be laid on the ſurface of it, or if a piece of iron be laid on mercury, the ſurface of the fluid will be depreſſed about the bodies laid on it. This is a plain indication of repulſion; as the riſing up of the fluid about the ſurfaces of other incumbent bodies is of attraction.

In the latter caſe, the fluid is ſuſpended, by an attractive power, above the level, and kept from falling by its gravity: in the former, a depreſſion is made by the repelling power, which the liquor, notwithſtanding its gravity, cannot run down into, and fill up.

Upon this depend all the phenomena of very light glaſs bubbles floating on water, about which, when clean, the water riſes; but when greaſed, the water ſinks into a channel all around them. Hence alſo it is, that in a glaſs-veſſel of water, the fluid ſtands higher all about the edges near the glaſs than towards the middle; but when the glaſs is filled till the water run down on all ſides, then it ſtands higher at the middle than at the ſides. Hence, alſo, in a glaſs not full of water, a clean glaſs bubble always runs to the ſide, by reaſon the preſſure, which is upon it towards the middle, is partly taken off by the attractive force with which the water is raiſed near the edge. If the glaſs be ſo full as to be ready to run over, the bubble returns from the ſide towards the middle, the force with which the water is raiſed in the middle taking off part of the preſſure.

Juſt the reverſe happens if the bubble be greaſy; becauſe there the force, by which the water and the bubble repel each other, is greateſt where the water is higheſt. Two clean bubbles and two greaſy ones always run towards each other, as being attracted; and a greaſy and a clean one always fly each other, as being repelled.

REPUTATION, *Injuries affecting*. See Injury.

REQUENA, in *Geography*, a town of Spain, in New Caſtile, ſeated on the top of a hill, near the Oliana, on the borders of Valencia. Bourgoanne, a modern traveller, ſays, that wealth and activity proclaim in this place the preſence of induſtry, and accordingly the number of ſilk looms amounts to 900. It has been ſuppoſed to be the Salaria, placed by Ptolemy in the country of the Baſtitani; 55 miles S.E. of Cuença.

REQUEST, in *Law*, a ſupplication or petition preferred to a prince, or court of juſtice, begging relief in ſome conſcionable caſes, where the common law grants no immediate redreſs.

The term requeſt is now, ſince the inſtitution of chancery, much diſuſed; together with the court of requeſts, where requeſts were cognizable.

In the old government of France, *requêtes civiles*, civil requeſts, obtained for the annulling of contracts, &c. made by ſurprize.

They had eighty maſters of requeſts to take cognizance of cauſes between the officers of the crown, the ſervants of the houſehold, &c.

Requests, *Court of*. See Court *of Requeſts*, and Court *of Conſcience*.

Request, in *Hunting*, is when the dogs have loſt the *queſt* or tract of the beaſt, and muſt *requeſt*, or *queſt* it again. They ſay, *to call to the requeſt*, *come to the requeſt*, &c.

To requeſt the game is chiefly uſed, when, after having run it down the night before, they ſeek it again the next morning with the blood-hound, or the like.

REQUEURIA, in *Botany*, a genus named in the Flora Peruviana, page 16, after Louis Requeur, a Spaniard, who was apothecary to king Philip V. *De Theis*. We are unacquainted with the plant, as well as with the botanical merits of the perſon to whom it is dedicated.

REQUIEM, a maſs ſung in the Romiſh church for the reſt of the ſoul of a perſon deceaſed.

It is thus called, becauſe the introit begins with "Requiem æternam dona eis, Domine," &c.

REQUINY, in *Geography*, a town of France, in the department of the Morbihan; 6 miles N.W. of Joſſelin.

REQUISTA, a town of France, in the department of the Aveiron; 18 miles S. of Rhodez.

RERE County. See Rier *County*.

Rere *Fiefs*, a name given in the Scotch laws to thoſe fiefs which were held by inferior tenants or feudatories, that cultivated the lands under the chief feudatories, who held by military ſervice.

Rere *Ward*, *arriere-garde*. See Rear, and Guard.

REREDOS, the ſkreen at the back of an ancient high altar, which ſeparated it from the Lady-chapel, being, for the moſt part, highly ornamented with niches, canopies, and tracery work. The richeſt of theſe which have reached our time are thoſe of Wincheſter and Durham cathedrals, and of St. Alban's abbey.

RERHUTTAN, in *Geography*, a town of Sweden, in Dalecarlia; 30 miles S.W. of Geffle.

RERIGONIAN Bay, in *Ancient Geography*, a bay on the northern side of ancient Britain, now Loch-rain, formed by the Mull of Galloway.

RERIGONIUM, called by some *Berigonium*, a town of the Novantæ, situated somewhere in Galloway, according to Camden the present Bargeny in Carrict; but Horsley prefers Barton or Strathaven.

RERONE, in *Geography*, a river of Italy, which rises in the Vicentin, and runs into the Brenta.

RERRE, a river of France, which runs into the Saudre, about a league above Romorantin.

RES, *Thing*. See Reality, Ens, Esse, Substance, &c.

Res *Mancipi*. See Abalienation.

Res *Naturales*. See Naturals.

Res *Non Naturales*, &c. See Non-*naturals*, &c.

RESAFA, in *Ancient Geography*, a town of Asia, on the W. side of the Euphrates.

RESAIA, a town of Mesopotamia, in Osrhoené.

RESAINA, or Theodosiopolis, *Ras-vin*, or *Ain-verdah*, a town of Mesopotamia, upon the banks of the river Chabotas. This town was famous on account of the victory obtained over Sapor by the younger Gordian, in the year 243. Under the empire of Severus, it was elevated to the dignity of a colony; and under Theodosius it assumed the name of Theodosiopolis.

RESAPHE, a town of Palmyrene, according to Ptolemy; but Procopius called it Sergiopolis. It was at some distance from the Euphrates.

RESAU or Rehau, in *Geography*, a town of Germany, in the principality of Culmbach; 7 miles E.S.E. of Hoff.

RESAVA, a river of Servia, which runs into the Passarovitz.

RESCEIT, Receptio, in *Law*, an admission or receiving of a third person to plead his right, in a cause formerly commenced between other two.

As, when an action is brought against a tenant for life or years, and he makes default; in such case he in the reversion may come in and pray to be received, to defend the land, and to plead with the demandant.

Resceit is also sometimes applied to an admittance of plea, though the controversy be only between two. He in reversion may come into court, and pray to be received in a suit against his particular tenant.

Resceit *of homage, receptio homagii*, denotes the lord's receiving homage of his tenant, at his admission to the lands.

RESCHOUET, in *Geography*, a town of Prussia, in Pomerelia; 7 miles N.N.E. of Zarnowitz.

RESCIPHA, in *Ancient Geography*, a place of Mesopotamia, on the banks of the Euphrates; situated S. of Corsote, and near to it.

RESCISSION, Rescissio, formed of *re*, and *scindo*, q. d. *I cut* or *divide again*, in the *Civil Law*, an action intended for the annulling or setting aside of any deed, contract, or the like.

A thing's being found damaged, or sold at above double the just value, is a good cause of rescission.

The deed or contract thus annulled, or rescinded, is sometimes called a *rescissory*; though that denomination be more properly given to the action brought for rescinding or setting it aside; which is properly called *actio rescissoria*.

RESCOUS, or Rescue, *Rescussus*, in *Law*, an illegal taking away, and setting at liberty, a distress taken, or a person arrested, by process, or course of law. This is properly a *rescous in fact*. If one distrain beasts for damage feasant in his ground, and as he drives them along the highway towards the pound, they enter into the owner's house, and he withholds them there, and will not deliver them upon demand; this detainer is a *rescous in law*. For a rescous, or the taking of goods by force, when, in a distress, they are in the custody of the law, which is considered as an atrocious injury, the distreiner has a remedy in damages, either by writ of *rescous* (F. N. B. 101.), in case they were going to the pound, or by writ *de parco fracto*, or pound-breach (ibid. 100.) in case they were actually impounded. He may also at his option bring an action on the case for this injury, and shall therein, if the distress were taken for rent, recover treble damages. (Stat. 2 W. & M. sess. 1. c. 5.) In case of the forcible delivery of a person arrested from the officer who is taking him to prison, the plaintiff has a similar remedy by action on the case, or of rescous (6 Mod. 201.); or, if the sheriff makes a return to such rescous to the court out of which the process issued, the rescuer will be punished by attachment. Cro. Jac. 419. Salk. 586. See Rescue.

He that commits a rescue or rescous, is called the *rescussor*.

Rescous is also used for a writ which lies for this fact, called *breve de rescussu*.

RESCRIPT, Rescriptum, an answer delivered by an emperor, or a pope, when consulted by particular persons, on some difficult question or point of law, to serve as a decision of it.

The civil and canon laws are full of such rescripts.

When the rescript was made in answer to the enquiry of a community, it was called a *pragmatic sanction*.

The papal rescripts are a kind of bulls or monitories, beginning with these words, "Significabit nobis dilectus filius," &c. They never obtained either in England or France, when contrary to the liberties of the English and Gallican churches; but were declared abusive.

Among the Romans the contending parties and even the magistrates themselves, frequently consulted the emperor on the measures they were to take in certain and nice difficult cases; and the answers returned by the emperor on such consultations, were called *rescripts*. These had not, indeed, the full force of laws; but they were deemed a strong prejudice or presumption: and in succeeding ages, they had the force of perpetual laws, though they ought to be carefully distinguished, by every rational civilian, from those general constitutions which had only the nature of things for their guides.

Justinian has inserted a great number of them in the Code; and by that means given them the authority they before wanted.

The author of the life of the emperor Macrinus observes of that prince, that he would have his officers judge by laws, not by rescripts; as esteeming it absurd to admit the wills of ignorant men, such as Commodus and Caracalla, for rules of judging; and because Trajan never gave any rescripts at all, as being loth to countenance a custom, where what is frequently granted as a favour, in particular cases, might be afterwards pleaded as a precedent. It is added, that Macrinus had a design to strip the rescripts of all their authority.

M. Schulting, in his Dissertations, does not at all approve of this design; and to the emperor's reasons answers, that indeed all rescripts are not to be admitted; that those which appear dictated out of favour, are to be thrown aside; but those which appear founded in reason, and natural equity, are, with Justinian, to be allowed. He adds, that it cannot be denied but the worst emperors have frequently made good laws, and useful rescripts.

As to what is urged of the emperor Trajan's never giving any rescripts, it appears but ill supported. For what is it but a rescript that he delivers to Pliny on the subject of the Christians, lib. x. epist. 28? Or that on the Isclastici, lib. x. epist. 120? The Digest, and Pliny's Epistles, need

only

only to be opened and compared, to find refcripts of Trajan. The refcripts of the emperor, his grants and decrees, his edicts and pragmatic fanctions, were fubfcribed in purple ink, or a compound of vermilion and cinnabar; and tranfmitted to the provinces as general or fpecial laws, which the magiftrates were bound to execute, and the people to obey. But as their number continually multiplied, the rule of obedience became each day more doubtful and obfcure, till the will of the fovereign was fixed and afcertained in the Gregorian, Hermogenian, and the Theodofian codes.

RESCUE. See RESCOUS. See alfo DISTRESS, and DISSEISIN.

RESCUE is one of thofe offences againft public juftice, which confifts in the forcibly and knowingly freeing another from an arreft or imprifonment; and it is generally the fame offence in the ftranger fo refcuing, as it would have been in a gaoler to have *voluntarily* permitted an efcape. A refcue, therefore, of one apprehended for felony, is felony; for treafon, treafon; and for a mifdemefnor, a mifdemefnor alfo. But here likewife, as upon voluntary efcapes, the principal muft firft be attainted, or receive judgment before the refcuer can be punifhed: and for the fame reafon; becaufe perhaps in fact it may turn out that there has been no offence committed. By ftatute 11 Geo. II. c. 26. and 24 Geo. II. c. 40. if five or more perfons affemble to refcue any retailers of fpirituous liquors, or to affault the informers againft them, it is felony, and fubject to tranfportation for feven years. By the ftatute 16 Geo. II. c. 31, to convey to any prifoner in cuftody for treafon or felony any arms, inftruments of efcape, or difguife, without the knowledge of the gaoler, though no efcape be attempted, or any way to affift fuch prifoner to attempt an efcape, though no efcape be actually made, is felony, and fubjects the offender to tranfportation for feven years: or if the prifoner be in cuftody for petit larceny, or other inferior offence, or charged with a debt of 100*l.*, it is then a mifdemefnor, punifhable with fine and imprifonment. And by feveral fpecial ftatutes, to refcue, or attempt to refcue, any perfon committed for the offences enumerated in thofe acts, is felony without benefit of clergy; and to refcue, or attempt to refcue, the body of a felon executed for murder, is fingle felony, and fubject to tranfportation for feven years. Nay, even if any perfon be charged with any of the offences againft the black act, 9 Geo. I. c. 22, and, being required by order of the privy council to furrender himfelf, neglects fo to do for forty days, both he and all that knowingly conceal, aid, abet, or fuccour him, are felons without benefit of clergy. See CONTEMPT.

RESCUSSOR, in *Law*. See RESCOUS.

RESA, or REZE, in *Geography*, a town of France, which runs into the Saudre, at Romorantin.

RESEARCH, formed of the French, *recherche*, and literally denoting a *fecond fearch*, a diligent fearch or enquiry into any thing.

RESEARCH, in *Mufic*, is a kind of prelude or voluntary played on the organ, harpfichord, violin, &c. in which the compofer feems to *fearch* or look out for the ftrains and touches of harmony, which he is to ufe in the regular piece to be played afterwards.

This is ufually done off-hand; and confequently it requires a mafter's fkill. When in a motetto, the compofer takes the liberty to ufe any thing that comes into his head, without applying any words to it, or fubjecting himfelf to the fenfe or paffion of it, the Italians call it *fantafia ricercata*, the French *recherche*, and the Englifh *refearch* and *voluntary*.

RESEARCHING, in *Sculpture*, the repairing of a caft, figure, &c. with proper tools; or the finifhing it with art and exactnefs, fo as that the minuteft parts may be well defined.

RESEDA, in *Botany*, a name which occurs in Pliny, and is evidently derived from *resēdo*, to allay or mitigate; fo that the fecond fyllable, vulgarly pronounced fhort, ought to be long. Pliny reports that this herb is known in the neighbourhood of Rimini, and is ufed for difperfing tumours, and all kinds of inflammations. The perfon who applies the medicine, fays "Refeda allay thefe difeafes," repeating thefe words, with fome others, and fpitting as often. After this account, the reader may not be anxious to know what Pliny's *Refeda* was. We have certainly no more reafon to believe it the fame as our's, than we have to rely on his fapient prefcription.—Linn. Gen. 242. Schreb. 326. Willd. Sp. Pl. v. 2. 876. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 512. Prodr. Fl. Græc. Sibth. v. 1. 322. Ait. Hort. Kew. v. 3. 153. Juff. 245. Tourn. t. 238. Lamarck Illuftr. t. 410. Gærtn. t. 76. (Luteola; Tourn. t. 238. Sefamoides; Tourn. t. 238.)—Clafs and order, *Dodecandria Trigynia*. Nat. Ord. *Mifcellaneæ*, Linn. *Capparides*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, deeply divided into narrow, erect, permanent fegments, two of which are further afunder than the reft, for the accommodation of the honey-bearing petal. *Cor.* Petals feveral, unequal; fome of them always cut half way down into three fegments; the upper one gibbous at the bafe, bearing honey, the length of the calyx. Nectary a flat erect gland, proceeding from the receptacle, fituated at the upper fide of the flower, between the ftamens and uppermoft petal, converging with the dilated bafe of the petals. *Stam.* Filaments eleven or fifteen, fhort; anthers erect, obtufe, the length of the corolla. *Pift.* Germen gibbous, ending in three or four very fhort ftyles; ftigmas fimple. *Peric.* Capfule gibbous, angular, coriaceous, tipped with the ftyles, and gaping at the fummit between them, of one cell. *Seeds* numerous, kidney-fhaped, inferted into the angles of the capfule.

Obf. Linnæus obferves, that there is fcarcely any genus whofe character is more difficult to determine, both the number and fhape of the parts being different in different fpecies. The effential character confifts in the three-cleft petals, one petal bearing honey at its bafe, and the capfule not being clofed, but always gaping.

R. Luteola has the *perianth* in four deep fegments; *petals* three, the upper, or honey-bearing one, cut half way down into fix fegments; the lateral ones oppofite, three-cleft; to which are often fubjoined, by nature or luxuriance, two more, very fmall, undivided petals; the *ftyles* are three: *ftamens* numerous.

R. alba has fix deep fegments in the *perianth*: *petals* fix, nearly equal, all of them half three-cleft; *ftyles* four; *capfule* with four angles; *ftamens* conftantly eleven.

Some other fpecies have a deeply five-cleft *perianth*; five diffimilar three-cleft *petals*; *ftyles* three; *ftamens* numerous.

Eff. Ch. Calyx of one leaf, deeply divided. Petals laciniated. Capfule fuperior, gaping at the top, of one cell, with many feeds.

1. R. *Luteola*. Dyer's-weed, Yellow-weed, or Weld. Linn. Sp. Pl. 643. Willd. n. 1. Ait. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 320. Mart. Ruft. t. 40. (Luteola; Ger. Em. 494. Pfeudoftruthium; Matth. Valgr. v. 2. 643.)—Leaves lanceolate, undivided, flat. Calyx four-cleft.—Native of wafte ground, rubbifh, banks, and old walls, chiefly about villages, in moft of the temperate parts of Europe. About Norwich it is very common; partly perhaps from the difperfion of its feeds, in confequence of the great ufe made of the cultivated herb, in the woollen manufactory of that city, for dyeing yellow. The colour it affords is very bright, and is efpecially ufeful for making a good

a good green; the cloth being first dyed blue. The *herb* is annual, flowering in July. *Root* spindle-shaped. *Stem* erect, wand-like, two or three feet high, branched, leafy, striated, smooth. *Leaves* linear-lanceolate, entire, smooth, for the most part furnished with a small callous tooth, on each side, at the base. *Flowers* small, cream-coloured, very numerous, in long, simple, solitary, terminal, slightly drooping *spikes*, which, according to Linnæus, follow the course of the sun, even in a cloudy day—

> "True, as the dial, to the sun,
> Although it be not shined upon."

2. R. *canescens*. Hoary Base Rocket. Linn. Syst. Nat. ed. 12. v. 2. 330. Willd. n. 2. Ait. n. 2? Vahl. Symb. v. 2. 52. (R. hexagyna; Forsk. Ægypt-Arab. 92. Sesamoides salmanticum parvum alterum; Clus. Hist. v. 1. 296, no figure. S. flore albo, foliis canescentibus; Tourn. Inst. 424.)—Leaves lanceolate, waved, somewhat hairy. Branches hispid.—Native of waste ground near Cairo. *Forskall.* Probably also of the south of Europe. The *stems* are decumbent, branched, eighteen inches or more in length, round, leafy, rough with copious, minute, white, spreading, short, bristly hairs. *Leaves* scattered, lanceolate, one and a half or two inches long, bluntish, entire, wavy, and roughish at the edges, as well as at the midrib on both sides; otherwise smooth, and somewhat glaucous; tapering at the base, and sending down two elevated ribs, for some distance, along the branch. *Flowers* in long, terminal, stalked, hairy clusters, on short partial stalks. *Calyx* five-cleft. *Petals* white. *Germen*, according to Forskal's description, stalked, with six *styles*.—Vahl has well remarked that *R. canescens* of Sp. Pl. cannot be the same with the above. Indeed it appears to be no other than either *R. sesamoides* or *purpurascens*, the figure of Clusius agreeing best with the former; his description and the Linnæan definition with the latter. Yet this same figure, adopted by Gerarde, seems to be the only foundation on which *R. canescens* depends for a place in Hort. Kew.—We have never seen the true *canescens* living, nor can we find a figure of it.

3. R. *glauca*. Glaucous Base Rocket. Linn. Sp. Pl. 644. Willd. n. 3. Ait. n. 3. (R. linariæ foliis; Bauh. Prodr. 42, no figure. Sesamoides linariæ folio glauco, pyrenaica, flore stamineo; Moris. sect. 15. t. 1. f. 4.—Leaves linear; toothed at the base. Styles four.—Native of the Pyrenæan mountains; according to Burser's herbarium, examined by Linnæus. Gathered also by Lœfling, in Spain. The *root* is said to be perennial, but has the appearance of being annual. Whole herb glaucous, slender, and smooth. *Stem* twelve or eighteen inches high, simple, round, wand-like, leafy. *Leaves* about two inches long, very narrow; all nearly of equal breadth, furnished at the base with a few white bristly teeth. *Cluster* terminal, solitary, very long, of numerous white *flowers*, whose *petals* are less divided than in most other species.

4. R. *dipetala*. Flax-leaved Base Rocket. Ait. n. 4. Willd. n. 4. Vahl. Symb. v. 2. 52. (R. capensis; Burm. Prodr. 13.)—Leaves linear, entire. Styles four. Petals two, undivided.—Native of the Cape of Good Hope, from whence its seeds were sent to Kew, in 1774, by Mr. Masson. The plant is biennial, flowering in August, being preserved in a greenhouse through the winter. Vahl compares its general aspect to *R. Sesamoides*, hereafter described. *Stem* somewhat shrubby, erect, with round branches. *Leaves* about an inch long, rather fleshy, smooth. *Cluster* terminal, lax. Segments of the *calyx* six, minute, bordered with white. *Petals* only two, wedge-shaped, undivided.

5. R. *purpurascens*. Purplish Base Rocket. Linn. Sp. Pl. 644. Willd. n. 5. (Sesamoides salmanticum parvum primum; Clus. Hist. v. 1. 296, excluding the figure. S. foliis crassis, floribus ex herbaceo purpurascentibus; Tourn. Inst. 424.)—Leaves linear, obtuse. Styles five.—Native of Spain. *Lœfling.*—*Stems* several, a span high, simple, leafy. *Leaves* scattered, the length of the nail, linear, obtuse, smooth. *Cluster*, or rather *spike*, long, lax. *Petals* very white, much divided. *Styles* five, sometimes, as Clusius describes them, only four. *Capsule* with as many protuberant, single-seeded, knobs or pouches.

6. R. *Sesamoides*. Spear-leaved Base Rocket. Linn. Sp. Pl. 644. Willd. n. 6. Ait. n. 5. (Sesamoides parvum salmanticum; Clus. Hist. v. 1. 295, the figure only. Ger. Em. 493. Lob. Ic. 353.)—Stem-leaves linear-lanceolate, obtuse, radical ones lanceolate, stalked, much larger. Fruit stellated.—Native of Barbary, and the south of Europe. A hardy annual in Kew garden, flowering in July and August. The *root* is spindle-shaped, very long, tapering, and branched at the extremity. *Stems* numerous, spreading nearly horizontally, from three to twelve inches long, generally simple, smooth, leafy. *Radical-leaves* numerous, lanceolate or somewhat obovate, entire, smooth, an inch long, tapering down into a *footstalk* of about the same length; *stem-leaves* much smaller and narrower, linear, and obtuse. *Clusters* terminal, rather dense. *Petals* white. *Styles* four or five. *Capsule* of the same number of spreading lobes, fringed at the edges, and assuming a star-like figure.—The wooden cut of Clusius so exactly represents this plant, especially the radical *leaves*, that we can take it for no other. Allioni's plate, t. 88. f. 3, does not accord with this, or any other *Reseda* known to us, except having a general resemblance to *canescens*, n. 2, without its roughness, or the undulations of its *leaves*.

7. R. *fruticulosa*. Shrubby Base Rocket. Linn. Sp. Pl. 645. Willd. n. 7. Ait. n. 6. Jacq. Coll. v. 3. 195. Ic. Rar. t. 474.—Leaves pinnate. Stem shrubby in the lower part. Styles three or four. Petals all three-cleft. Calyx in five spreading segments.—Native of Spain, and other parts of the south of Europe. John Symmons, esq. is recorded by Mr. Aiton as having introduced it into England, in 1794. The *root*, and base of the *stem*, are woody and perennial, producing a number of upright, less durable, *branches*, two or three feet high, leafy, subdivided, smooth, round, with elevated ribs. *Leaves* alternate, stalked, pinnate, of five, seven, or many more, lanceolate, entire, decurrent, smooth *leaflets*, seldom regularly opposite; the terminal one much the largest, sometimes, but not always, recurved at the point; the lower ones gradually smallest. *Clusters* terminal, erect, long, and rather lax. *Petals* five, white, uniform, oblong, all cut, not nearly half way down, into three equal segments. *Styles* often four; sometimes but three. *Stamens* eleven. Linnæus thought it an intermediate species between *alba* and *undata*. From the first of these it is very distinct. By an accidental error in Sp. Pl. the present species is there called *suffruticulosa*, which has led to the same inaccuracy in the Prodr. Fl. Græc. n. 1092. The name is correct in Herb. Linn.

8. R. *alba*. White Base Rocket, or Upright Mignonette. Linn. Sp. Pl. 645. Willd. n. 8. Ait. n. 7. Sm. Fl. Græc. Sibth. t. 459, unpublished. (R. maxima; Bauh. Pin. 100. Lob. Ic. 222. Ger. Em. 277.)—Leaves pinnate. Stem erect, branched. Styles three or four. Petals unequally and deeply five-cleft. Calyx in five spreading segments.—Native of Spain and the south of France; as well as of Greece and the island of Zante. It has been cultivated in our gardens ever since the days of Gerarde, being a hardy annual or biennial, ornamented, throughout the summer, with copious dense *spikes*, of elegant white *flowers*, whose *petals* have deeper, more numerous

ous ſegments, than the foregoing. Otherwiſe their parts of fructification do not much differ. The number of *ſtyles*, and of ſegments of the *calyx*, varies in both, according to luxuriance. The *leaflets* of *alba* are more numerous, as well as more equal in ſize, than in *fruticuloſa*, nor is the terminal one larger than the reſt. Sometimes their edges are roughiſh. Dr. Sibthorp obſerved, that the whole herb, and alſo the bruiſed ſeed, were uſed in Zante to dye ſilk yellow.

9. R. *undata*. Wave-leaved Baſe Rocket. Linn. Sp. Pl. 644. Willd. n. 9. Ait. n. 8. (R. decurſiva; Forſk. Ægypt-Arab. cat. 66. R. minor alba, dentatis foliis; Barrel. Ic. t. 588.)—Leaves pinnate, wavy. Styles three to five. Petals unequally cut.—Native of Spain. Cultivated by Miller, at Chelſea, in 1739. A hardy perennial, flowering in ſummer. The *ſtems* are erect, branched, ſtraight and wand-like, one to two feet high. *Leaves* unequally pinnate, very much criſped, or wavy. *Flowers* ſmaller than in either of the laſt, and of a leſs pure white, compoſing very long *cluſters*, or rather *ſpikes*, for each flower is nearly ſeſſile; the lower ones very remote. Some of the *petals* appear, by the dried ſpecimens, to have three, others five, obtuſe ſegments, of which the lateral ones are broadeſt. We have great doubts, whether the ſpecimen from which Linnæus took his remark of the great ſize of the *capſules*, really belongs to this ſpecies.

10. R. *lutea*. Yellow Baſe Rocket, or Wild Mignonette. Linn. Sp. Pl. 645. Willd. n. 10. Ait. n. 9. Fl. Brit. n. 2. Engl. Bot. t. 321. Jacq. Auſtr. t. 353. Bulliard. t. 281. (R. Plinii; Ger. Em. 277.)—All the leaves three-cleft; the lower ones pinnate. Petals ſix, very unequal. Calyx in ſix ſegments.—Native of dry chalky hills in the temperate and ſouthern countries of Europe; abundant in the chalky parts of England, flowering from June to the end of autumn. The *root*, generally annual with us, often ſurvives a mild winter. *Stems* ſpreading, branched, leafy, a foot or more in height. *Leaves* tapering at the baſe; ſome of them with only one pair of lateral leaflets; others with many, which are occaſionally ſubdivided; all the leaflets, or ſegments, are linear, channelled, more or leſs wavy; frequently very much criſped or curled. Such is the variety, mentioned as a ſpecies, by Dillenius, in Raii Syn. 366, as R. *criſpa gallica*, Bocc. Sic. 77. t. 41. f. 3; but we have often ſuſpected, that Boccone's plant might be the *undata*. It is hazardous, however, to depend much on ſuch imperfect materials as he affords. The *flowers* are numerous, ſulphur-coloured, ſlightly, and not agreeably, odorous; their two upper petals with two fan-like lateral lobes, and a ſhort linear one between; two lateral petals very unequally and variouſly three-cleft; two lower ones narrow, and almoſt ſimple.

11. R. *Phyteuma*. Scentleſs Mignonette. Linn. Sp. Pl. 645. Willd. n. 11. Ait. n. 10. Jacq. Auſtr. t. 132. (Reſedæ affinis Phyteuma; Bauh. Prodr. 42. Erucago apula, trifida et quinquefolia; Column. Ecphr. 267. t. 269. f. 2.)—Leaves undivided, or three-lobed. Calyx in ſix, very large, obovate ſegments. Petals four, more or leſs pectinated.—Native of the ſouth of Europe and north of Africa. On the walls of Rome it is very common, and having a general reſemblance, without the fragrance, of our garden mignonette, it has given riſe to a report of that charming flower being deſtitute of ſcent in Italy! Miller cultivated *R. Phyteuma* at Chelſea, where it ſtill ſprings up annually in the garden. The *root* is long and tapering. *Stems* very numerous, a ſpan high, compoſing a large ſpreading tuft. *Leaves* broadiſh, tapering at the baſe; ſome of them ſimply obovate; others with a pair of lateral lobes. *Flowers* cream-coloured, in lax ſimple cluſters. *Calyx* very much enlarged, and reflexed, after flowering. *Petals* four; the lower pair, in particular, elegantly pectinated at one ſide; but all of them are liable to vary, in the number and depth of their ſegments. *Fruit* pendulous, obovate, angular. *Styles* three.

12. R. *mediterranea*. Mediterranean Mignonette. Linn. Mant. 564. Willd. n. 12. Ait. n. 11. Jacq. Coll. v. 1. 147. Ic. Rar. t. 475.—Leaves flat, undivided, or three-lobed. Calyx much ſhorter than the corolla. Petals ſix, very unequal.—Native of Paleſtine, according to Linnæus, who received it from Schreber. Dr. Sibthorp met with it in corn fields in the iſlands of the Archipelago. This is a hardy annual, flowering all ſummer long, agreeing very much in appearance with the laſt, but ſtill more with the following. The *flowers* have no ſcent. Their *petals* are ſix, moſt reſembling thoſe of *R. lutea* in figure, but white, not yellow. The *leaves* are broader, and leſs divided, than in *lutea*, as well as quite flat; they vary however greatly in breadth, but are never undulated. The *calyx* is ſhort, never enlarged like that of *R. Phyteuma*.

13. R. *odorata*. Sweet Mignonette. Linn. Sp. Pl. 646. Willd. n. 13. Ait. n. 12. Mill. Ic. t. 217. Curt. Mag. t. 29.—Leaves flat; undivided, or three-lobed. Calyx equal to the corolla. Segments of the petals all very deep, ſomewhat ſpatulate.—Native of Egypt. Well known throughout the gardens of Europe, as a hardy annual, blooming all the year round, if properly ſheltered, and exhaling from its neat unoſtentatious flowers, a moſt delicious ſcent, reſembling that of the vine-bloſſom, or the fruit of the raſpberry. This odour remains long in wooden boxes, where the flowers are dried. The *petals* are of a pale buff, prettily contraſted with the red anthers, and, as Jacquin obſerves, in deſcribing the laſt, they differ from that in their uniform, long, wedge-ſhaped, or ſpatulate ſegments.

Reseda, in *Gardening*, contains a plant of the flowering ſweet-ſcented kind, of which the ſpecies cultivated is, the ſweet reſeda, or mignonette (R. odorata).

Mr. Curtis obſerves, that the luxury of the pleaſure-garden is greatly heightened by the delightful odour which this plant diffuſes; and as it grows more readily in pots, its fragrance may be conveyed into the houſe: its perfume, though not ſo refreſhing perhaps as that of the ſweet-briar, is not apt to offend the moſt delicate olfactories.

Method of Culture.—This is raiſed from ſeed, which ſhould be ſown on a moderate hot-bed in March, and when the plants are ſtrong enough to tranſplant, be pricked out upon another moderate hot-bed to bring them forward, having a large ſhare of air in warm weather, to prevent their drawing up weak. Or they may be ſown in pots of light mould, and plunged in the hot-bed, which is probably the better practice. In the firſt mode, about the end of May the plants may be planted out, ſome into pots, to place in or near the apartments, and others into warm borders, where they may remain to flower and ſeed. The plants which grow in the full ground, often produce more ſeeds than thoſe which are in pots; but at the time when the ſeed-veſſels begin to ſwell, the plants are frequently apt to be infeſted with green caterpillars, which, if they are not deſtroyed, eat off all the ſeed-veſſels.

And when the ſeeds are ſown on a bed of light earth in April, the plants come up very well; and when not tranſplanted, grow larger than thoſe which are raiſed in the hot-bed; but they do not flower ſo early, and in cold ſeaſons ſcarcely ripen their ſeeds. In a warm dry border, however, the ſeeds often come up ſpontaneouſly, and grow very luxuriantly; but to have the flowers early in ſpring, the ſeeds ſhould be ſown in pots in autumn, being kept in frames through the winter, or on a gentle hot-bed in ſpring. The plants may alſo be preſerved through the winter in a greenhouſe, where they

they continue flowering moſt part of the year, but the ſecond year they are not ſo vigorous as in the firſt.

It is cultivated for the fine fragrant ſmell which it affords, when pots of it are ſet about the houſe.

The ſeed becomes ripe in the beginning of the autumn, when it ſhould be carefully collected in a dry ſeaſon, and put by in a dry place for future uſe, after having been properly cleaned.

RESEISER, Reseisire, in *Law*, a taking of lands into the king's hands, where a general delivery, or ouſter le main, was formerly miſuſed, contrary to order of law.

RESELE, in *Geography*, a town of Sweden, in Angermannland; 55 miles N.N.E. of Hernoſand.

RESEMBLANCE. See Similitude.

RESENIUS, John Paul, in *Biography*, a Daniſh biſhop and writer, was born at Reſen in 1561. He ſtudied at various ſchools, and in 1583 became ſubdirector of that at Viborg. Some time after he travelled into foreign countries, took a degree at Wittemberg, and returned to Denmark in 1591. He was afterwards appointed profeſſor of logic and theology in the univerſity of Copenhagen, and received orders to accompany Chriſtian IV., who propoſed a viſit to England to ſee his relation, king James. In conſequence of another royal mandate, he undertook to tranſlate the whole of the ſcriptures into Daniſh. He completed the New Teſtament firſt, which he publiſhed in two vols. 12mo. in 1605, and the Old Teſtament followed in 1607. This verſion of the bible gave riſe, in 1609, to a controverſy between Reſenius and Ivarus Stubœus, profeſſor of Hebrew at Copenhagen, the reſult of which was, that Stubœus was diſplaced from his office. In 1614 he was involved in another diſpute with Olaf Coccius, the clergyman of Nicolas' church, Copenhagen, which ended in the diſgrace and baniſhment of his opponent. Reſenius was raiſed to the epiſcopal chair. He died in 1638, and bequeathed upwards of 5000 dollars to charitable purpoſes. He was author of many works, chiefly on ſubjects connected with theology. Gen. Biog.

Resenius, Peter, counſellor of ſtate in Denmark, was born at Copenhagen in 1625, and in 1646 he went to Leyden, where he applied himſelf to the ſtudy of juriſprudence and the belles lettres during the ſpace of four years, and then made a tour to France, Spain, and Italy. He took the degree of L.L.D. at Padua, and then returned to Copenhagen, where he married in 1655, and two years after was appointed profeſſor of moral philoſophy. In 1680 he was ennobled, and in 1684 was nominated a counſellor of ſtate. This learned man died in 1688, and bequeathed a large ſum of money, and a very valuable library, to the univerſity of Copenhagen. He was author of a great number of works, the titles of which are enumerated in the General Biography.

RESENTMENT is a leſſer degree of wrath, which is violent and permanent anger, and is excited by ſmaller offences, or by offences committed againſt leſs irritable minds: it is a deep reflective diſpleaſure againſt the conduct of the offender. Indignation is a reſentment againſt a conduct that appears peculiarly unworthy:—ſome atrocious violation of the principles of gratitude, or ſomething which appears peculiarly deſpicable and baſe. Reſentment is chiefly excited by ſome perſonal offence againſt the laws of ſocial intercourſe, of friendſhip, or of gratitude, and may terminate in indifference, and, in weak minds, in malice; but it is uſually appeaſed by conceſſions and acknowledgments.

RESERVATION, Reservatio, in *Law*, an action or clauſe by which ſomething is reſerved, *i. e.* is retained, kept, or ſecured to one's ſelf.

Thus, when a man lets his land, he reſerves a rent to be paid to himſelf for his maintenance, &c.

William the Conqueror, getting all the lands of England, except thoſe belonging to the church and religious houſes, into his hands by right of conqueſt, beſtowed a great part of them among his followers, reſerving ſome retribution of rents and ſervices to him and his heirs; which reſervation is now, as it was before the Conqueſt, called the tenure of the lands.

Sometimes reſervation ſignifies as much as an exception; as, when a man lets a houſe, and reſerves to himſelf one room, that room is excepted out of the demiſe.

Reservation, *Mental*, is a propoſition, which, ſtrictly taken, and according to the natural import of the terms, is falſe; but if qualified with ſomething reſerved or concealed in the mind, becomes true.

Mental reſervations are the great refuge of religious hypocrites, who uſe them to accommodate their conſciences with their intereſts. The Jeſuits are zealous advocates for mental reſervations; yet are they ſtrictly all real lyes, as including an intention to deceive.

RESERVATORY. See Reservoir.

RESERVE, in *Law*, the ſame with *reſervation;* which ſee.

Benefices are ſometimes reſigned with reſerve of a penſion. By the canon law, no perſon may reſerve to himſelf a penſion out of a benefice, unleſs he hath ſerved it ten years.

In the Romiſh church the ordinary prieſts have only a power to abſolve, in reſerve of certain caſes, hence called *reſerved caſes*, as being reſerved to the biſhop.

The court reſerves the cognizance of ſuch an affair to itſelf. The lawyers ſay, that no prince ever granted ſuch a power by his letters or patents, but that he reſerves to himſelf a greater.

Reserve, *body of*, *corps de reſerve*, in *War*. See Body *of Reſerve*.

Reserve *Guard* denotes the ſame as a *picquet* guard, except that the one mounts at troop-beating, and the other at retreat-beating. See Guard.

RESERVED Cases. See Cases.

RESERVOIR, a large pond or pen of water, artificially made, in order to retain and collect it for the uſe of canals, rivers, mills, &c. See Bason and Canal.

The reſervoir in a building is a large baſon, uſually of wood, lined with lead, where water is kept to ſupply the occaſions of the houſe. At Cannons, the late noble ſeat of the duke of Chandois, there was a very large reſervoir at the top of the houſe, to which the water was raiſed by a curious engine, contrived for the purpoſe. This reſervoir was of ſuch capacity, as that, beſides ſupplying all parts of the houſe by means of pipes and cocks, it likewiſe turned a mill.

The reſervoir is ſometimes alſo a large baſon of ſtrong maſonry, clayed or paved at the bottom, where the water is reſerved to feed jets d'eau, or ſpouting fountains.

Such is that large one on the top of Marley, called *tron d'enfer*, *hell mouth*, whoſe ſurface, Daviler tells us, contains fifty acres, and its depth ſuch as to contain a hundred thouſand cubic fathom of water.

Reſervoirs are of great uſe in collecting and preſerving the urine or other liquid matters diſcharged from the ſheds or ſtables where cattle or other animals are kept, for the purpoſe of manure, and ſhould of courſe be formed on all farm-yards. See Farm-*Yard*.

Such a reſervoir is conceived to be eſſential, even where there are no lands proper for being overflowed by the contents of it, particularly where care is taken to ſupply it occaſionally with a bottom of ſome good rich earthy matter, to to be imbued with the rich particles of the more heavy fubftances which are let fall during the ftagnant ftate of the liquid. This matter fhould be carried out in a dry time, when the water has been wholly removed by evaporation, and be fpread out over the grafs lands, particularly thofe under the fcythe, as foon as poffible after the hay has been taken off the ground. The benefit of a refervoir of this nature, whether formed in the intention of flowing the land below it, or of a pond for catching the mud, will commonly be in the proportion of its extent. And the coft of it will have a relation likewife to its dimenfions. It is fuppofed, that if the expence of one be ten pounds, and the annual increafe of hay only one load, the farmer may well afford to pay fix *per cent.* for the ufe of it. Therefore fuch refervoirs feldom fail to pay amply for the coft of preparing them. In fome floping fituations they may be conftructed at a very trifling expence, in comparifon of their ufefulnefs, when intended to be thrown over grafs lands, with a valve, by which, when full, the liquid may be let off, in a fufficient body, to fpread equally over the whole of the part to which it is applied, and produce the full effect that is wanted.

RESERVOIR, in *Anatomy*. See RECEPTACULUM *Chyli*.

RESET, in *Law*, the receiving or harbouring an outlawed perfon. Hence a receiver of an outlawed perfon is called a *refetter*.

RESHD, or RESHT, in *Geography*, a town of Perfia, and capital of the province of Ghilan, built on the fhore of the Cafpian, and carrying on a confiderable trade in filk, and other articles, with Aftrachan. The number of houfes, which lie difperfed, is eftimated at 2000. The heat in fummer is hardly fupportable, and dangerous, when a particular wind blows, but happily it does not continue above a quarter of an hour. The harbour is unfafe in ftormy weather, fo that the commanders of fhips generally prefer that of Lankeroon, a fmall port in the diftrict of Talifh, to the N.W. of Refht. Rice and wheat are cultivated in its vicinity; 300 miles N. of Ifpahan. N. lat. 37° 20′. E. long. 49° 50′. The province of Ghilan yields a net revenue of 149,490 tomauns, and 9058 dinars.

RESIANCE, RESIANTIA, in *Law*, a man's abode, or continuance in a place.

The word has the fame fignification with regard to laymen, as *refidence* with regard to ecclefiaftics.

Glanville obferves, that in the ancient law, refiance properly fignified a difeafe, by which the perfon was difabled from ftirring out of doors. Whence their *effoin de refiantia*, was the fame as our *effoin de malo lecto*.

RESIANT ROLLS, are rolls in which the refiants of a tithing, &c. are fet down.

RESIDENCE, RESIDENTIA, in *Canon* and *Common Law*, the abode of a perfon, or incumbent, upon his benefice; and his affiduity in attending on the fame.

By the rule of the ancient canon law, beneficiaries are obliged to refidence, without juft and neceffary caufe, and efpecially without the confent of the diocefan, under pain of deprivation of their benefices. The original reafon is, that in the primitive church none were promoted to holy orders, but fuch as had a benefice in promptu, which they were obliged to ferve; fo that this fervice was neceffarily attached to the orders; and whoever was honoured with them, at the fame time was obliged to perfonal fervice.

Regularly, perfonal refidence is required of ecclefiaftical perfons upon their cures; and to that end, by the canon law, if he that hath a benefice with cure be chofen to an office of bailiff, or beadle, or the like fecular office, he may have the king's writ for his difcharge. The intendment of the common law is that a clerk is refident upon his cure. 2 Inft. 625.

Refidence is alfo required by ftatute 9 Ed. II. ftat. 1. c. 8, called the ftatute articuli cleri. Thus alfo, by 21 Henry VIII. c. 13, commonly called the ftatute of non-refidence, perfons wilfully abfenting themfelves from their benefices for one month together, or two months in the year, incur a penalty of 5*l.* to the king, and 5*l.* to any perfon that will fue for the fame. And if any perfon or perfons fhall procure at the court of Rome, or elfewhere, any licence or difpenfation to be non-refident at their faid dignities, prebends, or benefices, contrary to this act; every fuch perfon, putting in execution any fuch difpenfation or licence for himfelf, fhall incur the penalty of 20*l.* for every time fo doing, to be forfeited and recovered as aforefaid, and fuch licence or difpenfation fhall be void. f. 27.

Provided, that this act of non-refidence fhall not extend nor be prejudicial to any fuch fpiritual perfon as fhall chance to be in the king's fervice beyond the fea, nor to any perfon going to any pilgrimage or holy place beyond the fea, during the time that they fhall fo be in the king's fervice, or in the pilgrimage going and returning home; nor to any fcholar or fcholars being converfant and abiding for ftudy, without fraud or covin, at any univerfity within this realm or without; nor to any of the chaplains of the king or queen, daily or quarterly attending and abiding in the king's or queen's moft honourable houfehold; nor to any of the chaplains of the prince or princefs, or any of the king's or queen's children, brethren, or fifters, attending daily in their honourable houfeholds, during fo long as they fhall attend in any of their houfeholds; nor to any chaplain of any archbifhop or bifhop, or of any fpiritual or temporal lords of the parliament, daily attending, abiding, and remaining in any of their honourable houfeholds; nor to any chaplain of any duchefs, marquefs, countefs, vifcountefs, or baronefs, attending daily, and abiding in any of their honourable houfeholds; nor to any chaplain of the lord chancellor, or treafurer of England, the king's chamberlain, or fteward of his houfehold for the time being, the treafurer and controller of the king's moft honourable houfehold for the time being, attending daily in any of their honourable houfeholds; nor to any chaplain of any of the knights of the honourable order of the garter, or of the chief juftice of the king's bench, warden of the ports, or of the mafter of the rolls, nor to any chaplain of the king's fecretary, dean of the chapel, amner for the time being, daily attending and dwelling in any of their houfeholds, during the time that they fhall fo abide and dwell, without fraud or covin, in any of the faid honourable houfeholds; nor to the mafter of the rolls, or dean of the arches, nor to any chancellor or commiffary of any archbifhop or bifhop, nor to as many of the twelve mafters of the chancery, and twelve advocates of the arches, as fhall be fpiritual men, during fo long time as they fhall occupy their faid rooms and offices; nor to any fuch fpiritual perfons as fhall happen by injunction of the lord chancellor, or the king's council, to be bound to any daily appearance and attendance to anfwer to the law, during the time of fuch injunction. f. 28.

Provided alfo, that it fhall be lawful to the king to give licence to every of his own chaplains, for non-refidence upon their benefices; any thing in this act to the contrary notwithftanding. f. 29.

Provided alfo, that every duchefs, marquefs, countefs, baronefs, widows, which fhall take any hufbands under the degree of a baron, may take fuch number of chaplains as they might have done being widows; and that every fuch chaplain may have like liberty of non-refidence, as they might have had if their faid ladies and miftreffes had kept themfelves widows. f. 33.

Legal refidence is not only in the parifh, but alfo in the parfonage parsonage house; for it hath been resolved, that the statute intended residence, not only for serving the cure, and for hospitality, but also for maintaining the house, that the successor also may keep hospitality there. 25 Hen. VIII. cap. 16. 33 Hen. VIII. cap. 28. 28 Hen. VIII. cap. 13.

On a review of these statutes, a question has occurred, how far, taken together, they supersede the canon law, so as to take away the power which the ordinary had before, of enjoining residence to the clergy of his diocese. It seems to be clear, that before these statutes, the bishops of this realm had and exercised a power of calling their clergy to residence; but more frequently, they did not exert this power, which so far forth was to the clergy a virtual dispensation for non-residence. But this not exerting of their power was in them not always voluntary; for they were under the controlling influence of the pope, who granted dispensations of non-residence to as many as would purchase them, and disposed of abundance of ecclesiastical preferments to foreigners, who never resided here at all. The king also, as appears, had a power to require the service of clergymen; and consequently in such case to dispense with them for non residence upon their benefices. This power of the king is reserved to him by the aforesaid act of the 21 Hen. VIII. c. 13. But it is the power of dispensation in the two former cases which is intended to be taken away, namely, by the bishop, and by the pope; and by the said act residence is injoined to the clergy, under the penalty therein mentioned, notwithstanding any dispensation to the contrary, from the court of Rome or elsewhere; with a proviso nevertheless, that the said act shall not extend nor be prejudicial to the chaplains and others therein specially excepted. It is argued, that this act being made to rectify what had been insufficient or ineffectual in the canon law, and inflicting a temporal penalty to inforce the obligation of residence, the parliament intended that the said act should be, from thenceforth, if not the sole, yet the principal rule of proceeding in this particular; and consequently, that the persons excepted in the act need no other exemption than what is given to them by the act of their non-residence. Unto this it is answered, that the intention of the act was not to take away any power which the bishop had of injoining residence, but the contrary; namely, it was to take away that power which the bishop or pope exercised, of granting dispensations for non-residence, that is to say, the act left to them that power which was beneficial, and only took from them that which tended to the detriment of the church; and, consequently, that the bishop may injoin residence to the clergy as he might before, only he may not dispense with them as he did before for non-residence. And indeed, from any thing that appears upon the face of the act, the contrary supposition seemeth to bear somewhat hard against the rule which hath generally been adhered to in the construction of acts of parliament, that an act of parliament in the affirmative doth not take away the ecclesiastical jurisdiction, and that the same shall not be taken away in any act of parliament, but by express words. It is therefore further urged, that the three subsequent acts do explain this act, and by the express words thereof do establish the foregoing interpretation. In the first of the three it is said, that the persons therein mentioned may retain one chaplain *which may be absent from his benefice, and not resident upon the same;* in the second it is said, that persons above forty years of age, residing in the universities, *shall not be excused of their non-residence,* and again, that persons *under* forty years of age, *shall not enjoy the privilege of non-residence contained in the proviso of the said former act,* unless they perform the common exercises there, and the like, which implies, that if they do this, they shall enjoy such privilege: and in the third, it is said, that the persons therein mentioned may retain one chaplain, *which may be absent from his benefice, and non-resident upon the same;* and it is not to be supposed, that the parliament intended a greater privilege to the chaplains of the inferior officers mentioned in the said last act, than to the chaplains of the royal family and principal nobility mentioned in the first act. Unto this the most apposite answer seemeth to be, that it is not expressed absolutely in any of the said three acts, that the chaplains or others therein mentioned shall enjoy the privilege of non-residence, or may be absent from their benefices, and not resident upon the same; but only this, that they may be absent or non-resident as aforesaid, *the said statute made in the said twenty-first year, or any other statute or ordinance to the contrary notwithstanding.* So that they are only exempted thereby from the restraints introduced by the statute law; but in other respects are left as they were before.—But concerning this, although it is a case likely enough to happen every day, there hath been no adjudication.

By 43 Geo. III. c. 84. it is enacted, that so much of 21 Hen. VIII. c. 13. as imposes the penalty of ten pounds on any spiritual person who shall not keep residence on one of his dignities, prebends, or benefices, but absent himself one month together, or two months, to be accounted at several times, in any one year, shall be, and the same is hereby repealed; and that every spiritual person, being possessed of any archdeaconry, deanery, or other dignity, prebend, benefice, donative, or perpetual curacy, or parochial chapelry, who shall, without sufficient cause, as in the said act, or the 25 Hen VIII. c. 16. or in 28 Hen. VIII. c. 13. or in 33 Hen. VIII. c. 28. is specified, or such other sufficient cause as would exempt such spiritual person from any of the pains, penalties, and forfeitures under the said recited acts, for any non-residence, and who shall not have any such licence or exemption as is in this act mentioned, wilfully absent himself therefrom for three months together, or to be accounted at several times in any one year, and make his residence at any other place or places, except at some other dignity, prebend, benefice, donative, perpetual curacy, or parochial chapelry, of which he may be possessed, shall, when such absence shall exceed such period, and not exceed six months, forfeit and pay one-third of the annual value of the dignity, prebend, benefice, donative, perpetual curacy, or parochial chapelry, from which he shall so absent himself; and when such absence shall exceed six months, and not eight months, one-half of such annual value; and when such absence shall exceed eight months, two-thirds of such annual value; and when such absence shall have been for the whole of the year, three-fourths of such annual value; to be recovered by action of debt, bill, plaint, or information, in any of his majesty's courts of record at Westminster, or the courts of great sessions in Wales, wherein no essoign, privilege, protection, or wager of law, or more than one imparlance, shall be allowed; and the whole of every such penalty or forfeiture shall go and be paid to the person or persons who shall inform and sue for the same, together with such costs of suit as shall be allowed; provided that no parsonage that hath a vicar endowed, or perpetual curate, and having no cure of souls, shall be taken to be or be comprehended under the name of benefice, within the meaning of this act. s. 12.

No spiritual person holding any office, in such manner as the same, under any of the provisions of the said recited acts, would exempt such spiritual persons from residence, or from the penalties and forfeitures in the said acts contained for non-residence, or actually serving as a chaplain of the house of commons, or as a clerk of his majesty's closet, or as a deputy clerk thereof, or as a chaplain general of his majesty's forces, or brigade chaplain on foreign service, or chaplain on board any of his majesty's ships, or of his majesty's dock yards, or in any of his majesty's garrisons, or chaplain of his majesty's corps of artillery, or as chaplain to any British factory, or in the household of any British ambassador or public minister residing abroad, or as chancellor or vicar-general, or in his absence the principal surrogate or official in any ecclesiastical court of any diocese, or as minor canon, or vicar-choral, or priest, vicar, or any such other public officer in any cathedral or collegiate church, or as deans, sub-deans, priests, or readers in his majesty's royal chapels at St. James's and Whitehall, or as reader in his majesty's private chapel at Windsor, or elsewhere, or as chaplain at the royal military asylum at Chelsea, or royal military college at High Wycombe, or teacher at the royal military academy at Woolwich, or chaplains at the royal hospitals at Greenwich and Chelsea, or as chaplains to the royal hospitals for seamen at Haslar and Plymouth, or as a preacher or reader in any of the inns of court, or at the rolls, or as bursar, dean, vice-president or public tutor or chaplain, or other such public officer, in any college or hall, in either of the universities of Oxford or Cambridge, or as public librarian or public registrar, or proctor, or public orator, or other such public officer, in either of the said universities, or as fellow of any college in either of the universities, or of Eton or Winchester college, or as warden or provost of Eton or Winchester college, or as schoolmaster or usher in the same, or as schoolmaster or usher of Westminster-school, during the period that they shall respectively be required, by reason of any such office, to perform the duties of the same, and actually shall perform the duties of the same, shall be liable to any of the pains, penalties, or forfeitures in the said first recited act or this act contained, for or on account of any non-residence on any dignity, prebend, benefice, donative, or perpetual curacy. s. 15.

It shall be lawful for any bishop to grant licences to spiritual persons within his diocese, to reside out of the proper house of residence, or out of the parish, and within such distance therefrom, as the case may appear to such bishop to require, if such bishop shall, in his discretion, think the same fit and proper, in the several cases hereinafter mentioned; (that is to say,) to any spiritual person who shall be prevented from residing in the proper house of residence, or in the parish, by actual illness of himself, or wife or child; and also to any spiritual person having any dignity, prebend, benefice, donative, perpetual curacy, or parochial chapelry, where there shall be no house of residence, or where the house of residence shall be unfit for the residence of such ecclesiastical person, such unfitness not being occasioned by such ecclesiastical person, such spiritual person keeping such house in such repair as shall be to the satisfaction of the bishop; and also to any spiritual person having any benefice, donative, perpetual curacy, or parochial chapelry, and having any mansion or messuage belonging to himself or any relative, to reside in such mansion or messuage, such spiritual person keeping the house of residence in good repair, to the satisfaction of the bishop; and also to any spiritual person having any benefice, donative, perpetual curacy, or parochial chapelry, of small value, and serving as a stipendiary curate elsewhere, with licence, and providing for the serving of such his benefice, donative, perpetual curacy, or parochial chapelry, to the satisfaction of the bishop of his diocese; and also to any master or usher of any endowed school duly licensed by the bishop, and actually employed in teaching therein, or to the master of any other school who now is or shall be, within one month after the passing of this act, duly licensed by the bishop; and also to any master or preacher of hospitals or incorporated charitable foundation, during the period for which he may be required to reside in the same, and shall actually reside and perform his duties therein; or to any person holding any endowed lectureship, chapelry, or preachership, and performing the duties thereof respectively; or to any spiritual person having any benefice, donative, perpetual curacy, or parochial chapelry of small value, and serving as preacher in any proprietary chapel in cities or towns, with the licence of the bishop in whose diocese he shall so officiate; or to the librarians of the British museum, or of Sion college; or to the trustees of lord Crewe's charity, during the times of their personal attendance on the duties of their office: provided always, that for any such licence, the party obtaining the same shall not pay more than the sum of ten shillings, exclusive of any such stamps as may be required by law: provided always, that if any spiritual person, applying to any bishop for any such licence, shall think himself aggrieved by the refusal thereof, it shall be lawful for such spiritual person to appeal to the archbishop of the province, who shall confirm such refusal, or grant a licence under this act, as shall seem just and proper. s. 19.

It shall be lawful for any bishop, in cases not enumerated, to grant licences to reside out of the proper house of residence, or out of the parish, and to assign to a curate such salary as he shall judge fit: provided, that in every such case, the reasons that have induced such bishop to grant such licence shall be transmitted to the archbishop of the province to which such bishop shall belong, who shall allow or disallow such licence, in the whole, or in part, or make any alteration therein, as to the period for which the same may have been granted, or otherwise, and likewise as to the stipend assigned to the curate, as to such archbishop shall seem fit; and no such licence shall be good unless it shall have been so allowed and approved by such archbishop: provided also, that no licence shall be made void by the death or removal of the bishop or archbishop granting the same, but the same shall be good and valid, unless the same shall be revoked by the next or any succeeding bishop or archbishop: provided also, that any spiritual person may appeal against any such revocation by the bishop alone: provided also, that the respective archbishops may, in their respective dioceses of which they are bishops, grant licences in all cases in which any licences may be granted by any bishop, either by his own authority, or with the allowance and approval of the archbishop as aforesaid: provided also, that it shall be lawful for any such archbishop to order reasonable fees and charges to be paid by any such spiritual person appealing: provided always, that in every case when any costs and charges directed by such archbishop or bishop as aforesaid, shall remain unpaid for the period of twenty-one days after demand thereof, it shall be lawful for such bishop or archbishop to cause the same to be recovered by sequestration. s. 21.

Provided always, that it shall be lawful for any bishop or archbishop to revoke any such licence: provided also, that no licence for non-residence granted under this act shall continue in force for more than two years from the granting thereof.

Every bishop or archbishop shall cause a copy of such licence or revocation to be filed in the registry of the diocese; and a list shall be made out by the register of the said diocese, and entered in a book, and kept for the inspection of all persons; and a copy of every such licence and revocation shall be transmitted to the churchwardens of the parish to which the same relates, within one month after the grant thereof.

thereof, to be by them depofited in the parifh cheft; and a copy of the fame fhall likewife be read at the vifitation of the archdeacon. f. 22.

Provided, that during the vacancy of any fee, the power of granting licences under this act fhall be exercifed by the vicar-general of the diocefe; and that during the abfence of any prelate out of the realm, or fuch infirmity as difables him from exercifing in perfon the functions of his office, it fhall be exercifed by fuch perfon or perfons as is or are lawfully empowered to exercife his general jurifdiction in the diocefe. f. 28.

And nothing in this act fhall exempt any perfon or perfons from any canonical or ecclefiaftical cenfures, or affect any proceedings in any ecclefiaftical court, in relation to non-refidence, not being duly licenfed according to the provifions of this act, to be abfent therefrom, nor having any other lawful caufe of abfence; provided no fuch cenfures, by reafon of any non-refidence, not exceeding three months in any one year, fhall be put in force at the fuit or inftance of any perfon or perfons other than the archbifhop, bifhop, or archdeacon. f. 29.

In every cafe in which it fhall appear to any bifhop or archbifhop, that any fpiritual perfon, not being licenfed according to this act, nor having any other lawful caufe of abfence, does not fufficiently refide, it fhall be lawful for fuch bifhop or archbifhop to iffue a monition to fuch fpiritual perfon, to refide thereon, and to make a return to fuch monition within a certain number of days after the iffuing thereof; fo as that there fhall be thirty days between the time of executing fuch monition, and the time fpecified for the return thereto; and it fhall be lawful for the bifhop or archbifhop to whom any fuch return fhall be made, to require fuch return to be verified by the oath of fuch fpiritual perfon, or others; and where no fuch return fhall be made, or where fuch return fhall not be deemed fatisfactory, it fhall be lawful for fuch bifhop or archbifhop to iffue an order to require fuch perfon to proceed to and refide, within thirty days after fuch order fhall have been delivered; and in cafe of non-compliance, to fequefter the profits of fuch benefice, donative, perpetual curacy, or parochial chapelry of fuch fpiritual perfon, and to direct the application of fuch profits, after deducting the neceffary expences of ferving the cure, to the payment of fuch expences as fhall have been incurred in relation to fuch monition and fequeftration, and in the next place, towards the augmentation or improvement of any fuch parfonage, vicarage, donative, or perpetual curacy, or the houfe of refidence, or any of the buildings and appurtenances, or any of the glebe or demefne lands; or may order and direct the fame, or any portion thereof, to be paid to the governors of the bounty of queen Anne, to be applied as fuch bifhop or archbifhop fhall in his difcretion think fit; and it fhall alfo be lawful for any fuch bifhop or archbifhop, within fix months after fuch order for fequeftration, or within fix months after any money fhall have been actually levied by fuch fequeftration, to remit to any fuch fpiritual perfon any part of fuch profits, or caufe the fame or any part thereof that fhall have been paid to fuch governors of queen Anne's bounty, to be repaid to fuch fpiritual perfon, in any cafe in which, by reafon of the fubfequent obedience of any fuch fpiritual perfon, fuch bifhop or archbifhop fhall think the fame proper: provided, that when any fuch fpiritual perfon fhall think himfelf aggrieved by reafon of any fuch fequeftration, it fhall be lawful for any fuch fpiritual perfon to appeal to the archbifhop, who fhall make fuch order as fhall be juft and proper: provided, that the party fo appealing fhall give fecurity to the bifhop for the payment of expences occafioned by the appeal: provided alfo, that no fuch order for any fequeftration fhall be put in force during fuch appeal. f. 30.

Perfons who fhall return to refidence on monition, fhall pay the cofts. f. 31.

If any perfon, returning to refidence on monition, fhall before fix months thereafter abfent himfelf, the bifhop may, without monition, fequeftrate the profits of the benefice. f. 32.

And if any clerk fhall continue under any fequeftration for non-refidence for the fpace of three years, or fhall incur three fequeftrations in the faid fpace of three years, not being relieved with refpect to any of fuch fequeftrations, upon appeal, the benefice fhall become *ipfo facto* void, and the patron or perfon entitled to prefent or nominate fome clerk thereto, other than the clerk who fhall have fo continued under fuch fequeftration or fequeftrations. f. 33.

Provided, that if an action be brought before the iffuing of the monition, the bifhop or archbifhop fhall retain out of the profits of the benefice fufficient to fatisfy the penalty and cofts; but if at the time of filing the monition, no action fhall have been commenced, none fhall be brought afterwards. f. 36.

But nothing in this act contained fhall affect his majefty's royal prerogative in the granting of difpenfations for non-refidence, nor any privilege of clerks retained in his majefty's fervice under the ftatute 9 Edward II. c. 8.—f. 40.

No archbifhop or bifhop having any dignity, prebend, benefice, donative, or perpetual cure, fhall, by reafon of non-refidence, be fubject or liable to any penalties or forfeitures. f. 41.

By 54 Geo. III. c. 175. bifhops are empowered to punifh paft non-refidence by monition and fequeftration, as well as to compel refidence in future, and to exercife the fame powers of remitting or ordering the repayment of any part of fuch penalties as is directed or allowed in 43 Geo. III. c. 84. Perfons may appeal, as under the laft cited act, and penalties may be remitted; nor are penalties recoverable for more than one year. This ftatute repeals the provifion of the former act 43 Geo. III. as to perfons neglecting to notify the caufe of exemption from refidence, for which it is not neceffary to obtain a licence, and enacts that a perfon chargeable with fuch neglect fhall forfeit and pay for fuch offence the fum of 20*l.* to be levied by fequeftration, if not otherwife paid after monition, to be applied as the archbifhop or bifhop of the diocefe to whom the notification ought to have been made fhall direct, who poffeffes the power of remitting or ordering the repayment of any part of fuch penalties, as is allowed in the faid act, in cafes of non-compliance with an order for refidence. A perfon who has no houfe of refidence, but who fhall have refided nine months in the year within the limits of his benefice, donative, perpetual curacy, or parochial chapelry, fhall not be liable to any penalties on account of non-refidence, nor be obliged to take out any licence for it; but the fame fhall be deemed a legal refidence; and in all returns made by the bifhops, perfons fo refiding fhall be returned as refident. It is enacted alfo, that houfes purchafed by the governors of queen Anne's bounty, though not fituated within the parifhes for which they are purchafed, fhall be deemed refidences; and in all cafes of finecure rectories having vicarages endowed, the refidence of the vicar in the rectory houfe fhall be deemed a fufficient legal refidence.

For leafes of non-refidents, fee LEASE.

We

We obferve here, that the act of 13 Eliz. c. 20, referred to under LEASE, which was at firft temporary, but made perpetual by 3 Car I. c. 4, is repealed by 43 Geo. III. c. 84, as well as feveral other ftatutes, fo far as they relate to it. This ftatute enacts, that fpiritual perfons may take houfes, &c. though not in a city, &c. and fuch as have not fufficient glebe may, by confent of the bifhop, take farms. They may alfo hold eftates as property, but not any farm for cultivation, unlefs under a leafe granted on or before Jan. 1, 1803, or by confent of the bifhop. They may alfo buy or fell cattle or corn for the occupation of farms. Vicars or curates may take leafes of the impropriate parfonages of their parifhes; but if not occupied by a fpiritual perfon before the paffing of this act, the licence of the bifhop is neceffary. A licenfed clergyman, or one exempt from refidence, may occupy, where he refides, fuch lands as the bifhop may allow. This ftatute is amended, in feveral refpects, by 54 Geo. III. c. 175. By one claufe in this laft act, fo much of 53 Geo. III. c. 149, as enacts that incumbents, neglecting to notify the death of a curate, fhall lofe his exemption from refidence, or licence for non-refidence, is repealed; and a penalty of 20*l.* is impofed.

By 53 Geo. III. c. 149. f. 2, the bifhop or ordinary is empowered to appoint falaries to licenfed curates; the licence fpecifying the amount of fuch falary; and curates may be directed to refide in the parfonage houfe in cafe of the non-refidence of incumbents for four months in each year, during the faid non-refidence: but the diftance of the refidence of fuch curate, licenfed to refide out of the parifh, from any church or chapel which he fhall be licenfed to ferve, fhall not exceed five ftatute miles, except in cafes of neceffity, to be approved by the bifhop or ordinary, and fpecified in the licence. The bifhop may direct the curate to give up poffeffion of the parfonage or vicarage houfe, and in cafe of refufal, he fhall forfeit to the rector or vicar, all fuch parts of his ftipend as fhall then be unpaid, or fhall thereafter become due, and alfo the fum of 50*l.* to fuch rector or vicar, recoverable in an action of debt. The falaries payable to curates fhall be in proportion to the value of the benefices; in no cafe lefs than 80*l. per annum,* or than the annual value of the benefice, donative, perpetual curacy, or parochial chapelry, if the faid value fhall not amount to 80*l. per annum;* nor lefs than 100*l. per annum,* or the whole value as aforefaid, if the faid value fhall not amount to 100*l. per annum* in any parifh or place where the population, (according to the returns then laft made in purfuance of any act or acts of parliament,) fhall amount to or exceed 300 perfons; and fuch falary fhall not be lefs than 120*l. per annum,* or the whole value as aforefaid, if the faid value fhall not amount to 120*l. per annum,* in any parifh or place where the population fhall appear as aforefaid to amount to or exceed 500 perfons; and fuch falary fhall not be lefs than 150*l. per annum,* or than the whole value as aforefaid, if the faid value fhall not amount to 150*l. per annum,* in any parifh or place where the population fhall appear, as aforefaid, to amount to or exceed 1000 perfons: provided always, that the annual value of all benefices, donatives, perpetual curacies, or parochial chapelries, of which the faid value, eftimated as is herein provided, does not amount to 150*l. per annum,* fhall be eftimated from the returns made by the bifhops of the feveral diocefes to the governors of queen Anne's bounty, in purfuance of an addrefs of the houfe of lords, or from any future returns which may be made by the faid bifhops to the faid governors, refpecting parifhes or places omitted in the faid returns, or refpecting parifhes or places in the actual income of which it fhall be made appear to the faid bifhops that any confiderable variation has taken place, either by augmentations made by the faid governors or otherwife.

However, where the curate's falary is of the value of the benefice, it fhall be liable to the charges affecting it. When the curate is permitted to ferve in an adjoining parifh, it fhall be lawful for the bifhop or ordinary to appoint for fuch incumbent, or perpetual curate, fo licenfed, a falary lefs by a fum not exceeding 30*l. per annum,* than the falary which in the feveral cafes herein before mentioned the bifhop or ordinary is refpectively required by this act to appoint; and in every cafe where the bifhop or ordinary fhall find it neceffary or expedient as aforefaid, to licenfe one and the fame perfon to ferve as curate for two adjoining or other parifhes or places, it fhall be lawful for fuch bifhop or ordinary to direct that during fuch time as fuch curate fhall ferve fuch two churches or chapels, the falary to be received by him for ferving each of the faid churches or chapels fhall be lefs by a fum not exceeding 30*l. per annum,* than the falary which in the feveral cafes herein before mentioned the bifhop or ordinary is required by this act to appoint: Provided always, that no fuch falary fhall in any cafe be lefs than 50*l. per annum,* or than the whole value of the faid benefice, donative, perpetual curacy, or parochial chapelry, which fuch incumbent, perpetual curate, or curate, fhall be licenfed to ferve, if the faid value fhall not amount to 50*l. per annum:* Provided always, that no incumbent, perpetual curate, or curate, fhall be licenfed to ferve as curate in any church or chapel which is diftant more than five ftatute miles from any church or chapel already ferved by fuch incumbent, perpetual curate, or curate, except in cafes of neceffity, to be approved by the bifhop or ordinary, and fpecified in the licence.

In certain cafes, fmaller falaries are to be allowed to curates. The bifhop is to allow the rector, &c. to deduct from the curate's falary for repairs to a limited amount, fo that it fhall not in any year exceed one-fourth part of the falary allotted to the curate. The curate is required, in certain cafes, to pay the taxes of the parfonage houfe. Where the benefice, clear of all deductions, exceeds 400*l. per annum,* the bifhop may affign to the curate of fuch parifh or place, refident within the fame, and ferving no other cure, a falary of 100*l. per annum,* though the population may not amount to 300 perfons; and if the population fhould amount to 500 perfons, the bifhop may affign to the curate any larger ftipend or allowance, fo that the fame fhall not exceed by more than 50*l. per annum* the amount of the ftipend or allowance before fpecified, as required to be affigned to fuch curate. No licence fhall be granted to ferve more than two churches in one day; excepting only in certain cafes, where three chapels or churches are not diftant from each other more than four meafured miles, the reafons for granting fuch licence being ftated in it; and it is required that the refidence of the curate be fuch, that it fhall not be neceffary for him to travel more than fifteen miles to perform his whole duty. An incumbent applying for licence for non-refidence fhall ftate what falary he propofes to give to his curate. See CURATE.

Bifhops are not punifhable by the ftatute of the 21 Hen. VIII. for non-refidence upon their bifhoprics; but although an archbifhop or bifhop be not tied to be refident upon his bifhopric by the ftatutes; yet they are thereto obliged by the ecclefiaftical law, and may be compelled to keep refidence by ecclefiaftical cenfures. (Watf. c. 37.) See alfo the conftitutions of archbifhop Langton, of Otho, and of Othobon. By canon 42, every dean, mafter, or warden, or chief governor of any cathedral or collegiate church, fhall be refident in the fame fourfcore and ten days, *conjunctim* or *divifim,* *divisim*, in every year at the leaſt, and then ſhall continue there in preaching the word of God, and keeping good hoſpitality; except he ſhall be otherwiſe let with weighty and urgent cauſes, to be approved by the biſhop of the dioceſe, or in any other lawful ſort diſpenſed with.

By can. 44 no prebendaries nor canons in cathedral or collegiate churches, having one or more benefices with cure, (and not being reſidentiaries in the ſame cathedral or collegiate churches,) ſhall, under colour of their ſaid prebends, abſent themſelves from their benefices with cure above the ſpace of one month in the year, unleſs it be for ſome urgent cauſe, and certain time to be allowed by the biſhop of the dioceſe. And ſuch of the ſaid canons and prebendaries, as by the ordinances of the cathedral or collegiate churches do ſtand bound to be reſident in the ſame, ſhall ſo among themſelves ſort and proportion the times of the year, concerning reſidence to be kept in the ſaid churches, as that ſome of them always ſhall be perſonally reſident there; and all thoſe who be, or ſhall be reſidentiaries in any cathedral or collegiate church, ſhall, after the days of their reſidency appointed by their local ſtatutes or cuſtom expired, preſently repair to their benefices, or ſome one of them, or to ſome other charge where the law requireth their preſence, there to diſcharge their duties according to the laws in that caſe provided. And the biſhop of the dioceſe ſhall ſee the ſame to be duly performed and put in execution.

So that, beſides the general laws directing the reſidence of other clergymen, theſe dignitaries have another law peculiar to themſelves, namely, the local ſtatutes of their reſpective foundations, the validity of which local ſtatutes this canon ſuppoſeth and affirmeth. And, with reſpect to the new foundations in particular, the act of parliament of the 6 Anne, c. 21. enacteth that their local ſtatutes ſhall be in force, ſo far as they are not contrary to the conſtitution of the church of England, or the laws of the land. This canon is undoubtedly a part of the conſtitution of the church: ſo that if the canon interfereth in any reſpect with the ſaid local ſtatutes, the canon is to be preferred, and the local ſtatutes to be in force only ſo far forth as they are modified and regulated by the canon.

There doth not appear to be any difference, either by the eccleſiaſtical or temporal laws of this kingdom, between the caſe of a rector and of a vicar concerning reſidence; except only that the vicar is ſworn to reſide, (with a proviſo, unleſs he ſhall be otherwiſe diſpenſed withal by his dioceſan,) and the rector is not ſworn. And the reaſon of this difference was this: in the council of Lateran, held under Alexander III., and in another Lateran council, held under Innocent III., there were very ſtrict canons made againſt pluralities; by the firſt of theſe councils pluralities are reſtrained, and every perſon admitted *ad eccleſiam, vel eccleſiaſticum miniſterium,* is bound to reſide there, and perſonally ſerve the cure; by the ſecond of theſe councils, if any perſon, having one benefice with cure of ſouls, accepts of a ſecond, his firſt is declared void *ipſo jure.* Theſe canons were received in England, and are ſtill part of our eccleſiaſtical law.

At the firſt appearance of theſe canons, there was no doubt made but they obliged all *rectors;* for they, according to the language of the law, had churches *in title,* and had *beneficium eccleſiaſticum:* and of ſuch the canons ſpoke. But *vicars* did not then look upon themſelves to be bound by theſe canons, for they, as the gloſs upon the decretals ſpeaks, had not *eccleſiam quoad titulum*; and the text of the law deſcribes them, not as *having benefices,* but as bound *perſonis et eccleſiis deſervire,* that is, as aſſiſtant to the rector in his church.

Upon this notion a practice was founded, and prevailed in England, which eluded the canons made againſt pluralities. A man beneficed in one church could not accept another, without avoiding the firſt; but a man poſſeſſed of a benefice, could accept a vicarage under the rector in another church, for that was no benefice in law, and therefore not within the letter of the canon, which forbids any man holding two benefices.

The way then of taking a ſecond living in fraud of the canon was this: a friend was preſented, who took the inſtitution, and had the church *quoad titulum;* as ſoon as he was poſſeſſed, he conſtituted the perſon vicar for whoſe benefit he took the living, and by conſent of the dioceſan, allotted the whole profit of the living for the vicar's portion, except a ſmall matter reſerved to himſelf.

This vicar went and reſided upon his firſt living, for the canon reached him where he had the *benefice;* but having no benefice where he had only a vicarage, he thought himſelf ſecure againſt the ſaid canons requiring reſidence.

This piece of management gave occaſion to ſeveral papal decrees, and to the following conſtitution of archbiſhop Langton; *viz.* No ordinary ſhall admit any one to a vicarage, who will not perſonally officiate there. Lind. 64.

And to another conſtitution of the ſame archbiſhop, by which it is injoined, that vicars who will be non-reſident ſhall be deprived. Lind. 131.

But the abuſe ſtill continued, and therefore Otho, in his legatine conſtitutions, applied a ſtronger remedy, ordaining, That none ſhall be admitted to a vicarage, but who, renouncing all other benefices (if he hath any) with cure of ſouls, ſhall ſwear that he will make reſidence there, and ſhall conſtantly ſo reſide: otherwiſe his inſtitution ſhall be null, and the vicarage ſhall be given to another. Athon. 24.

And it is upon the authority of this conſtitution that the oath of reſidence is adminiſtered to vicars to this day. And this obligation of vicars to reſidence was further inforced by a conſtitution of Othobon, as followeth: If any ſhall detain a vicarage contrary to the aforeſaid conſtitution of Otho, he ſhall not appropriate to himſelf the profits thereof, but ſhall reſtore the ſame; one moiety whereof ſhall be applied to the uſe of that church, and the other moiety ſhall be diſtributed half to the poor of the pariſh, and half to the archdeacon. And the archdeacon ſhall make diligent inquiry every year, and cauſe this conſtitution to be ſtrictly obſerved. And if he ſhall find that any one detaineth a vicarage contrary to the premiſes, he ſhall forthwith notify to the ordinary that ſuch vicarage is vacant, who ſhall do what to him belongeth in the premiſes; and if the ordinary ſhall delay to inſtitute another into ſuch vicarage, he ſhall be ſuſpended from collation, inſtitution, or preſentation to any benefices until he ſhall comply. And if any one ſhall ſtrive to detain a vicarage contrary to the premiſes, and perſiſt in his obſtinacy for a month; he ſhall, beſides the penalties aforeſaid, be *ipſo facto* deprived of his other benefices (if he have any); and ſhall be diſabled for ever to hold ſuch vicarage, which he hath ſo vexatiouſly detained, and from obtaining any other benefice for three years. And if the archdeacon ſhall be remiſs in the premiſes, he ſhall be deprived of the ſhare of the aforeſaid penalty aſſigned to him, and be ſuſpended from the entrance of the church, until he ſhall perform his duty. Athon. 95.

So that, upon the whole, the doubt was not, whether rectors were obliged to reſidence; the only queſtion was, whether vicars were alſo obliged: and to inforce the reſidence

dence of vicars, in like manner as of rectors, the aforesaid constitutions were ordained. Sherl. ibid. p. 20, 21, 22.

By the 43 Geo. III. c. 84. no oath shall be required of or taken by any vicar in relation to residence on his vicarage. f. 37.

Can. 47. Every beneficed man licensed by the laws of this realm, upon urgent occasions of other service, not to reside upon his benefice, shall cause his cure to be supplied by a curate that is a sufficient and licensed preacher, if the worth of the benefice will bear it. But whosoever hath two benefices, shall maintain a preacher licensed in the benefice where he doth not reside, except he preach himself at both of them usually.

And by the last article of archbishop Wake's directions it is required, that the bishop shall take care, as much as possible, that whosoever is admitted to serve any cure, do reside in the parish where he is to serve; especially in livings that are able to support a resident cure: and where that cannot be done, that they do at at least reside so near to the place, that they may conveniently perform all their duties, both in the church and parish.

By the 36 Geo. III. c. 83. the ordinary, besides appointing to curates an allowance not exceeding 75*l. per ann.* may, on livings where the rector or vicar does not personally reside four months in the year at least, grant the use of the rectory or vicarage house, and the garden and stable thereto belonging, such use to be granted to the said curate for the space of twelve calendar months by the authority of the ordinary, under his hand and seal, with power in the said ordinary to renew and grant from time to time, or a further sum, not exceeding 15*l. per ann.* in lieu of such house, garden, and stable, in case there shall be none such, or it shall appear to him not to be convenient to allot and assign the same to such curate. Provided that the said house, garden, and stable, shall be for the use of the said curate and his family only during his *actual* residence in the said rectory and vicarage house. Provided also, that the ordinary shall have power at any time under his hand and seal, to revoke the grant to the said curate of the said house, garden, and stable, or any of them, and also to insert in such grant such terms and conditions to be observed on the part of the curate as he shall think reasonable.

By the faculty of dispensation, a pluralist is required, in that benefice from which he shall happen to be most absent, to preach thirteen sermons every year; and to exercise hospitality for two months yearly, and for that time, according to the fruits and profits thereof, as much as in him lieth, to support and relieve the inhabitants of that parish, especially the poor and needy.

By the 1 W. c. 26. if any person presented or nominated by either of the universities to a popish benefice with cure, shall be absent from the same above the space of sixty days in any one year; in such case, the said benefice shall become void. Burn's Eccl. Law, art. *Residence.*

Residence, in *Chemistry*, &c. the *settling*, or what remains of a liquor, or other substance, in the vessel after the chief part of it has been poured or taken out, to change the manner of the operation on what is left.

Residence, *Country*, in *Ornamental Gardening*, a rural habitation, mansion, or other kind of place, where it, as well as the ground which surrounds it, are formed and laid out in some sort of ornamental style. There have been a great many ways of accomplishing this proposed at different times, which have given rise to the variety of styles that have prevailed at different periods; but the *avowedly formal*, and the *affectedly graceful*, are the two which have been chiefly had recourse to, according to the writer of the "Treatise on Country Residences," before that of the free, characteristic, natural one, which he has suggested the introduction of; which is confined to no particular style or mode, but which furnishes and supplies beauties and effects which are suitable to the scene and situation, whatever the age or country may be from which they are borrowed, or by whatever epithets they may be called or known.

Suppose a piece of ground containing from four to five hundred acres, of which more than three hundred are to be formed into a residence; that a brook may pass through it, partly among meadows or wastes of copse and pasture, and partly along the hedge fences; that two farm-houses, some cottages, and belts of planting may likewise appear; that the farm-house in the centre is on the highest ground, which descends in varied and gentle slopes on every side to the margin of the brook, except toward a cluster of cottages upon the banks of it, where it abruptly terminates in a wooded precipice of rocks or gravel, or something of a similar kind.

The manner of forming a residence, in such a situation, according to the ancient formal style of a century ago, would, in the first place, have been to clear away every cottage, hedge, and tree; then to level down the precipice, and all irregularities. After which to form it into square fields and avenues, planting belts of trees between them. Two small woods would have been placed on each side of the house, and a large one near the garden. The water of the brook would have been introduced through a conduit, to an oblong canal; from that to two round basins in the central garden; thence to another oblong canal answering to the first. From that, under ground, as before, to two ponds in the large wood; after which to be carried by the side of the outer strip of plantation until it rejoined the former canal. The other parts are not very material. But it may be noticed that the surrounding fields would have nothing done to them, but the removal of the cottages, and the belt of planting, which would otherwise have closed the view from the avenue. The short avenues would probably be continued through the fields in single rows of trees.

And according to the affectedly graceful, or more modern style of Brown and his followers, the same portion of land would have been laid out by means of clearing, levelling, and smoothing the irregularities of the surface in the first instance, only leaving a single small cottage properly hidden by the belt of planting. The house would be built on the highest part of the ground. The whole of the offices sunk under or below it, with the exception of the stables; and the part of the house which is seen, in the form of a cube, with a large front, visible only on the side on which is the approach. The brook elevated upon the side of the rising ground, and formed into a still river, with cascades and islands, which are capable of being seen all round from the house. The park surrounded with a belt, inclosing a ride or drive within this, the whole diversified with clumps of various sizes, but mostly similar in shape. The park fed with deer, sheep, and cattle, and the more considerable spaces in the drive, with the whole of the pleasure ground, regularly mown. Buildings would be introduced in various places in the drives as well as the park. The approach and walks formed in different turns and windings, and the pleasure ground, and kitchen garden, in a regular manner, the latter mostly in the perfectly square form. From each of the drives, the approach, walks, and the pleasure ground, the objects of view are either the ornamental buildings or the mansion, vistas being made in all places from the one to the other; the belt excludes the whole of the distant country from the lower parts of the ground, and the clumps from the higher, as well as from the houfe. It may be fuppofed that nothing would be done to the furrounding country, only, perhaps, that in the place of the removed cottages, a formal ftreet, under the title of improved village, might be formed and raifed at a fuitable diftance from the manfion and its approach. It is fuggefted that numbers of places in this country, as well as in Scotland, are laid out nearly in this manner; and that the general paftures, the *belt*, the *clump*, the *tame* and *ftill* river, abound in both countries, and continue to be formed in the fame way, whatever may be the natural character of the fituation or place.

But according to the characteriftic or natural manner which the writer has advifed, fuch a fituation fhould be laid out fomewhat in this way. The houfe fhould be placed on the abrupt termination of the rifing grounds, the whole of the offices be brought more or lefs into view, each of fuch buildings being made low, irregular, and fuitable to the nature of the ground. The brook be rendered more characteriftic as fuch, by having little aits and iflands formed in it, as well as occafional pools, or ftagnated fpots of water, in the open parts, and under the fhade of the grove where not feen. Near the houfe, in the hollow, it fhould fpread out in the manner of a lake, being varied by prominences, iflands, and wood. The ftable offices, kitchen garden, and farm, fhould be placed near each other, and at no great diftance from the main refidence. The wood fhould be feen in one extenfive irregular mafs, crowning the large eminence, and connecting it with the lower grounds in which the brook runs. Inftead of furrounding the whole with a belt of planting, the borders of the park fhould every where blend in an irregular manner with the country; in fome places a hedge only, in others a funk fence, and in a few open paling fhould feparate it from the corn-fields; in different places large portions of it may be united to the country by means of hurdle fences, in which way more or lefs of it may be inclofed and let out to tenantry as thought proper. In this mode, the wood does not terminate abruptly with the park; but gradually lofes itfelf in fcattered trees, hedge-rows, and occafional ftrips among the corn lands of the neighbouring farms. Hence, it is fuggefted, arife the beauty of the views in walking round the outfide border of the park. An irregular village fhould be formed by fcattered cottages, wood, and pafture, from which the approach is led to the houfe; with a branch to the offices and the garden; the farm road is moftly concealed, but might often be partially feen with advantage. Walks fhould be formed in different parts of the grounds; thofe for morning and evening fhould be extenfive and open; thofe for noon wholly under the wood. They both afford confiderable variety, whether the beauty and wildnefs of the park, the views of the diftant corn-fields and hedge-rows, the village, the brook, or the different picturefque compofitions formed by the houfe and offices be regarded; without faying any thing concerning diftant profpect, which, in the other practice, is often loft by the belt, and at all events conftantly prevented from harmonizing with the park, by its dark diftant boundary. The cattle may be guarded and kept off from the front of the manfion by fome proper fort of fence, and a certain fpace along the border and rivulet be preferved as pleafure ground, in which exotic fhrubs and flowers may be planted in difperfed natural-like groups and thickets. The whole of the other parts of the ground may be fed with cattle, horfes, deer, and fheep, as well as other animals. The kitchen garden, in fuch a fituation, need not be fo large as in other cafes, as many culinary vegetables may be grown in other places, and the fields of the farm. Nor will an orchard be neceffary in many cafes, as a fufficient number of fruit-trees may be introduced in the groups, and pleafure-ground fcenery. There may, befides thefe, be fome other differences made, which need not be noticed in this place. A drive may be made through the park as thought proper, and through the furrounding country according to the circumftances of it as connected with the park. The planting in the park fhould abound with low growths and wildneffes, in the nature of the trees and the various maffes of wood in it.

The fame fpot of ground is difplayed as formed and laid out after thefe three different methods, in the work already alluded to, which may be confulted with much advantage by the inquirer on this head.

In comparing the leading diftinctions between the two latter of the above methods of forming and laying out rural refidences, or that followed by Brown, Repton, and others, and that which has been fuggefted by the writer; it is remarked that, in relation to the *whole*, the object of the *former* is to render a refidence feparate from the country; while the *latter*, or the characteriftic ftyle of forming, and the improvements propofed in refidences already formed on bad principles, tend to harmonize it. In relation to the parts, that fort of gardening forms and places every thing diftinctly and alone; while this groups and connects them with each other, and with the whole.

In what regards *wood*, the vulgar practice is, it is faid, to fhut out the country by a belt, and to vary the fpace within by the clumps: while that which is propofed tends to increafe the expreffion and character of the fituation or place, whatever part of the grounds it may direct to be wooded, whether in the middle or the boundaries; and inftead of fhutting out the country, the wood diverges in a gradual manner into hedge-rows, fo as to unite and harmonize it as much as poffible with the refidence.

In refpect to *buildings*, the former or common way is to conceal every thing except the manfion: while this, on the contrary, fhews every building, not as fingle objects, but as compound parts of the fcenery of the place.

In relation to *water*, the old or former plan is to produce quantity or extent of furface, and to render it as confpicuous as poffible: while the ftyle here propofed is to produce natural character.

In refpect to *ground*, the former or modern fyftem is to fmooth and form undulating furfaces: while that of this is to attend to natural character.

In what regards *parks*, modern landfcape gardening, it is faid, makes them fmooth and deftitute of under-growths, ferns, and other plants: while this, by introducing hollies, thorns, briars, ferns, and fometimes furze, broom, and brambles, gives them a wild foreft character, which is the great and main object of their formation and arrangement.

In refpect to *pleafure-ground*, the common mode, it is faid, is to form many acres of lawn, which are to be kept in prefervation at a great expence, while they produce nothing. The plan here propofed admits of more or lefs, according to circumftances and fituation, but generally forms little that is not grazed by fheep or covered by flowers, extenfive mowing being therefore never requifite, and it commonly permits the cattle to come within a fmall diftance of the refidence.

The difference of expence will, it is fuppofed, be very confiderable, as muft be evident from the general confideration of the difference between affifting what Nature has already begun, and counteracting her altogether. This will be fo whether it relates to the manfions, buildings, planting, water, gardens, farms, or pleafure-grounds. And there will be differences

differences of a minor nature on all these heads, as well as on many others.

The ideas respecting the latter of these methods of forming and laying out residences of this nature, have yet been but little put in practice, nor their union in the mind of any one person been such as to produce a distinct style in regard to them, except, perhaps, with the writer of the work before alluded to. They are, however, of considerable importance, and highly deserving of attention, not only as being founded on the principles of nature, but as according so well with the nature of rural scenery.

In chusing situations for residences of this description, it is advised, that attention should be particularly paid to such as are most convenient in what respects scite and position, as they relate to the adjoining country; that they should be the most striking which the grounds will afford; and that they should furnish the best views from the residences of the surrounding country which it is capable of supplying.

A perfect knowledge of what is deficient, and whether that which is wanted can be supplied by the proposed scite, or is wholly wanting, or some others deficient that cannot readily be afforded, will greatly contribute to the decision of the first point. And much assistance, in some respects, may often be derived from the neighbouring residences, especially as to climate, weather, springs, rivulets, roads, markets, and many other similar particulars; though they can mostly be ascertained with little trouble in other ways.

In regard to the next point, it is of very great importance, as the effect depends much upon it. Where the surfaces are only gently varied, some of the highest eminences may be mostly fixed upon for this purpose. But where they are varied in a high degree, and where a number of hills are within the proposed space: if such hills slope gently, some of their sides may commonly be selected for this use; or, when they are very steep, it may be upon some gentle rising or eminence near their bottom parts. Occasionally, where rivers pass through the grounds, it may be on some of their banks, where they are rendered interesting either by rocks, bends, or other similar means. Where there are lakes, the margins of them may be proper for the purpose, as producing good effects in such cases; and the rocky margins of the sea, in some instances, may be very suitable. Many other appropriate situations for this purpose might be noticed, but these may shew the nature of striking ones, and the means of selecting them.

The proper accomplishment of this object is very material, as any error in it may be highly injurious in various ways; while its being properly done saves expence, and at the same time affords a far superior effect, as is seen in a variety of instances.

In respect to the last matter, or that of the views towards the surrounding scenery being agreeable, it is supposed to be the best accomplished by the proper arrangement or disposition of the apartments of a residence. Where regularity is to prevail this cannot always be so easily done, but where the irregular is had recourse to, which should mostly be the case in this sort of residence, there can be little difficulty in effecting it, either by means of projections or recesses.

Thus, the breakfasting room should front a morning scene, and afford a prospect somewhat inviting to exercise throughout the day; the drawing room should have such a disposition as to display the effects of the setting sun, &c. In short, to every view, some object, it is supposed, should appear sufficiently striking to characterise it; as a hill, a spire, or some other thing of a similar nature; as, unless this be the case, too trifling an impression is left upon the mind. All these matters, it is supposed, are the best decided upon the particular spots where they should be marked out and left for the observations of others, with the view of their being afterwards finally settled. They should never be determined upon in the closet of the designer.

In forming residences of this nature, the style of the buildings should, in some measure, it is thought, be adapted to, or regulated by, the nature of the place, and the general growth of the trees in it; the forms of the particular trees which may be peculiar to it; the general character of the surrounding scenery; and the colour of the rocks, as well as of the ground. It is found that the more common sorts of trees, in their natural growth, whether single or in groups, deviate a little in their general form, and the delicacy of their parts, according as their situation may be. Thus, where much exposed, they are mostly broad and low, being more hardy, rough, and picturesque, than when covered with young shoots, which are comparatively soft, fresh, and beautiful. In high rocky spots and exposures, trees are much broken, or divided into parts, and distant from each other, but apparently firmly attached to the place; these are hardier than others, with much less softness and beauty. In low fertile plains, trees are mostly large and erect, throwing out their branches on all sides; the foliage is full and fresh; and the whole outline round, full, and flowing. When single in this sort of situation, the balance of the branches in the trees is better preserved, than in the contrary cases. Where vallies are confined between hills, trees grow high and upright, rarely broad, or putting forth many horizontal branches: the growth is quick; the shoots and foliage are tender and delicate; the trunk comparatively slender; and the whole trees more elegant and capable of graceful motions than in any of the former situations or aspects.

It is supposed that these different circumstances in the growth of trees may easily suggest styles of building somewhat analogous in their general magnitude, height, and finishing. On rocky exposed spots, where trees grow low and irregular; low irregular edifices in the castle style may be raised. In vallies, where they grow high and elegant, houses in the tower style, which implies much height, should commonly be had recourse to. In rich extended plains, buildings of the Grecian order, or such as are in a more massy and regular style than the others, should be formed. "This mode is," it is said, "certainly deserving of attention, were it for no other reason than that the trees might group well with the buildings; that when full grown they might neither be too large, nor too small; that they might neither diminish it into insignificance, nor leave it staring through trees, which, from want of due proportion to it, appear as copsewood." Many instances of these different evils are to be met with in different places.

And it is noticed, that this mode of fixing on the style of residences of this kind must be attended to, though trees be not growing on the situations at the time of forming and raising them. This is to be determined in such cases, by the nature of the climate and the qualities of the soil, as the growth of trees chiefly depends upon them.

With regard to the forms of trees, most places are capable of affording common ones, such as oaks, elms, beeches, and others of similar kinds. But there are many spots, where residences of this sort may be formed, that are only capable of raising certain descriptions to the state of trees. This frequently occurs in hilly and maritime situations; which therefore require the particular attention of the designer; as the kinds of trees that suit them are so very different from the ordinary sort, that if he were to be attempting to group with oaks and beeches, he might be grievoufly difappointed, as not any would probably grow, but fpiry larches, dark Scotch firs, birches, and mountain afh, or perhaps only ivy and elder. This may furnifh a variety of ufeful hints to the defigner, as well as others.

The general character of the furrounding fcenery is equally deferving of attention as the trees, and fhould concur in deciding on the ftyle of the refidence. It is a common notion that buildings fhould form ftrong contrafts to the works of nature, from which various ftyles of them have been fuggefted under different circumftances; but more full inquiry will fhew that very fudden contrafts are not found in general nature, though they may accidentally occur in fome cafes, confequently that they are highly improper to be ufed in this way.

With refpect to the colour of the rocks, and the ground, it is faid, that, not merely the general forms of the furface, but the appearances of the foil and the rocks, fhould deferve attention, as contributing greatly to promote the principle of harmony. The tints of rocks, ftones, gravel, and the foil, are moftly the fame in one part of the country. Where they agree with the colour of the refidence, the effect muft, it is fuppofed, be fingularly happy, as feen in the works of painters, as well as in the ancient refidences of the country kind. But where they difagree, it muft be difgufting, as is feen in many cafes of white-wafhing buildings in rocky fituations. This furnifhes hints which may be ufeful in managing that procefs to the moft advantage in other cafes; and others are likewife thrown out upon different matters, which are equally ufeful. But the defigner is cautioned againft carrying thefe, or any other notions, into the extreme, contrary to the common practice; as where the expreffion of gaiety, or ftriking beauty, is defirable, no reafons fuggefted from the colour of the rocks or foil are intended to hinder the production of thefe characters, if in general harmony with what furrounds them.

There are many other matters which relate to the fubject, that are forcibly pointed out, and the means of executing them well explained, in the work alluded to above, fuch as the methods of uniting refidences of this fort with the grounds by means of the offices and appendages of other kinds; and with the furrounding country or fcenery by the former, as well as by architectural appendages principally of the ornamental defcription. Alfo as to the modes of executing and finifhing them.

More full information on the whole of this fubject may be obtained from the above treatife, and the writings of Knight, Price, and others on the fame head.

RESIDENT, a public minifter, who manages the affairs of a king in the court of a prince, or petty ftate; or the affairs of a prince, or petty ftate, in the court of a king or prince.

Thus, the king of England has refidents in the courts of the electors, and other princes of Germany and Italy; at the republics of Genoa and Lucca; and they, reciprocally, have refidents in the court of Great Britain.

Refidents are a clafs of public minifters inferior to ambaffadors and envoys; but, like them, they are under the protection of the law of nations.

The refident does not reprefent the prince's perfon in his dignity, but only in his affairs. His reprefentation is in reality of the fame nature as that of the envoy; and he is accordingly, together with the envoy, often termed a minifter of the fecond order; and thus the public minifters are diftinguifhed only into two claffes; ambaffadors, who have the reprefentative character, fo termed by way of excellence, and all the minifters who are not invefted with that eminent character.

RESIDENT, *Refidens*, in our *Ancient Cuftoms*, was a tenant who was obliged to refide on his lord's land, and not to depart from the fame, called alfo *homme levant* and *couchant*, and in Normandy *reffeant du fief*.

"Quantumque de aliis teneat, ei magis obnoxius eft; & ejus refidens effe debet, cujus legius eft." Leg. H. I.

RESIDENTIARY, RESIDENTIARIUS, a canon inftalled to the privileges and profits of refidence.

RESIDUAL ANALYSIS, is a branch of algebra invented by Landen, and applied to the folution of thofe problems ufually folved by means of the differential and integral calculus, or the direct and inverfe method of fluxions; by which the ingenious author thought to be able to avoid the objections generally made to the new calculus under either of the above forms. With regard to the fluxional procefs, he thought it more free from objection than the differential calculus; although many important ones might be difcovered in it. However natural, fays the author, it may be, in certain problems, to confider fuch magnitudes as enter therein, to be generated by motion, it feems very unnatural to bring motion into confideration in the folution of queftions purely algebraical. Nor does it feem natural in the folution of problems concerning the motion of bodies, to fuperinduce imaginary motions, and thereby bring into confideration the velocity of time, the velocity of velocity, &c.; nor yet does it appear more natural, in the refolution of other problems, to make ufe of the fluxionary method, when (as is moft commonly the cafe in that doctrine) the fluxions introduced into the procefs can, only in a figurative fenfe, be faid to be the velocities of increafe of the quantities called their fluents; fuch figurative expreffions not being the natural language of analytics, but frequently, inftead of conveying clear and diftinct ideas, are confufedly employed in treating of quantities as generated by motion, which in reality cannot be conceived to be fo generated. That thefe are legal objections to the doctrine of fluxions we are not difpofed to deny; but it is now generally admitted, that the defect of the fluxionary calculus is by far lefs than that which has place in the refidual analyfis, which M. Landen was defirous of fubftituting for it. Indeed, we believe its defects were fo obvious, that few, if any, mathematicians were induced to make it the foundation of any of their inveftigations; and it would, therefore, be ufelefs for us to occupy our pages in explaining the principles on which the author refted his calculus. We fhall, therefore, merely obferve, that in this analyfis, a geometrical or phyfical problem is reduced to another purely algebraical; and the folution is then obtained without any fuppofition of motion, and without confidering quantities as compofed of infinitely fmall particles.

Inftead of finding the fluxion of a variable quantity, in the refidual analyfis, the author proceeds by taking the difference of the fame function of the variable, in two different ftates of that quantity, and expreffing the relation of this difference to the difference between the two ftates of the variable quantity itfelf. This relation, being firft expreffed generally, is then confidered in the cafe in which the difference of the two ftates of the variable quantity is equal to zero.

Thus when, in the fluxionary calculus, it would be neceffary to find the fluxion of fuch a quantity $v^{\frac{m}{r}}$, which is $\frac{m}{r} v^{\frac{m-r}{r}} \dot{v}$, M. Landen takes the quotient of $\frac{v^{\frac{m}{r}} - w^{\frac{m}{r}}}{v - w}$, when

when $v = w$, and finds it to be $\frac{m}{r} v^{\frac{m-r}{r}}$, as above; and in the ſame manner he determines what is commonly called the fluxions of a^x, x^x, log. x, &c.

The firſt book of the reſidual analyſis was publiſhed in 1764, which contains its application to a variety of algebraical inquiries, and in determining the tangents, evolutes, ordinates, points of contrary flexure, double and triple points, &c. And in the ſecond book it was intended to ſhew its application in a variety of mechanical and phyſico-geometrical inquiries; but, for ſome reaſon not known, that book was never publiſhed.

RESIDUAL *Figure*, in *Geometry*, the figure remaining after ſubtraction of a leſſer from a greater.

RESIDUAL *Root*, is a root compoſed of two parts or members, only connected together with the ſign $-$.

Thus, $a - b$, or $5 - 3$, is a reſidual root; and is ſo called, becauſe its true value is no more than its reſidue, or difference between the parts a and b, or 5 and 3.

RESIDUARY LEGATEE. See LEGATEE.

RESIDUE, RESIDUUM, the remainder or reliqua of an account, debt, or obligation.

RESIDUUM *of a Charge*, in *Electricity*, firſt diſcovered by Mr. Gralath, in Germany, in 1746, is that part of the charge that lay on the uncoated part of a Leyden phial, which doth not let go all its electricity at once; ſo that it is afterwards gradually diffuſed to the coating.

RESIDUUM *of an Inteſtate's Effects*. See INTESTATE. See alſo EXECUTOR, and *Reſiduary* LEGATEE.

RESIGNATION, in *Ethics*, is a moral virtue, which ſuperadds to patience a ſubmiſſive diſpoſition, reſpecting the intelligent cauſe of our uneaſineſs. It acknowledges both the power and the right of a ſuperior to afflict: it is uſually connected with a confidence in his juſtice, and indulges a hope alſo in ſome future exemption, and thus it oppoſes a fretful repining temper of mind.

RESIGNATION, *Reſignatio*, in the *Canon Law*, the ſurrender or giving up of a benefice into the hands of thoſe from whom it was received.

Reſignation is of equal import with *ſurrender;* only the former is reſtrained to ſpiritual benefices, and the latter to temporal offices or employments.

It is a maxim in the eccleſiaſtical law, that all reſignations muſt be made to ſome ſuperior (Gibſ. 822.); therefore a biſhop muſt reſign, not to the dean and chapter, but to his metropolitan, from whom he received confirmation and conſecration; but the archbiſhop can reſign to none but the king himſelf.

Reſignation muſt be made to the next immediate ſuperior, and not to the mediate; as of a church preſentative to the biſhop, and not to the metropolitan. (2 Roll. Abr. 358.) Donatives are not reſignable to the ordinary, but to the patron who hath power to admit; and if there be two patrons of a donative, and the incumbent reſign to one of them, it is good for the whole. Regularly, reſignation muſt be made in perſon, and not by proxy. It is uſually done either by perſonal appearance before the ordinary, or elſewhere before a public notary, by an inſtrument directed immediately to the ordinary, and atteſted by the ſaid notary, in order to be preſented to the ordinary by a proper perſon, who may pray his acceptance. No reſignation can be valid, till accepted by the proper ordinary; that is, no perſon appointed to a cure of ſouls can quit that cure, or diſcharge himſelf of it, but upon good motives, to be approved by the ſuperior who committed it to him; for it may be, that he would quit it for money, or to live idly, or the like. Nor is there any pretence to ſay, that the ordinary is obliged to accept; ſince the law hath appointed no known remedy if he will not accept, any more than he will not ordain. 1 Still. 334.

Lindwood makes a diſtinction in this caſe, between a cure of ſouls, and a ſine-cure. The reſignation of a ſine-cure, he thinks, is good immediately, without the ſuperior's conſent; becauſe none but he that reſigneth hath intereſt in that caſe: but where there is a cure of ſouls, it is otherwiſe, becauſe not he only hath intereſt, but others alſo unto whom he is bound to preach the word of God; wherefore, in this caſe, it is neceſſary that there be the ratification of the biſhop, or of ſuch other perſon as hath power by right or cuſtom to admit ſuch reſignation. (Gibſ. 823.) After acceptance of the reſignation, lapſe ſhall not run but from the time of notice given. The church, indeed, is void immediately upon acceptance, and the patron may preſent, if he pleaſe; but as to lapſe, the general rule that is here laid down is the general doctrine of all the books: inſomuch that if the biſhop, who accepted the reſignation, dies before notice given, the ſix months ſhall not commence till notice is given by the guardian of the ſpiritualities, or by the ſucceeding biſhop, with whom the act of reſignation is preſumed to remain. Gibſ. 283.

Reſignations are either *ſimple* or *conditional*.

RESIGNATIONS, *Simple* or *Pure*, are thoſe by which the incumbent ſtrips himſelf of all his right, abſolutely, and without any conditions, or reſerve of penſion. Theſe are made to the biſhop, or ordinary.

By the 31 Eliz. cap. 6. § 8. if any incumbent of any benefice, with cure of ſouls, ſhall corruptly reſign the ſame, or corruptly take for, or in reſpect of reſigning the ſame directly or indirectly, any penſion, ſum of money, or other benefit whatſoever; as well the giver, as the taker, ſhall loſe double the value of the ſum given or received; half to the queen, and half to him that ſhall ſue for the ſame. Before the ſtatute, the biſhop, in caſes of reſignation, might, and did frequently, aſſign a penſion, during life, out of the benefice reſigned, to the perſon reſigning. But by the aforeſaid act, no penſions whatſoever can be reſerved. But a man may bind himſelf by bond to reſign, and it is not unlawful. For bonds of reſignation, ſee SIMONY.

RESIGNATIONS *in Favour*, or *Conditionol Reſignations*, are ſuch as are only made on condition that ſuch other perſons ſhould be inveſted with them; ſo that the reſignations are null, unleſs the conditions be punctually executed. Theſe reſignations *in favorem* are not of above two hundred and fifty years ſtanding. Strong oppoſition was at firſt made to them, they being eſteemed a kind of ſucceſſion or tranſmiſſion of benefices, as of patrimonies belonging to a family. Accordingly, theſe reſignations are not made into the hands of the ordinary, or collator, as pure reſignations are, but to the collator paramount, who in the Romiſh church is the pope; there being a ſuſpicion of ſimony or other unlawful paction therein, where admitted of in prejudice to the lay patron.

RESIGNEE, in *Law*, the party to whom a thing is reſigned.

RESINS, in *Chemiſtry* and the *Arts*, peculiar inflammable compounds, furniſhed by ſome vegetables, and in ſome caſes by animals.

Agreeably to what we have obſerved under OILS, all bodies coming under the head of the latter, although perfect liquids in their ordinary ſtate, are ſuſceptible of a ſolid form, by long expoſure to the air, and more ſpeedily by expoſure to bodies furniſhing oxygen with facility. Thoſe oils we term fat oils, ſuch as olive, ſpermaceti, rape, &c. by treating with nitric acid, become ſolid like tallow, and poſſeſs

possess similar properties. The oils termed *drying*, such as linseed and nut-oil, by the presence of oxygen, assume a solid form, unlike the greasy substance afforded by the fat oils, and more like horn, or elastic gum (caoutchouc.) The volatile oils are susceptible of the same change, from liquidity to solidity, by the agency of oxygen; the result being resins, which differ from each other in nothing material, excepting their degrees of solidity, and their peculiar odour. If we are to conclude that every essential or volatile oil is capable of being converted into a resin, which is highly probable, the number of resins will be very great. Indeed the known species are vastly too numerous for our notice in this place: we shall, therefore, confine our attention to a few of the most particular resins, especially those which are valuable in the arts, and in medicine. Dr. Thomson gives the following list of resins, with the names of the vegetables from which they are obtained.

1. Turpentine of Chio, from the pistacia terebinthus.
2. Venice turpentine.
3. Strasburgh turpentine, from the common fir.
4. Pitch, from the pinus picea.
5. Elemi, from the amyris elemifera.
6. Mastic, from the pistacia lentiscus.
7. Sandarach, from the juniper.
8. Guaiac, from the guaiacum officinale.
9. Laudanum, from the cistus ladaniferus.
10. Dragon's blood, from the dracæna draco.
11. Balsam of Mecca, from the amyris opobalsamum.
12. Balsam of Copahu, from the copaifera officinalis.

To these may be added,

13. Balsam of Canada, from the pinus balsamea.
14. Guaiacum, from the lignum vitæ.
15. Copal, from the copallinum of North America.

Some of the resins are combined with benzoic acid, by which their properties are altered: of these are benzoin, balsam of Tolu, balsam of Peru, and storax.

Another class of these bodies are combined with gum, and hence have been called *gum resins*: of these are olibanum, galbanum, scammony, assafœtida, myrrh, ammoniac, aloes, and opium. They admit of analysis, either by separating the resinous part by alcohol, or the gummy part by water.

These latter substances are used in medicine. Some of the first class, or the pure resins, are used as cements; and their solution in alcohol constitutes a variety of useful varnishes.

Those resins which are distinguished by the name of balsams are said to be such as contain benzoic acid. It appears, however, they have also been distingushed for their liquidity, and from their excess of odour; so that at present the phrase appears to be very indefinite. See BALSAM.

The resins are of various degrees of consistence and hardness. The balsams of Canada and Mecca are thickish fluids: the former is often so liquid as to be spread with a brush, and is sometimes used for varnishing pictures. It gradually hardens, on exposure to the air, and ultimately may be rubbed with the hand without soiling.

Others of the resins become hard with very little exposure to the air, and are found in hard tears, sticking to the tree which affords it: of these are mastic, sandarach, and copal. Those which do not easily become solid may be obtained in that form, by distilling off the thin part. Resin and pitch are obtained in this way: the former is obtained by distilling turpentine, the latter by distilling tar. Tar is no other than turpentine contaminated with the soot, which is produced by the partial combustion employed for its extraction from the wood.

All the resins become harder by exposure to a moderate heat. It is upon this fact that the art of the japanner depends. If the surface to be japanned be covered with common tar only, and exposed to the temperature of 300° for a length of time, the coating becomes hard and infusible. At the same temperature, any other resin applied in the same way, would assume a similar hardness.

Some animals and minerals, as well as the vegetables, afford resins, or bodies very analogous to them. The concrete part of the bile of animals has most of the properties of a resin, and shell-lac is furnished from the insect called *coccus lacca*.

Ear-wax is also found to have the properties of a resin; and the substances well known as perfumes, castor, civet, and musk, are no other than animal resins. For the particular application of resins to *varnishing* and *japanning*, see those articles.

Resins are employed for many purposes. Those of the cheapest kind are used for torches, and to cover the outsides of ships and boats. The fine transparent resins compose varnishes. Many of them are employed medicinally: such are those which enter into the composition of ointments and plasters; or internally, as the resins of scammony, jalap, and turpeth, which are purgative. Other resins, the smell of which is agreeable, as benjamin and storax, are employed as perfumes.

RESIN, *Elastic*. See CAOUTCHOUC.

RESIN, *Mastic*. See MASTIC.

RESISTANCE, or RESISTING *Force*, in *Physics*, any power which acts in opposition to another, so as to destroy or diminish its effect.

Of resistance there are various kinds, arising from the various natures and properties of the resisting bodies, and governed by various laws: as the resistance of solids, the resistance of fluids, the resistance of the air, &c.

RESISTANCE *of Solids*, in *Mechanics*, is the force with which the quiescent parts of solid bodies oppose the motion of others contiguous to them.

Of this there are two kinds. The first, where the resisting, and the resisted parts, *i. e.* the moving and quiescent bodies, are only contiguous, and do not cohere; *i. e.* where they constitute separate bodies or masses.

This is what M. Leibnitz calls *resistance of the surface;* but which is now more commonly denominated friction; for the laws of which, see FRICTION.

The second case of resistance is where the resisting and resisted parts are not only contiguous, but cohere; *i. e.* are parts of the same continued body or mass; for the phenomena and laws of which, see COHESION.

To which we may also add, the resistance which takes place between surfaces of solids, when completely in contact, though not forming one and the same body, or the resistance they offer to separation, the particulars of which are treated of under the article ADHESION.

RESISTANCE *of the Fibres of solid Bodies, Theory of the.* To form an idea of this resistance or renitency of the parts, suppose a cylindrical body suspended vertically by one end. Here all its parts, being heavy, tend downwards, and endeavour to separate the two contiguous planes, where the body is the weakest; but all the parts resist this separation by the force with which they cohere, or are bound together. Here then are two opposite powers; *viz.* the weight of the cylinder, which tends to break it; and the force of cohesion of the parts, which resists the fracture.

If the base of the cylinder be increased without increasing its length, it is evident the resistance will be increased in the same ratio as the base; but the weight also increases in the same ratio: whence it is evident, that all cylinders of the ſame matter and length, whatever their baſes may be, have an equal reſiſtance, when vertically ſuſpended.

But if the length of the cylinder be increaſed, without increaſing its baſe, its weight is increaſed, while the reſiſtance or ſtrength remains the ſame: conſequently it is weakened by its additional length, and has a greater tendency to break.

Hence, to find the greateſt length a cylinder of any matter may have, to break with its own weight; it is only neceſſary to know what weight is juſt ſufficient to break another cylinder of the ſame baſe and matter: for the length of the required cylinder muſt be ſuch, that its weight may be equal to the weight of the firſt cylinder, together with the additional weight that was employed in producing the ſeparation.

Thus let l denote the firſt length of the cylinder, c its weight, g the given weight the lengthened cylinder is to bear, and w the leaſt weight that breaks the cylinder l, alſo x the length ſought: then as $l : x :: c : \frac{cx}{l} =$ the weight of the longeſt cylinder; and this, together with the given weight g, muſt be equal to $c + w$: hence then, $\frac{cx}{l} + g = c + w$; or $x = \frac{c + w - g}{c} l =$ the length ſought. When the cylinder is juſt to break with its own weight only, then $g = 0$, and the expreſſion is ſimply $x = \frac{c + w}{c} l$.

If one end of the cylinder were fixed horizontally into a wall, and the reſt ſuſpended thence, its weight and reſiſtance would then act in a different manner; and if it be broke by the action of its weight, the rupture would be at the end fixed into the wall. A circle or plane contiguous to the wall, and parallel to the baſe, and conſequently vertical, would be detached from the contiguous circle within the plane of the wall, and would deſcend. All the motion is performed on the loweſt extremity of the diameter, which remains immoveable, while the upper extremity deſcribes a quadrant of a circle, and till the circle, which before was vertical, become horizontal; *i. e.* till the cylinder be entirely broken.

In the fracture of the cylinder it is viſible two forces have acted, and the one has overcome the other: the weight of the cylinder, which aroſe from its whole maſs, has overcome the reſiſtance which aroſe from the largeneſs of the baſe; and as the centres of gravity are points in which all the forces, ariſing from the weights of the ſeveral parts of the ſame bodies, are conceived to be united, one may conceive the weight of the whole cylinder applied in the centre of gravity of its maſs, *i. e.* in a point in the middle of its axis: and the reſiſtance of the cylinder applied in the centre of gravity of its baſe, *i. e.* in the centre of the baſe; it being the baſe which reſiſts the fracture.

When the cylinder breaks by its own weight, all the motion is on an immoveable extremity of a diameter of the baſe. This extremity, therefore, is the fixed point of a lever, whoſe two arms are the radius of the baſe, and half the axis; and, of conſequence, the two oppoſite forces do not only act of themſelves, and by their abſolute force, but alſo by the relative force they derive from their diſtance with regard to the fixed point of the lever.

Hence it evidently follows, that a cylinder, *e. gr.* of copper, which, vertically ſuſpended, will not break by its own weight, if leſs than four hundred and eighty fathom long, will break with a leſs length in an horizontal ſituation; becauſe the length, in this latter caſe, contributes two ways to the fracture; both as it makes it of ſuch a weight, and as it is an arm of a lever to which the weight is applied. Hence, alſo, the ſmaller the baſe is, the leſs length or weight will ſuffice to break it; both becauſe the reſiſtance is really leſs, and becauſe it acts by a leſs arm of a lever.

Hence, to find the length a priſm will bear, when fixed in an horizontal poſition, before it breaks, either by its own weight, or by the addition of any adventitious weight; take any length of ſuch a priſm, and load it with weights till it break; then put

l = the length of this priſm,
c = its weight,
w = the weight that breaks it,
a = the diſtance of the weight w,
g = any given weight to be borne,
d = its diſtance,
x = the length required to break it.

Then $l : x :: c : \frac{cx}{l}$, the weight of the priſm x; and $\frac{cx}{l} \times \frac{1}{2} x = \frac{cx^2}{2l}$ = its momentum; alſo dg = the momentum of the weight g; $\frac{cx^2}{2l} + dg$ = momentum of the priſm x, and its additional weight g.

In like manner we have $\frac{1}{2} cl + aw$, for the momentum of the ſhorter priſm, together with the weight w.

Conſequently we obtain the following equation:

$$\frac{cx^2}{2l} + dg = \tfrac{1}{2} cl + aw;$$

from which is found $x = \sqrt{\frac{(aw + \frac{1}{2}cl - dg)\,2l}{c}}$, the length ſought, or that by which the cylinder will break with the weight g, at the diſtance d. If this laſt weight be nothing, or the length be required when the cylinder would juſt break with its own weight, then we ſhall have $dg = 0$, and the expreſſion becomes ſimply $x = \sqrt{\frac{(aw + \frac{1}{2}cl)\,2l}{c}}$.

If two cylinders of the ſame matter, having their baſes and lengths in the ſame proportion, be ſuſpended horizontally; it is evident, that the greater has more weight than the leſſer, both on account of its length, and of its baſe. But it hath leſs reſiſtance on account of its length, conſidered as a longer arm of a lever, and has only more reſiſtance on account of its baſe; therefore it exceeds the leſſer in its bulk and weight more than in reſiſtance, and conſequently it muſt break more eaſily.

Hence, we ſee why, upon making models and machines in ſmall, people are apt to be miſtaken as to the reſiſtance and ſtrength of certain horizontal pieces, when they come to execute their deſigns in large, by obſerving the ſame proportion as in the ſmall. Galileo's doctrine of reſiſtance, therefore, is no idle ſpeculation, but becomes applicable in architecture, and other arts.

The weight required to break a body, placed horizontally, being always leſs than that required to break it in a vertical ſituation; and this weight being to be greater or leſs, according to the ratio of the two arms of the lever, the whole theory is always reducible to this: *viz.* to find what part of the abſolute weight the relative weight is to be, ſuppoſing the figure of the body known; which indeed is neceſſary, becauſe it is the figure that determines the two centres of gravity, or the two arms of the lever. For if the body,

e. gr.

e. gr. were a cone, its centre of gravity would not be in the middle of its axis, as in the cylinder; and, if it were a ſemi-parabolical ſolid, neither would its centre of gravity be in the middle of its length or axis, nor the centre of gravity of its baſe in the middle of the axis of its baſe. But ſtill, whereſoever theſe centres fall in the ſeveral figures, the two arms of the lever are eſtimated accordingly.

It may be here obſerved, that if the baſe, by which the body is faſtened into the wall, be not circular, but, *e. gr.* parabolical, and the vertex of the parabola be at the top, the motion of the fracture will not be on an immoveable point, but on a whole immoveable line; which may be called the *axis of equilibrium;* and it is with regard to this that the diſtances of the centres of gravity are to be determined.

Now, a body horizontally ſuſpended, being ſuppoſed ſuch as that the ſmalleſt addition of weight would break it, there is an equilibrium between its poſitive and relative weight; and of conſequence thoſe two oppoſite powers are to each other reciprocally as the arms of the lever to which they are applied. On the other hand, the reſiſtance of a body is always equal to the greateſt weight which it will ſuſtain in a vertical ſituation, without breaking, *i. e.* is equal to its abſolute weight. Therefore, ſubſtituting the abſolute weight for the reſiſtance, it appears that the abſolute weight of a body, ſuſpended horizontally, is to its relative weight as the diſtance of its centre of gravity from the axis of equilibrium is to the diſtance of the centre of gravity of its baſe from the ſame axis.

The diſcovery of this important truth, at leaſt an equivalent to it, and to which this is reducible, we owe to Galileo. From this fundamental propoſition are eaſily deduced ſeveral conſequences; as, for inſtance, that, if the diſtance of the centre of gravity of the baſe from the axis of equilibrium be half the diſtance of the centre of gravity of the body, the relative weight will only be half the abſolute weight; and that a cylinder of copper, horizontally ſuſpended, whoſe length is double the diameter, will break, provided it weigh half what a cylinder of the ſame baſe, 4801 fathoms long, weighs.

On this theory of reſiſtance, which we owe to Galileo, M. Mariotte made a very ingenious remark, which gave birth to a new ſyſtem. Galileo ſuppoſes, that, where the body breaks, all the fibres break at once; ſo that the body always reſiſts with its whole abſolute force, or with the whole force that all its fibres have in the place where it is to be broke. But M. Mariotte, finding that all bodies, even glaſs itſelf, bend before they broke, ſhews that fibres are to be conſidered as ſo many little bent ſprings, which never exert their whole force till ſtretched to a certain point, and never break till entirely unbent. Hence, thoſe neareſt the axis of equilibrium, which is an immoveable line, are ſtretched leſs than thoſe farther off; and, of conſequence, employ a leſs part of their force.

This conſideration only takes place in the horizontal ſituation of the body: in the vertical, the fibres of the baſe all break at once; ſo that the abſolute weight of the body muſt exceed the united reſiſtance of all its fibres; a greater weight is, therefore, required here than in the horizontal ſituation; that is, a greater weight is required to overcome their united reſiſtance, than to overcome their ſeveral reſiſtances one after another. The difference between the two ſituations ariſes hence, that, in the horizontal, there is an immoveable point or line, as a centre of motion, which is not in the vertical.

Varignon has improved on the ſyſtem of M. Mariotte, and ſhewn, that, to Galileo's ſyſtem, it adds the conſideration of the centre of percuſſion. The compariſon of the centres of gravity with the centres of percuſſion afford a fine view, and ſet the whole doctrine in a moſt agreeable light.

In each ſyſtem, the baſe, by which the body breaks, moves on the axis of equilibrium, which is an immoveable line in the ſame baſe; but in the ſecond, the fibres of this baſe are continually ſtretching more and more, and that in the ſame ratio as they recede farther and farther from the axis of equilibrium; and, of conſequence, are ſtill exerting a greater and greater part of their whole force.

Theſe unequal extenſions, like all other forces, muſt have ſome common centre where they all meet, and with regard to which they make equal efforts on each ſide; and as they are preciſely in the ſame proportion as the velocities which the ſeveral points of a rod moved circularly would have to one another, the centre of extenſion of the baſe, by which the body breaks, or tends to break, muſt be the ſame with its centre of percuſſion. Galileo's hypotheſis, according to which the fibres are ſuppoſed to ſtretch equally, and break all at once, correſponds to the caſe of a rod moving parallel to itſelf, where the centre of extenſion or percuſſion does not appear, as being confounded with the centre of gravity.

The baſe of fraction being a ſurface, whoſe particular nature determines its centre of percuſſion, it is neceſſary that this ſhould be firſt known, to find on what point of the vertical axis of that baſe it is placed, and how far it is from the axis of equilibrium. Indeed, we know in the general, that it always acts with ſo much the more advantage as it is farther from it; becauſe it acts by a longer arm of a lever; and of conſequence it is the unequal reſiſtance of the fibres in M. Mariotte's hypotheſis, which produces the centre of percuſſion; but this unequal reſiſtance is greater or leſs, according as the centre of percuſſion is placed more or leſs high on the vertical axis of the baſe, in the different ſurfaces of the baſe of the fracture.

To expreſs this unequal reſiſtance, accompanied with all the variation it is capable of, regard muſt be had to the ratio between the diſtance of the centre of percuſſion from the axis of equilibrium, and the length of the vertical axis of the baſe. In which ratio, the firſt term, or the numerator, is always leſs than the ſecond, or the denominator; ſo that the ratio is always a fraction leſs than unity; and the unequal reſiſtance of the fibres in M. Mariotte's hypotheſis is ſo much the greater, or, which amounts to the ſame, approaches ſo much nearer to the equal reſiſtance in Galileo's hypotheſis, as the two terms of the ratio are nearer to an equality.

Hence it follows, that the reſiſtance of bodies in M. Mariotte's ſyſtem is to that in Galileo's, as the leaſt of the terms in the ratio is to the greateſt. Hence, alſo, the reſiſtance being leſs than what Galileo imagined, the relative weight muſt alſo be leſs; ſo that the proportion already mentioned between the abſolute and relative weight cannot ſubſiſt in the new ſyſtem, without an augmentation of the relative weight, or a diminution of the abſolute weight; which diminution is had by multiplying the weight by the ratio, which is always leſs than unity. This done, we find that the abſolute weight, multiplied by the ratio, is to the relative weight, as the diſtance of the centre of gravity of the body from the axis of equilibrium, is to the diſtance of the centre of gravity of the baſe of the fracture from the ſame axis: which is preciſely the ſame thing with the general formula given by M. Varignon for the ſyſtem of M. Mariotte. In effect, after conceiving the relative weight of a body, and its reſiſtance equal to its abſolute weight, as two contrary powers applied to the two arms of a lever, in the hypotheſis of Galileo, there needs nothing to convert it into

into that of M. Mariotte, but to imagine that the refiftance, or the abfolute weight, is become lefs, every thing elfe remaining the fame.

One of the moft curious, and perhaps the moft ufeful queftions in this refearch, is to find what figure a body muft have, that its refiftance may be equal in all its parts, whether it be loaded with an additional weight, or as only fuftaining its own weight.

To this end it is neceffary that fome part of it fhould be conceived to be cut off by a plane parallel to the fracture, fo that the momentum of the part retrenched, be to its refiftance in the fame ratio as the momentum of the whole is to its refiftance. Thefe four powers act by arms of levers peculiar to themfelves, and are proportional in the whole, and in each part, of a folid of equal refiftance. From this proportion Varignon deduces two folids, which fhall refift equally in all their parts, or be no more liable to break in one part than in another. Galileo had previoufly found one of thefe, which is that in which the fides are parabolical: the other, found by Varignon, is in the form of a trumpet, which is to be fixed into the wall by its greater end; fo that its magnitude or weight is always diminifhed in proportion as its length, or the arm of the lever by which it acts, is increafed. It is remarkable, that, however different the two fyftems may be, the folids of equal refiftance are the fame in both.

We cannot purfue the theory of refiftances to a greater length in the prefent article; but fhall confine ourfelves to exhibiting a general fynopfis of the moft important refults which have been drawn by different writers on this fubject, both practical and theoretical.

1. The refiftance of a beam, or bar, to a fracture, by a force acting laterally, is as the folid made by a fection of the beam in the place where the force is applied, into the diftance of its centre of gravity from the point or line where the breach will end.

2. In fquare beams, the lateral ftrengths are as the cubes of their breadths or depths.

3. In cylindric beams, the refiftances or ftrengths are as the cubes of the diameters.

4. In rectangular beams, the lateral ftrengths are conjointly as the breadths and fquares of the depths.

5. The lateral refiftances of any beams, whofe fections are fimilar figures and alike placed, are as the cubes of the like dimenfions of thofe figures.

6. The lateral ftrength of a beam, with its narrower face upwards, is to its ftrength with the broader face upwards, as the breadth of the broader face to the breadth of the narrower.

7. The lateral ftrengths of prifmatic beams of the fame materials, are as the areas of the fections, and the diftance of their centre of gravity, directly, and as their lengths and weights reciprocally.

8. When the beam is fixed at both ends, the fame property has place, except that, in this cafe, we muft confider the beam as only half the length of the former.

9. Cylinders and fquare prifms have their lateral ftrengths proportional to the cubes of their diameters, or depths, directly, and their lengths and weights inverfely.

10. Similar prifms and cylinders have their ftrength inverfely proportional to their linear dimenfions.

For other propofitions relative to the refiftance or ftrength of beams of various forms and in various pofitions, fee the article Strength *and Strefs of Materials*.

The following refults are wholly drawn from experiments on different fubftances, by Emerfon and other writers, by means of which the propofitions ftated in the preceding part of this article may be fubmitted to computation.

The relative Refiftances or Strengths of Wood and other Bodies.

	Proportional Refiftance.
Box, yew, plum-tree, oak	11
Elm, afh	$8\frac{1}{2}$
Walnut, thorn	$7\frac{1}{2}$
Red fir, hollin, elder, plane crab-tree, apple-tree	7
Beech, cherry-tree, hazel	$6\frac{2}{3}$
Alder, afp, birch, white fir, willow	6
Iron	107
Brafs	50
Bone	22
Lead	$6\frac{1}{2}$
Fine free-ftone	1

A cylindric rod of good clean fir, of an inch circumference, drawn in length, will bear at its extremity 400 lbs.; and a fpear of fir, of two inches diameter, will bear about feven ton weight. A rod of good iron, of an inch circumference, will bear nearly three ton weight. A good hempen rope, of an inch circumference, will bear 1000 lbs. at its extremity. Hence Emerfon concludes, that if a rod of fir, or a rope, or a rod of iron, of d inches diameter, were to lift a quarter of the extreme weight that they would fupport, then

The fir would bear $8\frac{1}{5}\ d^2$ hundred weight.
The rope - $22\ d^2$ ditto.
The iron - $6\frac{3}{4}\ d^2$ tons.

To thefe refults we may add, from the experiments and inveftigations of profeffor Robifon, that a prifm of white marble, an inch fquare and a foot long, bears about 500 lbs. And that, from the various authors he has collected, the cohefive force of a fquare inch of gold, when caft, is about 20,000 lbs.; of filver, 40,000 lbs.; caft iron from 40,000 to 60,000 lbs.; wrought iron from 60,000 to 90,000 lbs.; foft fteel, 12,000 lbs.; razor fteel, 15,000 lbs.; oak and beech, in the direction of their fibres, from 8000 to 17,000 lbs.; willow, 12,000 lbs.; cedar, 5000 lbs.; fir, 8000 lbs.; ivory, 16,000 lbs.; bone, 5000 lbs.; rope, 20,000 lbs. And a cylinder, an inch in diameter, loaded to one-fourth, will carry, if of iron, 135 cwt.; of rope, 22 cwt.; oak, 14 cwt.; and fir, 9 cwt.

The refiftance of fome metals is doubled, or tripled, by the operation of forging and wire-drawing; and the cohefive, as well as the repulfive, force of wood, is often increafed by moderate compreffion. Oak will *fufpend* much more than fir; but fir will *fupport* twice as much as oak; which difference is fuppofed to arife from the curvature of the fibres of oak; yet oak has been known to fupport, with fafety, more than two tons for every fquare inch. Stone will fupport from 250 to 850 thoufand pounds, on a foot fquare; brick, 300 lbs.; and fometimes they are practically made to fupport one-fixth as much. Stone is faid to be capable of bearing a much greater weight in that pofition in which it is found in the quarry, than in any other pofition. See Strength *of Materials*.

Resistance *of Fluids*, in *Hydroftatics*, is the force with which bodies, moving in fluid mediums, are impeded and retarded in their motion.

A body moving in a fluid is refifted from two caufes: the firft, the cohefion of the parts of the fluid. For a body, in its motion, feparating the parts of a liquid, muft overcome the force with which thofe parts cohere.

The fecond is the inertia, or inactivity of matter, by which

which a certain force is required to move the particles from their places, in order to let the body pafs.

The retardation from the firft caufe is always the fame in the fame fpace, the body remaining the fame, whatever be the velocity, that is, the refiftance is as the fpace run through in the fame time; in which ratio the velocity alfo increafes; and therefore the refiftance from the firft caufe is as the velocity itfelf.

The refiftance from the fecond caufe, when the fame body moves through different fluids with the fame velocity, follows the proportion of the matter to be removed in the fame time, which is as the denfity of the fluid.

When the fame body moves through the fame fluid with different velocities, this refiftance increafes in proportion to the number of particles ftruck in an equal time; which number is as the fpace run through in that time, that is, as the velocity. But it alfo increafes in proportion to the force with which the body ftrikes againft every part; which force is alfo as the velocity of the body; and therefore, if the velocity be triple, the refiftance is triple, from a triple number of parts to be removed. It is alfo triple from a ftroke three times ftronger againft every particle; therefore the whole refiftance is nine-fold, that is, as the fquare of the velocity. Hence, a body moved in a fluid is refifted partly in a ratio of the velocity, and partly in a duplicate ratio of it.

Hence, therefore, if d denotes the denfity of the fluid, v the velocity of the body, and a and b conftant co-efficients; then $a d v^2 + b v$ will be proportional to the whole refiftance to the fame body, moving with different velocities, in the fame direction through fluids of different denfities, but of the fame tenacity. But to take into confideration the different tenacities of fluids, let t denote the tenacity, or the cohefion of the parts of the fluid; then $a d v^2 + b t v$ will be as the faid whole refiftance.

The quantity of refiftance, however, arifing from the cohefion of the parts of the fluids, is very trifling with refpect to the other refiftance, except in very glutinous ones; and it alfo increafes in a much lower degree, being only as the velocity, while the other is as the fquare of the velocity. Hence then the term $b t v$ is very fmall, in refpect of the other term $a d v^2$, and, confequently, the refiftance is nearly as the latter term, or nearly as the fquare of the velocity: which formula has been employed by moft authors, and is, indeed, very nearly the truth in flow motions; but in very rapid ones it is far from correct, not fo much from the omiffion of the fmall term $b t v$, due to the cohefion; but from the want of the full counter preffure on the hinder part of the body, by which means a vacuum, either perfect or partial, is left behind the body in its motion; and alfo perhaps to fome compreffion or accumulation of the fluid againft the fore-part of the body. Therefore, in order to conceive the refiftance of fluids to a body moving in them, it is neceffary to diftinguifh between thofe fluids which, being compreffed by fome incumbent weight, perpetually clofe up the fpace behind the body in motion, without permitting, for an inftant, any vacuity to remain behind it; and thofe fluids which, not being fufficiently compreffed, the fpace left behind the moving body remains for fome time empty. Thefe differences, in the refifting fluids, will occafion very remarkable varieties in the laws of their refiftance, and are abfolutely neceffary to be confidered in the determination of the action of the air on fhot and fhells; for the air partakes of both thefe affections, according to the different velocities of the projected body.

In treating of thefe refiftances, the fluids may likewife be confidered as continued or difcontinued, that is, as having their particles contiguous, or as being feparated and unconnected, and alfo as either elaftic or non-elaftic.

If a fluid was fo conftituted, that all the particles compofing it were at fome diftance from each other, and there was no action between them, then the refiftance of a body moving in it would be eafily computed, from the quantity of motion communicated to thefe particles: for inftance, if a cylinder moved in fuch a fluid in the direction of its axis, it would communicate to the particles it met with a velocity equal to its own, and in its own direction, fuppofing that neither the cylinder, nor the parts of the fluid, were elaftic; whence, if the velocity and diameter of the cylinder be known, and alfo the denfity of the fluid, there would thence be determined the quantity of motion communicated to the fluid, which, action and re-action being equal, is the fame with the quantity loft by the cylinder, confequently the refiftance would be thereby afcertained.

In this kind of difcontinued fluid, the particles being detached from each other, every one of them can purfue its own motion in any direction, at leaft for fome time, independent of the neighbouring ones; wherefore, if inftead of a cylinder, moving in the direction of its axis, a body, with a furface oblique to its direction, be fuppofed to move in fuch a fluid, the motion which the parts of the fluid will hereby acquire, will not be in the direction of the refifted body, but perpendicular to its oblique furface; whence the refiftance to fuch a body will not be eftimated from the whole motion communicated to the particles of the fluid, but from that part of it only which is in the direction of the refifted body. In fluids then, where the parts are thus difcontinued from each other, the different obliquities of that furface, which goes foremoft, will occafion confiderable changes in the refiftance; although the fection of the folid, by a plane perpendicular to its direction, fhould in all cafes be the fame. And fir Ifaac Newton has particularly determined, that, in a fluid thus conftituted, the refiftance of a globe is but half the refiftance of a cylinder of the fame diameter, moving in the direction of its axis with the fame velocity.

But though the hypothefis of a fluid, thus conftituted, be of great ufe in explaining the nature of refiftances; yet, in reality, we know of no fuch fluid exifting in nature; all the fluids, with which we are converfant, are fo formed, that their particles either lie contiguous to each other, or at leaft act on each other in the fame manner as if they did; confequently, in thefe fluids, no one particle contiguous to the refifted body can be moved, without moving at the fame time a great number of others, fome of which will be diftant from it; and the motion thus communicated to a mafs of the fluid, will not be in any one determined direction, but will in each particle be different, according to the different manners in which it lies in contact with thofe from which it receives its impulfe; whence great numbers of the particles being diverted into oblique directions, the refiftance of the moving body, which will depend on the quantity of motion communicated to the fluid in its own direction, will neceffarily be different in quantity, from what it would be in the preceding fuppofition, and its eftimation becomes much more complicated and operofe.

If the fluid be compreffed by the incumbent weight of its upper parts, as all the fluids are with us, except at their very furface, and if the velocity of the moving body be much lefs than that with which the parts of the fluid would rufh into a void fpace, in confequence of their compreffion; it is evident, that in this cafe the fpace left by the moving body will be inftantaneoufly filled up by the fluid; and the

parts

parts of the fluid, againſt which the foremoſt part of the body preſſes in its motion, will, inſtead of being impelled forwards in the direction of the body, circulate in ſome meaſure towards the hinder part of it, thereby to reſtore the equilibrium, which the conſtant influx of the fluid behind the body would otherwiſe deſtroy; whence the progreſſive motion of the fluid, and conſequently the reſiſtance of the body, which depends on it, would be in this inſtance much leſs than in the hypotheſis, where each particle is ſuppoſed to acquire, from the ſtroke of the reſiſting body, a velocity equal to that with which the body moved, and in the ſame direction. Sir Iſaac Newton has determined, that the reſiſtance of a cylinder, moving in the direction of its axis, in ſuch a compreſſed fluid as we have here treated of, is but one-fourth part of the reſiſtance which the ſame cylinder would undergo, if it moved with the ſame velocity, in a fluid conſtituted in the manner deſcribed in the firſt hypotheſis, each fluid being ſuppoſed to be of the ſame denſity.

But again, it is not only in the quantity of their reſiſtance that theſe fluids differ, but likewiſe in the different manner in which they act on ſolids of different forms, moving in them. In the diſcontinued fluid, firſt deſcribed, the obliquity of the foremoſt ſurface of the moving body would diminiſh the reſiſtance; but in compreſſed fluids this holds not true, at leaſt not in any conſiderable degree; for the principal reſiſtance in compreſſed fluids ariſes from the greater or leſſer facility with which the fluid, impelled by the fore-part of the body, can circulate towards its hindermoſt part; and this being little, if at all, affected by the form of the moving body, whether it be cylindrical, conical, or ſpherical, it follows, that while the tranſverſe ſection of the body, and conſequently the quantity of impelled fluid is the ſame, the change of figure in the body will ſcarcely affect the quantity of its reſiſtance.

And this caſe, that is, the reſiſtance of a compreſſed fluid to a ſolid, moving in it with a velocity much leſs than what the parts of the fluid would acquire from their compreſſion; this caſe has been very fully conſidered by ſir Iſaac Newton, who has aſcertained the quantity of ſuch a reſiſtance according to the different magnitudes of the moving body, and the denſity of the fluid. But he very expreſsly informs us, that the rules he has laid down are not generally true, but upon a ſuppoſition that the compreſſion of the fluid be increaſed in the greater velocities of the moving body: however, ſome unſkilful writers, who have followed him, overlooking this caution, have applied his determination to bodies moving with all kinds of velocities, without attending to the different compreſſions of the fluids they are reſiſted by; and by this means they have accounted the reſiſtance of the air to muſket and cannon-ſhot, to be but one-third part of what it is found to be by experience.

It is indeed evident, that the reſiſting power of the medium muſt be increaſed, when the reſiſting body moves ſo faſt that the fluid cannot inſtantaneouſly preſs in behind it, and fill the deſerted ſpace; for when this happens the body will be deprived of the preſſure of the fluid behind it; which in ſome meaſure balanced its reſiſtance, and muſt ſupport on its fore-part the whole weight of a column of the fluid, independent of the motion it gives to the parts of the fluid; and beſides, the motion in the particles driven before the body, is, in this caſe, leſs affected by the compreſſion of the fluid, and conſequently they are leſs deflected from the direction in which they are impelled by the reſiſted ſurface; whence this ſpecies of reſiſtance approaches more and more to that deſcribed in the firſt hypotheſis, where each particle of the fluid being unconnected with the neighbouring ones, it purſues its own motion, in its own direction, without being interrupted or deflected by their contiguity; and therefore, as the reſiſtance of a diſcontinued fluid to a cylinder, moving in the direction of its axis, is four times greater than the reſiſtance of a fluid ſufficiently compreſſed of the ſame denſity; it follows, that the reſiſtance of a fluid, when a vacuity is left behind the moving body, may be nearly four times greater than that of the ſame fluid, when no ſuch vacuity is formed; for when a void ſpace is thus left, the reſiſtance approaches in its nature to that of a diſcontinued fluid.

This, then, may probably be the caſe in a cylinder moving in the ſame compreſſed fluid, according to the different degrees of its velocity; ſo that if it ſet out with a great velocity, and moves in the fluid till that velocity be much diminiſhed, the reſiſting power of the medium may be nearly four times greater in the beginning of its motion than in the end.

In a globe the difference will not be ſo great, becauſe, on account of its oblique ſurface, its reſiſtance in a diſcontinued medium is but about twice as much as in one properly compreſſed; for its oblique ſurface diminiſhes its reſiſtance in one caſe, and not in the other: however, as the compreſſion of the medium, even when a vacuity is left behind the moving body, may yet confine the oblique motion of the parts of the fluid, which are driven before the body, and as in an elaſtic fluid, as the air is, there will be ſome degree of condenſation in thoſe parts; it is highly probable, that the reſiſtance of a globe moving in a compreſſed fluid may greatly exceed the proportion of the reſiſtance to ſlow motions.

And as this increaſe of the reſiſting power of the medium will take place, when the velocity of the moving body is ſo great that a perfect vacuum is left behind it, ſo ſome degree of augmentation will be ſenſible in velocities much ſhort of this; for even when, by the compreſſion of the fluid, the ſpace left behind the body is inſtantaneouſly filled up; yet, if the velocity with which the parts of the fluid ruſh in behind, is not much greater than that with which the body moves, the ſame reaſons we have urged above, in the caſe of an abſolute vacuity, will hold in a leſs degree in this inſtance; and therefore we are not to ſuppoſe, that, in the increaſed reſiſtance which we have hitherto treated of, it immediately vaniſhes, when the compreſſion of the fluid is juſt ſufficient to prevent a vacuum behind the reſiſted body; but we muſt conſider it as diminiſhing only, according as the velocity with which the parts of the fluid follow the body, exceeds that with which the body moves.

Hence, then, we may conclude, that if a globe ſets out in a reſiſting medium, with a velocity much exceeding that with which the particles of the medium would ruſh into a void ſpace, in conſequence of their compreſſion, ſo that a vacuum is neceſſarily left behind the globe in its motion: the reſiſtance of this medium to the globe will be near three times greater, in proportion to its velocity, than what we are ſure, from ſir Iſaac Newton, would take place in a ſlower motion. We may alſo farther conclude, that the reſiſting power of the medium will gradually diminiſh as the velocity of the globe decreaſes, till at laſt, when it moves with a velocity which bears but a ſmall proportion to that with which the particles of the medium follow it, the reſiſtance becomes the ſame with what is aſſigned by ſir Iſaac Newton in the caſe of a compreſſed fluid.

And from this determination we ſee how falſe that poſition is, which aſſerts the reſiſtance of any medium to be in the duplicate proportion of the velocity of the reſiſted body;

body; for it is evident by what we have ſaid, that this can only be conſidered as nearly true in ſmall variations of velocity, and can never be applied in the comparing together of the reſiſtances to all velocities whatever, without the moſt enormous errors. See New Principles of Gunnery, by Mr. Robins, chap. 2. prop. 1. See RESISTANCE *of the Air*. See alſo PROJECTILE and GUNNERY.

Reſiſtance and retardation are uſed indifferently for each other, as being both in the ſame proportion, and the ſame reſiſtance always generating the ſame retardation. But, with regard to different bodies, the ſame reſiſtance frequently generates different retardations; the reſiſtance being as the quantity of motion, and the retardation as that of the celerity. For the difference and meaſure of the two, ſee RETARDATION.

The retardations from this reſiſtance may be compared together, by comparing the reſiſtance with the gravity or quantity of matter. Thus, let $v =$ the velocity; $a =$ the area of the face, or end of a cylinder; $n =$ the ſpecific gravity of the fluid; $g = 32\frac{1}{6}$ feet, the force of gravity; then the altitude due to the velocity v being $\frac{v^2}{2g}$, the whole reſiſtance, or motive force m, will be expreſſed by the following formulæ;

$$m = an \times \frac{v^2}{2g} = \frac{anv^2}{2g}; \text{ or } = \frac{anv^2s^3}{2g}:$$

the latter having place when the motion is not in a direction perpendicular to the plane or end, but is inclined to it at a given angle, whoſe ſine is s. For it is a known property, that, in this caſe, the reſiſtance varies as the cube of the ſine of the angle of inclination. If now w be made to denote the weight of the body, and f the retarding force; then, on the ſame principles, we derive

$$f = \frac{m}{w} = \frac{anv^2s^3}{2gw}.$$

If the body be a cylinder, moving in the direction of its axis, and the diameter of the baſe equal d, or radius r, and $\pi = 3.14159$, &c. then

$$f = \frac{m}{w} = \frac{\pi n d^2 v^2}{8gw} = \frac{\pi n r^2 v^2}{2gw}.$$

But when the cylinder moves in a direction perpendicular to its axis, then writing b for the height or length of the cylinder, we have

$$f = \frac{m}{w} = \frac{nv^2bd}{3gw} = \frac{nv^2br}{\frac{3}{2}gw}.$$

And when it moves obliquely to its axis, then writing s for the ſine of the angle of inclination, we have

$$f = \frac{nv^2rbs^3}{2g}\left\{1 - \frac{3s^2 - 1}{6} + \frac{3(s^2-1)^2}{40} + \frac{(s^2+5)(s^2-1)^3}{112} + \&c.\right\} + \frac{\pi n v^2 r^2}{2g}.(-s^2)^{\frac{1}{2}}$$

See Moore's Theory of Military Rockets.

If the body be a cone, then the ſame notation remaining, only writing s for the ſine of the angle of inclination of the ſide of the cone; then

$$f = \frac{m}{w} = \frac{\pi n d^2 v^2 s^2}{8gw} = \frac{\pi n r^2 v^2 s^2}{2gw}.$$

For, in this caſe, the inclination has no effect in reducing the ſection oppoſed to the reſiſtance of the fluid, this being the ſame as in the cylinder, and therefore will vary as s^2.

The ſame notation ſtill remaining, it is found, from a fluxional inveſtigation (ſee Gregory's Mechanics, vol. i.) that the reſiſtance of the body, when terminated with a hemiſpherical ſurface, is

$$f = \frac{m}{w} = \frac{\pi n d^2 v^2}{16gw} = \frac{\pi n r^2 v^2}{4gw}.$$

that is, half what it is when the end is a plane ſurface.

Hence the reſiſtance of a ſphere, when impelled through any fluid, is equal to half the direct reſiſtance to a great circle of it, or to a cylinder of the ſame diameter. Since $\frac{1}{6}\pi d^3$ is the magnitude of the globe, if N denotes its denſity, or ſpecific gravity, its weight $w = \frac{1}{6}\pi N d^3$; and, therefore, the retardive force becomes

$$f = \frac{m}{w} = \frac{\pi n v^2 d^2}{16gw} \times \frac{6}{\pi N d^3} = \frac{3nv^2}{8gNd} = \frac{v^2}{2gs},$$

where s is the ſpace deſcribed; for $2fgs = v^2$, by the law of accelerated or retarded motions. From which it appears, that the reſiſtance varies as the ſquare of the velocity directly, and as the diameter inverſely, all things elſe being the ſame; and hence the reaſon, why a large ball overcomes reſiſtance better than a ſmaller one.

James Bernouilli demonſtrates the following theorems, Acta Erud. Lipſ. for June 1693, p. 252, &c.

1. If an iſoſceles triangle be moved in a fluid according to the direction of a line perpendicular to its baſe; firſt, with the vertex foremoſt, and then with its baſe; the reſiſtances will be in the duplicate ratio of the baſe, and of the ſum of the legs.

2. The reſiſtance of a ſquare, moved according to the direction of its ſide, is to the reſiſtance of the ſame ſquare, moved with the ſame celerity in the direction of its diagonal, as the diagonal is to the ſide.

3. The reſiſtance of a circular ſegment, leſs than a ſemicircle, carried in a direction perpendicular to its baſis, when it goes with the baſe foremoſt, and when with its vertex foremoſt (the ſame direction and celerity continuing), is as the ſquare of the ſame diameter to the ſame, leſs one-third of the ſquare of the baſe of the ſegment. Hence, the reſiſtances of a ſemicircle, when its baſe and when its vertex go foremoſt, are to one another in a ſeſquialterate ratio.

4. A parabola moving in the direction of its axis, firſt with its baſis, and then its vertex foremoſt, has its reſiſtances as the tangent to an arc of a circle, whoſe diameter is equal to the parameter, and the tangent equal to half the baſis of the parabola.

5. The reſiſtances of an hyperbola and ellipſis, when the vertex and baſe go foremoſt, may be thus computed. Say, as the ſum (or difference) of the tranſverſe axis and latus rectum is to the tranſverſe axis, ſo is the ſquare of the latus rectum to the ſquare of the diameter of a certain circle; in which circle apply a tangent, equal to half the baſis of the hyperbola or ellipſe. Then ſay again, as the ſum (or difference) of the axis and parameter is to the parameter, ſo is the aforeſaid tangent to another right line. And farther, as the ſum (or difference) of the axis and parameter is to the axis, ſo is the circular arc correſponding to the aforeſaid tangent to another arc. This done, the reſiſtances will be as the tangent to the ſum (or difference) of the right line thus found, and the arc laſt mentioned.

6. In the general, the reſiſtances of any figure whatever, going now with its baſe foremoſt, and then with its vertex, are as the figures of the baſe to the ſum of all the cubes of the elements of the baſe, divided by the ſquares of the elements of the curve line.

All which rules may be of ufe in the conftruction of fhips, and in perfecting the art of navigation univerfally; as alfo for determining the figures of the balls of pendulums for clocks, &c.

RESISTANCE *of Fluid Mediums to the Motion of Falling Bodies.*—A body freely defcending in a fluid is accelerated by the refpective gravity of the body, which continually acts upon it, yet not equably, as in a vacuum: the refiftance of the fluid occafions a retardation, that is, a diminution of acceleration, which diminution increafes with the velocity of the body. Now there is a certain velocity, which is the greateft a body can acquire by falling; for if its velocity be fuch, that the refiftance arifing from it becomes equal to the refpective weight of the body, its motion can be no longer accelerated; for the motion here continually generated by the refpective gravity, will be deftroyed by the refiftance, and the body forced to go on equably. A body continually comes nearer and nearer to this greateft celerity, but can never attain to it.

When the denfities of a fluid body are given, the refpective weight of the body may be known; and by knowing the diameter of the body, it may be found from what height a body falling in vacuo can acquire fuch a velocity as that the refiftance in a fluid fhall be equal to that refpective weight, which will be that greateft velocity above-mentioned. If the body be a fphere, it is known, that a fphere is equal to a cylinder of the fame diameter, whofe height is two-third parts of that diameter; which height is to be increafed in the ratio in which the refpective weight of the body exceeds the weight of the fluid, in order to have the height of a cylinder of the fluid, whofe weight is equal to the refpective weight of the body; but if you double this height, you will have a height from which a body falling in vacuo acquires fuch a velocity as generates a refiftance equal to this refpective weight, and which therefore is the greateft velocity which a body can acquire, by falling in a fluid, from an infinite height. Lead is eleven times heavier than water; wherefore its refpective weight is to the weight of water, as ten to one; therefore a leaden ball, as appears from what has been faid, cannot acquire a greater velocity, in falling in water, than it would acquire in falling in vacuo, from a height of $13\frac{1}{3}$ of its diameters.

A body lighter than a fluid, and afcending in it by the action of the fluid, is moved exactly by the fame laws as a heavier body falling in the fluid. Wherever the body is placed, it is fuftained by the fluid, and carried up with a force equal to the difference between the weight of a quantity of the fluid of the fame bulk as the body, and the body itfelf; by which not only the action of gravity of the body is deftroyed; but the body is alfo carried upwards by a motion equably accelerated, in the fame manner as a body heavier than a fluid defcends by its refpective gravity: but the equability of the acceleration is deftroyed in the fame manner by the refiftance, in the afcent of a body lighter than the fluid, as it is deftroyed in the defcent of a body heavier.

When a body fpecifically heavier than a fluid is thrown in it, it is retarded upon a double account; on account of the gravity of the body, and on account of the refiftance of the fluid; confequently, a body rifes to a lefs height than it would rife to in vacuo with the fame celerity. But the defects of the height in a fluid from the height to which a body would rife in vacuo with the fame celerity, have a greater proportion to each other than the heights themfelves; and in lefs heights the defects are nearly as the fquares of the heights in vacuo.

In order to fubmit the above principles to accurate computation, we muft refer back to our preceding determination of the retardative force of a fluid to a body moving it, which we found to be

$$f = \frac{m}{w} = \frac{\pi n v^2 d^2}{16 g w} \times \frac{6}{\pi N d^3} = \frac{3 n v^2}{8 g N d} = \frac{v^2}{2 g s};$$

from the two latter terms of which we have $s = \frac{N}{n} \times \frac{4}{3} d$;

which is the fpace that would be defcribed by the globe, while its whole motion is generated or deftroyed by a conftant force, which is equal to the forces of refiftance, if no other force acted on the globe to continue its motion. And if the denfity of the fluid were equal to that of the globe, the refifting force is fuch as, acting conftantly on the globe without any other force, would generate or deftroy its motion in defcribing the fpace $\frac{4}{3}d$, or $\frac{4}{3}$ of its diameter, by that accelerating or retarding force.

Hence the greateft velocity that a ball will acquire by defcending in a fluid by means of its relative weight in that fluid, will be found by making the refifting force equal to that weight. For, after the velocity has arrived at fuch a degree, that the refifting force is equal to the weight that urges it, it will increafe no longer, and the globe will then continue to defcend with an uniform velocity.

Now N and n being the feparate fpecific gravities of the globe and fluid, $N - n$ will be the relative gravity of the globe in the fluid; and, therefore, $w = \frac{1}{6} \pi d^3 (N - n)$ is the weight by which it is urged, $m = \frac{\pi n v^2 d^2}{16 g}$ is the refiftance; confequently $\frac{\pi n v^2 d^2}{16 g} = \frac{1}{6} \pi d^3 (N - n)$ when the velocity becomes uniform; whence we obtain

$$v = \sqrt{\left(2 g \times \frac{4}{3} d \times \frac{N - n}{n}\right)}$$

for the uniform or greateft velocity of the globe.

Thus, for example, if a leaden ball one inch in diameter defcend in water, and in air of the fame denfity as at the earth's furface; the three fpecific gravities being, lead $= 11\frac{1}{3}$, water $= 1$, and air $= \frac{3}{2500}$; then

$$v = \sqrt{(2 \times 32\tfrac{1}{6} \times \frac{4}{36} \times 10\tfrac{1}{3})} = 8.5944 \text{ feet}$$

per fecond for the greateft velocity in water; and

$$v = \sqrt{\left(4 \times \frac{193}{12} \times \frac{4}{36} \times \frac{34}{3} \times \frac{2500}{3}\right)} = 259.82 \text{ feet}$$

per fecond for the greateft velocity in air.

But as this velocity, all other things being the fame, varies as $\sqrt{d}$; it follows that a ball of $\frac{1}{100}$th of an inch diameter would only acquire velocities $\frac{1}{10}$th of thofe given above. Hence it appears, how foon fmall bodies come to their greateft or uniform velocity in defcending in fluids, and how very fmall that velocity is; which explains the reafon of the flow precipitation of mud and fmall particles in water, as alfo why, in precipitations, the larger and grofs particles defcend fooneft and loweft.

It appears alfo, from the preceding formulæ, that where $N = n$, or the denfity of the body is equal to that of the fluid; then $N - n = 0$, and confequently the velocity and fpace are in this cafe both equal to zero, as they ought to be.

Again, when the body is lighter than the fluid, then $N - n$ becomes negative, and the motion and force both tend the contrary way; that is, the ball will afcend by the same laws by which, in the preceding case, the heavier body descended, as stated in the preceding part of this article.

Resistance *of the Air*, in *Pneumatics*, is the force with which the motion of bodies, particularly of projectiles, is retarded by the opposition of the air or atmosphere. See Gunnery.

The air being a fluid, the general laws of the resistance of fluids obtain in it, except that the different degrees of density, in the different stages or regions of the atmosphere, occasion some irregularity.

As to the resistance of the air, it has been thus determined from experiments. Mr. Robins, in his New Principles of Gunnery, chap. 2. prop. 2, &c. having taken a musket barrel, and charging it successively with a leaden ball of three-quarters of an inch diameter, and about half its weight of powder, and taking such precaution in weighing of the powder, and placing it, as to be sure, by many previous trials, that the velocity of the ball could not differ by 20 feet in 1″ from its medium quantity, fired it against a pendulum, called the ballistic pendulum, (described under Gunnery), placed at 25 feet, at 75 feet, and at 125 feet distance from the mouth of the piece respectively. In the first case, it impinged against the pendulum with a velocity of 1670 feet in 1″; in the second case, with a velocity of 1550 feet in 1″; and in the third case, with a velocity of 1425 feet in 1″; so that in passing through 50 feet of air, the bullet lost a velocity of about 120 or 125 feet in 1″; and the time of its passing through that space being about $\frac{1}{33}$d or $\frac{1}{30}$th of 1″, the medium quantity of resistance must, in these instances, have been about 120 times the weight of the ball; which, as the ball was nearly $\frac{1}{12}$th of a pound, amounts to about 10lbs. avoirdupois.

Now, if a computation be made, according to the method laid down for compressed fluids, in the 38th propos. of lib. ii. of sir Isaac Newton's Principia, supposing the weight of water to be to the weight of air as 850 to 1, it will be found that the resistance of a globe of three-quarters of an inch diameter, moving with a velocity of about 1600 feet in 1″, will not, on those principles, amount to any more than a force of $4\frac{1}{6}$lbs. avoirdupois; whence we may conclude, the rules in that proposition for slow motions being very accurate, that the resisting power of the air in slow motions is less than in swift motions, in the ratio of $4\frac{1}{6}$ to 10, a proportion between that of 1 to 2, and 1 to 3.

Again, charging the same piece with equal quantities of powder, and balls of the same weight, and firing three times at the pendulum, placed at 25 feet distance from the mouth of the piece, the medium of the velocities with which the ball impinged was nearly that of 1690 feet in 1″. Then removing the piece 175 feet from the pendulum, the velocity of the ball, at a medium of five shots, was that of 1300 feet in 1″. Whence the ball, in passing through 150 feet of air, lost a velocity of about 390 feet in 1″; and the resistance, computed from these numbers, gives something more than in the preceding instance, amounting to between 11 and 12 pounds avoirdupois: whence, according to these experiments, the resisting power of the air to swift motions is greater than in slow ones, in a ratio which approaches nearer to the ratio of 3 to 1, than in the preceding experiments. Next, to examine this resistance in smaller velocities, the pendulum being placed at 25 feet distance, was fired at five times, with an equal charge each time, and the mean velocity with which the ball impinged, was that of 1180 feet in 1″. Then removing the pendulum to the distance of 250 feet, the medium velocity of five shot, at this distance, was that of 950 feet in 1″; whence the ball, in passing through 225 feet of air, lost a velocity of 230 feet in 1″, and as it passed through that interval in about $\frac{3}{13}$ths of 1″, the resistance to the middle velocity will come out to be near $33\frac{1}{2}$ times the gravity of the ball, or 2lb. 10oz. avoirdupois. Now the resistance to the same velocity, according to the laws observed in slower motions, amounts to $\frac{7}{11}$ths of the same quantity; whence, in a velocity of 1065 feet in 1″ (the medium of 1180 and 950), the resisting power of the air is augmented in no greater proportion than that of 7 to 11; whereas, in greater degrees of velocity, as before, it amounted very nearly to the ratio of 1 to 3.

By other experiments, it appears, that the resistance of the air is very sensibly increased, even in so small a velocity as that of 400 feet in 1″.

That this resisting power of the air to swift motions is very sensibly increased beyond what sir Isaac's theory for slow motions makes it, seems hence to be evident. It being, as has been said, in musket, or cannon shot, with their full charge of powder, nearly three times the quantity assigned by that theory.

However, this increased power of resistance diminishes as the velocity of the resisted body diminishes, till at length, when the motion is sufficiently abated, the actual resistance coincides with that supposed in the theory.

The resistance of a bullet of three-quarters of an inch diameter, moving in air with the velocity of 1670 feet in 1″, amounting, as we said, to 10lbs., the resistance of a cannon ball of 24lbs., fired with 16lbs., or its full charge of powder, and thereby moving with a velocity of 1650 feet in 1″, (which scarcely differs from the other), may hence be determined. For the velocity of the cannon ball being nearly the same as the musket bullet, and its surface above 54 times greater, it follows, that the resistance on the cannon ball will amount to more than 540lbs. which is nearly 23 times its own weight.

Euler has shewn, that the common doctrine of resistance answers very well when the motion is not very swift, but in very swift motions it gives the resistance less than it ought to be, on two accounts. 1. Because in very quick motions the air does not fill up the space behind the body fast enough to press on the hinder parts, that the resistance on the fore part is increased. 2. The density of the air before the ball, being increased by the quick motion, will press more strongly on the fore part, and, being heavier than in its natural state, will retard its motion.

He has also shewn, that Mr. Robins has restrained his rule to velocities not exceeding 1670 feet in 1″; whereas, had he extended it to greater velocities, the result must have been erroneous: as he apprehends that it is not perfectly exact, when the motion is not extremely swift. He has investigated a formula for determining the degree of this resistance, and deduced conclusions differing from those of Mr. Robins. See Principles of Gunnery investigated, &c. 1777, p. 224, &c.

Mr. Robins having proved that, in very great changes of velocity, the resistance does not accurately follow the duplicate proportion of the velocity, lays down two positions, which may be of considerable service in the practice of artillery, till a more complete and accurate theory of resistance, and the changes of its augmentation, may be obtained. The first of these is, that till the velocity of the projectile surpasses that of 1100 feet in a second, the resistance may be esteemed to be in the duplicate proportion of the velocity: and the second is, that if the velocity be greater than that of 1100 or 1200 feet in a second, the absolute quantity of the resistance will be nearly three times as great as it should be by a comparison with the smaller velocities. Upon these principles, he proceeds in approximating the actual ranges of pieces with small angles of elevation, *viz.* such as do not exceed 8° or 10°, which he sets down in a table, compared with their corresponding potential ranges. See his Mathematical Tracts, vol. i. p. 179, &c.

Since

All which rules may be of ufe in the conftruction of fhips, and in perfecting the art of navigation univerfally; as alfo for determining the figures of the balls of pendulums for clocks, &c.

Resistance *of Fluid Mediums to the Motion of Falling Bodies.*—A body freely defcending in a fluid is accelerated by the refpective gravity of the body, which continually acts upon it, yet not equably, as in a vacuum: the refiftance of the fluid occafions a retardation, that is, a diminution of acceleration, which diminution increafes with the velocity of the body. Now there is a certain velocity, which is the greateft a body can acquire by falling; for if its velocity be fuch, that the refiftance arifing from it becomes equal to the refpective weight of the body, its motion can be no longer accelerated; for the motion here continually generated by the refpective gravity, will be deftroyed by the refiftance, and the body forced to go on equably. A body continually comes nearer and nearer to this greateft celerity, but can never attain to it.

When the denfities of a fluid body are given, the refpective weight of the body may be known; and by knowing the diameter of the body, it may be found from what height a body falling in vacuo can acquire fuch a velocity as that the refiftance in a fluid fhall be equal to that refpective weight, which will be that greateft velocity above-mentioned. If the body be a fphere, it is known, that a fphere is equal to a cylinder of the fame diameter, whofe height is two-third parts of that diameter; which height is to be increafed in the ratio in which the refpective weight of the body exceeds the weight of the fluid, in order to have the height of a cylinder of the fluid, whofe weight is equal to the refpective weight of the body; but if you double this height, you will have a height from which a body falling in vacuo acquires fuch a velocity as generates a refiftance equal to this refpective weight, and which therefore is the greateft velocity which a body can acquire, by falling in a fluid, from an infinite height. Lead is eleven times heavier than water; wherefore its refpective weight is to the weight of water, as ten to one; therefore a leaden ball, as appears from what has been faid, cannot acquire a greater velocity, in falling in water, than it would acquire in falling in vacuo, from a height of $13\frac{1}{3}$ of its diameters.

A body lighter than a fluid, and afcending in it by the action of the fluid, is moved exactly by the fame laws as a heavier body falling in the fluid. Wherever the body is placed, it is fuftained by the fluid, and carried up with a force equal to the difference between the weight of a quantity of the fluid of the fame bulk as the body, and the body itfelf; by which not only the action of gravity of the body is deftroyed; but the body is alfo carried upwards by a motion equably accelerated, in the fame manner as a body heavier than a fluid defcends by its refpective gravity: but the equability of the acceleration is deftroyed in the fame manner by the refiftance, in the afcent of a body lighter than the fluid, as it is deftroyed in the defcent of a body heavier.

When a body fpecifically heavier than a fluid is thrown in it, it is retarded upon a double account; on account of the gravity of the body, and on account of the refiftance of the fluid; confequently, a body rifes to a lefs height than it would rife to in vacuo with the fame celerity. But the defects of the height in a fluid from the height to which a body would rife in vacuo with the fame celerity, have a greater proportion to each other than the heights themfelves; and in lefs heights the defects are nearly as the fquares of the heights in vacuo.

In order to fubmit the above principles to accurate computation, we muft refer back to our preceding determination of the retardative force of a fluid to a body moving it, which we found to be

$$f = \frac{m}{w} = \frac{\pi n v^2 d^2}{16 g w} \times \frac{6}{\pi N d^3} = \frac{3 n v^2}{8 g N d} = \frac{v^2}{2 g s};$$

from the two latter terms of which we have $s = \frac{N}{n} \times \frac{4}{3} d$;

which is the fpace that would be defcribed by the globe, while its whole motion is generated or deftroyed by a conftant force, which is equal to the forces of refiftance, if no other force acted on the globe to continue its motion. And if the denfity of the fluid were equal to that of the globe, the refifting force is fuch as, acting conftantly on the globe without any other force, would generate or deftroy its motion in defcribing the fpace $\frac{4}{3}d$, or $\frac{4}{3}$ of its diameter, by that accelerating or retarding force.

Hence the greateft velocity that a ball will acquire by defcending in a fluid by means of its relative weight in that fluid, will be found by making the refifting force equal to that weight. For, after the velocity has arrived at fuch a degree, that the refifting force is equal to the weight that urges it, it will increafe no longer, and the globe will then continue to defcend with an uniform velocity.

Now N and n being the feparate fpecific gravities of the globe and fluid, $N - n$ will be the relative gravity of the globe in the fluid; and, therefore, $w = \frac{1}{6} \pi d^3 (N - n)$ is the weight by which it is urged, $m = \frac{\pi n v^2 d^2}{16 g}$ is the refiftance; confequently $\frac{\pi n v^2 d^2}{16 g} = \frac{1}{6} \pi d^3 (N - n)$ when the velocity becomes uniform; whence we obtain

$$v = \sqrt{\left(2 g \times \frac{4}{3} d \times \frac{N - n}{n}\right)}$$

for the uniform or greateft velocity of the globe.

Thus, for example, if a leaden ball one inch in diameter defcend in water, and in air of the fame denfity as at the earth's furface; the three fpecific gravities being, lead $= 11\frac{1}{3}$, water $= 1$, and air $= \frac{3}{2500}$; then

$$v = \sqrt{(2 \times 32\tfrac{1}{6} \times \frac{4}{36} \times 10\tfrac{1}{3})} = 8.5944 \text{ feet}$$

per fecond for the greateft velocity in water; and

$$v = \sqrt{\left(4 \times \frac{193}{12} \times \frac{4}{36} \times \frac{34}{3} \times \frac{2500}{3}\right)} = 259.82 \text{ feet}$$

per fecond for the greateft velocity in air.

But as this velocity, all other things being the fame, varies as $\sqrt{d}$; it follows that a ball of $\frac{1}{100}$th of an inch diameter would only acquire velocities $\frac{1}{10}$th of thofe given above. Hence it appears, how foon fmall bodies come to their greateft or uniform velocity in defcending in fluids, and how very fmall that velocity is; which explains the reafon of the flow precipitation of mud and fmall particles in water, as alfo why, in precipitations, the larger and grofs particles defcend fooneft and loweft.

It appears alfo, from the preceding formulæ, that where $N = n$, or the denfity of the body is equal to that of the fluid; then $N - n = 0$, and confequently the velocity and fpace are in this cafe both equal to zero, as they ought to be.

Again, when the body is lighter than the fluid, then $N - n$ becomes negative, and the motion and force both tend the contrary way; that is, the ball will afcend by the ſame laws by which, in the preceding caſe, the heavier body deſcended, as ſtated in the preceding part of this article.

Resistance *of the Air*, in *Pneumatics*, is the force with which the motion of bodies, particularly of projectiles, is retarded by the oppoſition of the air or atmoſphere. See Gunnery.

The air being a fluid, the general laws of the reſiſtance of fluids obtain in it, except that the different degrees of denſity, in the different ſtages or regions of the atmoſphere, occaſion ſome irregularity.

As to the reſiſtance of the air, it has been thus determined from experiments. Mr. Robins, in his New Principles of Gunnery, chap. 2. prop. 2, &c. having taken a muſket barrel, and charging it ſucceſſively with a leaden ball of three-quarters of an inch diameter, and about half its weight of powder, and taking ſuch precaution in weighing of the powder, and placing it, as to be ſure, by many previous trials, that the velocity of the ball could not differ by 20 feet in 1″ from its medium quantity, fired it againſt a pendulum, called the balliſtic pendulum, (deſcribed under Gunnery), placed at 25 feet, at 75 feet, and at 125 feet diſtance from the mouth of the piece reſpectively. In the firſt caſe, it impinged againſt the pendulum with a velocity of 1670 feet in 1″; in the ſecond caſe, with a velocity of 1550 feet in 1″; and in the third caſe, with a velocity of 1425 feet in 1″; ſo that in paſſing through 50 feet of air, the bullet loſt a velocity of about 120 or 125 feet in 1″; and the time of its paſſing through that ſpace being about $\frac{1}{32}$d or $\frac{1}{30}$th of 1″, the medium quantity of reſiſtance muſt, in theſe inſtances, have been about 120 times the weight of the ball; which, as the ball was nearly $\frac{1}{17}$th of a pound, amounts to about 10lbs. avoirdupois.

Now, if a computation be made, according to the method laid down for compreſſed fluids, in the 38th propoſ. of lib. ii. of ſir Iſaac Newton's Principia, ſuppoſing the weight of water to be to the weight of air as 850 to 1, it will be found that the reſiſtance of a globe of three-quarters of an inch diameter, moving with a velocity of about 1600 feet in 1″, will not, on thoſe principles, amount to any more than a force of $4\frac{1}{6}$lbs. avoirdupois; whence we may conclude, the rules in that propoſition for ſlow motions being very accurate, that the reſiſting power of the air in ſlow motions is leſs than in ſwift motions, in the ratio of $4\frac{1}{6}$ to 10, a proportion between that of 1 to 2, and 1 to 3.

Again, charging the ſame piece with equal quantities of powder, and balls of the ſame weight, and firing three times at the pendulum, placed at 25 feet diſtance from the mouth of the piece, the medium of the velocities with which the ball impinged was nearly that of 1690 feet in 1″. Then removing the piece 175 feet from the pendulum, the velocity of the ball, at a medium of five ſhots, was that of 1300 feet in 1″. Whence the ball, in paſſing through 150 feet of air, loſt a velocity of about 390 feet in 1″; and the reſiſtance, computed from theſe numbers, gives ſomething more than in the preceding inſtance, amounting to between 11 and 12 pounds avoirdupois: whence, according to theſe experiments, the reſiſting power of the air to ſwift motions is greater than in ſlow ones, in a ratio which approaches nearer to the ratio of 3 to 1, than in the preceding experiments. Next, to examine this reſiſtance in ſmaller velocities, the pendulum being placed at 25 feet diſtance, was fired at five times, with an equal charge each time, and the mean velocity with which the ball impinged, was that of 1180 feet in 1″. Then removing the pendulum to the diſtance of 250 feet, the medium velocity of five ſhot, at this diſtance, was that of 950 feet in 1″; whence the ball, in paſſing through 225 feet of air, loſt a velocity of 230 feet in 1″, and as it paſſed through that interval in about $\frac{3}{14}$ths of 1″, the reſiſtance to the middle velocity will come out to be near $33\frac{1}{2}$ times the gravity of the ball, or 2lb. 10oz. avoirdupois. Now the reſiſtance to the ſame velocity, according to the laws obſerved in ſlower motions, amounts to $\frac{7}{11}$ths of the ſame quantity; whence, in a velocity of 1065 feet in 1″ (the medium of 1180 and 950), the reſiſting power of the air is augmented in no greater proportion than that of 7 to 11; whereas, in greater degrees of velocity, as before, it amounted very nearly to the ratio of 1 to 3.

By other experiments, it appears, that the reſiſtance of the air is very ſenſibly increaſed, even in ſo ſmall a velocity as that of 400 feet in 1″.

That this reſiſting power of the air to ſwift motions is very ſenſibly increaſed beyond what ſir Iſaac's theory for ſlow motions makes it, ſeems hence to be evident. It being, as has been ſaid, in muſket, or cannon ſhot, with their full charge of powder, nearly three times the quantity aſſigned by that theory.

However, this increaſed power of reſiſtance diminiſhes as the velocity of the reſiſted body diminiſhes, till at length, when the motion is ſufficiently abated, the actual reſiſtance coincides with that ſuppoſed in the theory.

The reſiſtance of a bullet of three-quarters of an inch diameter, moving in air with the velocity of 1670 feet in 1″, amounting, as we ſaid, to 10lbs., the reſiſtance of a cannon ball of 24lbs., fired with 16lbs., or its full charge of powder, and thereby moving with a velocity of 1650 feet in 1″, (which ſcarcely differs from the other), may hence be determined. For the velocity of the cannon ball being nearly the ſame as the muſket bullet, and its ſurface above 54 times greater, it follows, that the reſiſtance on the cannon ball will amount to more than 540lbs. which is nearly 23 times its own weight.

Euler has ſhewn, that the common doctrine of reſiſtance anſwers very well when the motion is not very ſwift, but in very ſwift motions it gives the reſiſtance leſs than it ought to be, on two accounts. 1. Becauſe in very quick motions the air does not fill up the ſpace behind the body faſt enough to preſs on the hinder parts, that the reſiſtance on the fore part is increaſed. 2. The denſity of the air before the ball, being increaſed by the quick motion, will preſs more ſtrongly on the fore part, and, being heavier than in its natural ſtate, will retard its motion.

He has alſo ſhewn, that Mr. Robins has reſtrained his rule to velocities not exceeding 1670 feet in 1″; whereas, had he extended it to greater velocities, the reſult muſt have been erroneous: as he apprehends that it is not perfectly exact, when the motion is not extremely ſwift. He has inveſtigated a formula for determining the degree of this reſiſtance, and deduced concluſions differing from thoſe of Mr. Robins. See Principles of Gunnery inveſtigated, &c. 1777, p. 224, &c.

Mr. Robins having proved that, in very great changes of velocity, the reſiſtance does not accurately follow the duplicate proportion of the velocity, lays down two poſitions, which may be of conſiderable ſervice in the practice of artillery, till a more complete and accurate theory of reſiſtance, and the changes of its augmentation, may be obtained. The firſt of theſe is, that till the velocity of the projectile ſurpaſſes that of 1100 feet in a ſecond, the reſiſtance may be eſteemed to be in the duplicate proportion of the velocity: and the ſecond is, that if the velocity be greater than that of 1100 or 1200 feet in a ſecond, the abſolute quantity of the reſiſtance will be nearly three times as great as it ſhould be by a compariſon with the ſmaller velocities. Upon theſe principles, he proceeds in approximating the actual ranges of pieces with ſmall angles of elevation, *viz.* ſuch as do not exceed 8° or 10°, which he ſets down in a table, compared with their correſponding potential ranges. See his Mathematical Tracts, vol. i. p. 179, &c.

Since

Since the above experiments of Mr. Robins, Dr. Hutton has profecuted the fubject to a much greater length. His experiments were made not only with the whirling machine invented by the former, but with cannon balls of different weights, from 1lb. to 6lbs.; as alfo with figures of various fhapes, and with planes fet at a variety of angles of inclinations to the path of motion. From thefe experiments the author has afcertained the refiftance of bodies to all velocities, from 1 to 2000 feet *per* fecond; the bodies being different, and their faces at different angles of elevation. Some of his general tables, and conclufions from thofe experiments, are as follows.

Table I. Of Refiftances of different Bodies.

Velocity per Second.	Small Hemifphere, flat Side.	Large Hemifphere.		Cone.		Cylinder.	Whole Globe.	Refiftance as the Power of the Velocity.
		Flat Side.	Convex Part.	Vertex.	Bafe.			
feet.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.
3	.028	.051	.020	.028	.064	.050	.027	
4	.048	.096	.039	.048	.109	.090	.047	
5	.072	.148	.063	.071	.161	.143	.068	
6	.103	.211	.092	.098	.225	.205	.094	
7	.141	.284	.123	.129	.289	.278	.125	
8	.184	.368	.160	.168	.382	.360	.162	
9	.233	.464	.199	.211	.478	.456	.225	
10	.487	.573	.242	.260	.587	.566	.255	
11	.349	.698	.292	.315	.712	.688	.310	2.052
12	.418	.836	.347	.376	.850	.826	.370	2.042
13	.492	.988	.409	.440	1.000	.978	.435	2.936
14	.573	1.154	.478	.512	1.166	1.143	.305	2.031
15	.661	1.336	.552	.589	1.346	1.327	.581	2.036
16	.754	1.538	.634	.673	1.546	1.526	.663	2.033
17	.853	1.757	.722	.762	1.763	1.745	.752	2.038
18	.959	1.998	.818	.858	2.002	1.986	.848	2.044
19	1.073	2.258	.922	.959	2.260	2.246	.949	2.047
20	1.196	2.542	1.069	1.069	2.540	2.528	1.057	2.051
Mean proportional numbers.	140	288	119	126	291	285	124	2.040
1	2	3	4	5	6	7	8	9

In this table are contained the refiftances of feveral forms of bodies, when moved with feveral degrees of velocity, from 3 feet *per* fecond to 20 feet *per* fecond. The names of the bodies are at the tops of the columns, as alfo which end went foremoft through the air; the different velocities are in the firft column, and the refiftance, on the fame line in their feveral columns in avoirdupois ounces and decimal parts. Thus, on the firft line are contained the refiftances when the bodies move with a velocity of three feet in a fecond; *viz.* in the fecond column, for the fmall hemifphere of $4\frac{3}{4}$ inches diameter, its refiftance .028 ounces, when the flat fide went foremoft; in the third and fourth columns, the refiftances to a large hemifphere, firft with the flat fide, and next with the convex part foremoft; the diameter of this, as well as all the following figures, being $6\frac{5}{8}$ inches, and therefore the area of the great circle = 32 fquare inches, or $\frac{2}{9}$ of a fquare foot; then in the fifth and fixth columns are the refiftances of a cone, firft, with its vertex, and then with its bafe foremoft; the altitude of the cone being $6\frac{5}{8}$ inches, the fame as the diameter of its bafe; in the feventh column, the refiftance to the end of the cylinder; and in the eighth, that againft the whole globe or fphere. All the numbers fhew the real weights which are equal to the refiftances; and at the bottoms of the columns are placed proportional numbers, which fhew the mean proportions of the refiftances of all the figures to each other with any velocity. Laftly, in the ninth column are placed the exponents of the power of the velocity which the refiftances in the eighth column bear to each other, *viz.* which that of the 10 feet velocity bears to each of the following ones; the medium of all them being as the 2.04 power of the velocity; that is, very little above the fquare, or fecond power, fo far as the velocities in this table extends.

From this table the following inferences are readily deduced.

1. That the refiftance is nearly in the fame proportion as the furfaces; a fmall increafe only taking place in the greateft furfaces, and for the greater velocities: thus, by comparing together the numbers in the fecond and third columns for the bafes of the two hemifpheres, the areas of which bafes are in the proportion of $17\frac{3}{4}$ to 32, or 5 to 9 very nearly, it appears that the numbers in thefe two columns, expreffing the refiftances, are nearly as 1 to 2, or 5 to 10, as far as the velocity of 12 feet: but after that, the refiftances on the greater furface increafe gradually more and more above that proportion.

2. The refiftance to the fame furface, with different velocities, is, in thefe flow motions, nearly as the fquare of the velocity; but gradually increafes more and more above that proportion, as the velocity increafes. This is manifeft from all the columns; and from the index of the power of the velocity fet down in the ninth column for the refiftances in the eighth, the medium of which being 2.04, fhews that the refiftance to the fame body is, in thefe flow motions, as the 2.04 power of the velocity, or nearly as the fquare of it.

3. The round ends, and the fharp ends, of folids, fuffer lefs

lefs refiftance than the flat or plane ends of the fame diameter; but the fharper end has not always the leaft refiftance. Thus, the cylinder, and the flat ends of the hemifphere, and cone, have more refiftance than the round or fharp ends of the fame, but the round fide of the hemifphere has lefs refiftance than the fharp end of the cone.

4. The refiftance on the bafe of the hemifphere is to that of its convex part, as $2\frac{1}{7}$ to 1, inftead of 2 to 1, as given by theory. The experimented refiftances alfo exceed the theoretical by nearly $\frac{1}{4}$th.

5. The refiftance on the bafe of the cone is to that on its vertex, nearly as $2\frac{3}{10}$ to 1, which is the fame as the ratio of the fine of the angle of inclination of the fide of the cone to its axis; fo that, in this inftance, the refiftance is as the fine of the angle of incidence.

6. When the hinder parts of different bodies are of different forms, the refiftances are different, although the fore parts be exactly the fame; owing probably to the different preffures of the air on the hinder parts.

Thus the refiftance to the fore-part of the cylinder is lefs than on the equal flat furface of the cone, or of the hemifphere; and the refiftance on the bafe of the hemifphere lefs than that of the cone; and the round fide of the hemifphere lefs than the whole fphere.

TABLE II. Refiftance, both by Experiment and Theory, to a Globe of 1.965 Diameter.

Velocity per Second in Feet.	Refiftance by Experiment in Ounces.	Refiftance by Theory in Ounces.	Ratio of Experiment to Theory.	Refiftance as the Power of the Velocity.
5	0.006	0.005	1.20	
10	0.024½	0.020	1.23	
15	0.055	0.044	1.25	
20	0.100	0.079	1.27	
25	0.157	0.123	1.28	2.022
30	0.23	0.177	1.30	2.052
40	0.42	0.314	1.33	2.068
50	0.67	0.491	1.36	2.075
100	2.72	1.964	1.38	2.059
200	11	7.9	1.40	2.041
300	25	18.7	1.41	2.039
400	45	31.4	1.43	2.039
500	72	49	1.47	2.044
600	107	71	1.51	2.051
700	151	96	1.57	2.059
800	205	126	1.63	2.067
900	271	159	1.70	2.977
1000	350	196	1.78	2.086
1100	442	238	1.86	2.095
1200	546	283	1.90	2.102
1300	661	332	1.99	2.107
1400	785	385	2.04	2.111
1500	916	442	2.07	2.113
1600	1051	503	2.09	2.113
1700	1186	568	2.08	2.111
1800	1319	636	2.07	2.108
1900	1447	709	2.04	2.104
2000	1569	786	2.00	2.098

In the firft column of this table are contained the feveral velocities, gradually, from 5 feet *per* fecond to the greateft velocity of 2000 feet *per* fecond, with which a globe or ball is moved. In the fecond column are the experimented refiftances in avoirdupois ounces. In the third, the correfponding refiftances as deduced from theory. In the fourth column the ratio of thefe two refiftances, or the quotients of the former divided by the latter; and the fifth, or laft, the indices of the power of the velocity which is proportional to the experimented refiftances, and which are found by comparing the refiftance of 20 feet velocity with each of the following ones.

The following tables are of a fimilar kind, but the experiments are repeated on balls of different fizes.

TABLE III.—Refiftances to a ball of 1.965 inch diameter, and 16 oz. 13 dr. weight.

Velocity.	Refiftances.		1ft Dif.	2d Dif.
feet.	lbs.	oz.		
100	0.17	2¾		
200	0.69	11	8¼	
300	1.56	25	14	5¾
400	2.81	45	20	6
500	4.50	72	27	7
600	6.69	107	35	8
700	9.44	151	44	9
800	12.81	205	54	10
900	16.94	271	66	12
1000	21.88	350	79	13
1100	27.63	442	92	13
1200	34.13	546	104	12
1300	41.31	661	115	11
1400	49.06	785	124	9
1500	57.25	916	131	7
1600	65.69	1051	135	4
1700	74.13	1186	135	0
1800	82.44	1319	133	−2
1900	90.44	1447	128	−5
2000	98.06	1569	122	−6

TABLE IV.—Refiftances to a ball 2.78 inc. diameter, and 3lb. weight.

Velocity.	Ref.	Diff.
feet.	lbs.	
900	35	
950	41	6
1000	47	6
1050	53	6
1100	60	7
1150	67	7
1200	74	7
1250	82	8
1300	91	9
1350	101	10
1400	112	11
1450	122½	10½
1500	132½	10
1550	141½	9
1600	150	8½
1650	158	8
1700	165	7
1750	171	6
1800	176	5

TABLE V.—Refiftances to a ball 3.55 inc. diameter, and 6lb. 1 oz. 8dr. weight.

Velocity.	Ref.	Diff.
feet.	lbs.	
1200	125	
1250	124	9
1300	133	9
1350	142	9
1400	152	10
1450	162	10
1500	172½	10½
1550	184	11½
1600	197	13
1650	211	14
1700	226	15
1750	242	16
1800	259	17

The

The analogy among the numbers in all theſe tables is very remarkable and uniform, the ſame general law obtaining in them all, by means of which, together with our preceding remarks, we may anſwer many intereſting queſtions relating to this ſubject, as connected with artillery practice. For example, ſuppoſe it were required to determine what would be the reſiſtance of the air againſt a 24lb. ball, diſcharged with a velocity of 2000 feet *per* ſecond. By Table III. the ball of 1.965 inch diameter, when moving with 2000 feet velocity, ſuffered a reſiſtance of 98lbs.; then ſince the reſiſtances, with the ſame velocity, are as the ſurfaces, and the ſurfaces as the ſquares of the diameters; alſo the diameter of a 24-pound ball being 5.6 inches, we have as $(1.965)^2 : (5.6)^2$, or as $3.86 : 31.36 :: 98\text{lbs.} : 796\text{lbs.}$, the reſiſtance which a 24lb. ball experiences when diſcharged with the above velocity. And generally, if the diameter of any propoſed ball be d inches, and r the tabular reſiſtance correſponding to any velocity v; then we ſhall generally have as $(1.965)^2 : d^2 :: r : \frac{r\,d^2}{(1.965)^2} = \frac{r\,d^2}{3.8}$, or very nearly $\frac{1}{4} r\,d^2$.

Theſe reſiſtances relating to certain and determinate velocities, a principal object of inveſtigation has been, amongſt experimentaliſts, to determine ſome rule or formula by which the reſiſtance may be found for any velocity whatever, and the reſult of Dr. Hutton's inveſtigations on this ſubject is as follows, *viz.*

Reſiſtance $= r = .00002576\,v^2 - .00388\,v$, in avoirdupois pounds, the velocity being v.

This rule $.00002576\,v^2 - .00388\,v = r$ denotes the reſiſtance for a ball whoſe diameter is 1.965 inch, the ſquare of which is 3.9 or 4 nearly. Hence to adapt it to any other ball, whoſe diameter in inches is d, we ſhall have, by the ſame proportion as above, $\frac{d^2}{3.8}\,(.00002576\,v^2 - .00388\,v) = (.00000667\,v^2 - .0010)\,d^2 = (.00000\tfrac{2}{3}\,v^2 - .001\,v)\,d^2$, for the reſiſtance of any ball whoſe diameter is d, and velocity v.

In ſmaller velocities the ſame author finds the theorem $.00001725\,v^2 = r$ ſufficiently correct, and this is adapted to a ball whoſe diameter is d in exactly the ſame manner, giving the reſult $.00000447\,d^2\,v^2 = r$ for the reſiſtance when the velocities are ſmall.

For the application of theſe theorems to the ſolution of certain problems connected with the doctrine of *projectiles*, ſee that article: and for various other formulæ and reſults equally curious and intereſting, ſee Dr. Hutton's Tracts, as alſo vol. iii. of his Courſe of Mathematics; Robins' Gunnery; Moore's Theory of Rockets; Gregory's Mechanics; and Prony's Architecture Hydraulique.

Resistance, *Different, of the ſame Medium to Bodies of different Figures.*—Sir Iſaac Newton ſhews, that if a globe and a cylinder, of equal diameters, be moved with equal velocity in a thin medium, conſiſting of equal particles, diſpoſed at equal diſtances, according to the direction of the axis of the cylinder; the reſiſtance of the globe will be leſs by half than that of the cylinder.

Resistance, *Solid of the leaſt.*—From the laſt propoſition the ſame author deduces the figure of a ſolid which ſhall have the leaſt reſiſtance of any containing the ſame quantity of matter and ſurface.

The figure is this. Suppoſe D N F G (*Plate* XXXVI. *Mechanics, fig.* 15.) to be ſuch a curve, as that if from any point N be let fall a perpendicular N M to the axis A B; and from a given point G be drawn a right line G R parallel to a tangent to the figure in N, and cut the axis, when continued, in R; M N be to G R as G R *cub.* to 4 B R × G B *q*; a ſolid deſcribed by the revolution of this figure about its axis A B, moving in a medium from A towards B, is leſs reſiſted than any other circular ſolid of the ſame area, &c.

This theorem, which ſir Iſaac Newton has given without a demonſtration, has been demonſtrated by ſeveral mathematicians, as Fatio, Craig, M. d'Hoſpital, Bernouilli, &c. (See Dr. Horſley's edition of Newton, vol. ii. p. 390, and Maclaurin's Fluxions, ſect. 606 and 607.) For a more particular inveſtigation of this ſolid, ſee prob. 6. under the article Isoperimetry.

Resistance *of a Globe* perfectly hard, and in a medium whoſe particles are ſo too, is to the force with which the whole motion may either be deſtroyed, or generated, which it has at the time when it has deſcribed four-thirds of its diameter, as the denſity of the medium to the denſity of the globe. Hence, alſo, ſir Iſaac Newton infers, that the reſiſtance of a globe is, *cæteris paribus*, in a duplicate ratio of its velocity. Or its reſiſtance is, *cæteris paribus*, in a duplicate ratio of its diameter; or, *cæteris paribus*, as the denſity of the medium. Laſtly, that the actual reſiſtance of a globe is in a ratio compounded of the duplicate ratio of the velocity, and of the duplicate ratio of the diameter, and of the ratio of the denſity of the medium.

In theſe articles the medium is ſuppoſed to be diſcontinuous, as air probably is: if the medium be continuous, as water, mercury, &c. where the globe does not ſtrike immediately on all the particles of the fluid generating the reſiſtance, but only on thoſe next it, and thoſe again on others, &c. the reſiſtance will be leſs by half: and a globe in ſuch a medium undergoes a reſiſtance which is to the force with which the whole motion it has after deſcribing eight-thirds of its diameter, might be generated, or taken away, as the denſity of the medium to the denſity of the globe.

Resistance *of a Cylinder,* moving in the direction of its axis, is not altered by any augmentation or diminution of its length; and therefore is the ſame with that of a circle of the ſame diameter, moving with the ſame velocity in a right line perpendicular to its plane.

The reſiſtance of a cylinder, moving in an infinite non-elaſtic fluid, ariſing from the magnitude of a tranſverſe ſection, is to the force with which its whole motion, while it deſcribes four times its length, may be taken away, or generated, as the denſity of the medium to that of the cylinder, very nearly.

Hence, the reſiſtance of cylinders moving lengthwiſe, in infinitely continued mediums, are in a ratio compounded of the duplicate ratio of their diameters, the duplicate ratio of their velocities, and ratio of the denſity of mediums.

The reſiſtance of a globe, in an infinite non-elaſtic medium, is to the force by which its whole motion, while it deſcribes eight-thirds of its diameter, might be either generated or taken away, as the denſity of the fluid to the denſity of the globe, *quam proximè.*

Resistance *of Matter.* (See Matter.) The meaning of this expreſſion is not, that matter makes any *oppoſition* to a change of its ſtate, or exerts a force to maintain itſelf in the ſtate it is, as ſome have very improperly expreſſed themſelves. This would imply that activity which is inconſiſtent with its nature; and if it were true, a part of the force of every impulſe would be ſpent merely in overcoming this oppoſition, without producing any other effect; and, therefore, the ſum of the motions the ſame way would always be greater before than after colliſion, which is impoſſible. The *largeſt* body will be moved by any the

ſlighteſt

ſlighteſt impulſe of the *ſmalleſt;* but then it can be moved only in proportion to the force of the impulſe, and this is what is chiefly meant by the *reſiſtance* of matter: *e. gr.* a body at reſt will *reſiſt* another which is moving towards it; that is, it will be an *obſtruction* to the motion of this other; the latter will be retarded by the former, and will loſe juſt as much motion as it communicates. In other words; the reſiſtance of matter is that in its nature which makes it require an *adequate foreign* cauſe of every change of ſtate, or from whence it is *wholly paſſive*, and incapable of receiving any motion from impulſe, that is not in a certain fixed proportion to the *relative momentum* of the impelling body, and ſtrictly equal to the change of ſtate it ſuffers in conſequence of the impulſe. In this proportion matter is always moved *without difficulty;* but beyond this there is not only a *difficulty*, but an *impoſſibility* of moving it; and whatever motion it can be ſuppoſed to receive from any impulſe that is greater than that which the impelling body loſes, it muſt derive from nothing at all. The activity which is denied to matter, is a power of changing its own ſtate, not that of acting upon other matter by *impulſe*. This ſort of activity, or power, follows from, and is neceſſarily implied in its perfect paſſiveneſs or inertia. See Price's Diſſertations, p. 35, note.

Non-Resistance, in *Politics*. See Passive *Obedience*.

RESITU, in *Geography*, a town of Naples, in the province of Capitanata; 16 miles N.N.W. of Vieſte.

RESLEU, a river which riſes in Bavaria, and runs into the Egra, in Bohemia.

RESOLIF, a town of Scotland, in the county of Cromarty; 7 miles W. of Cromarty.

RESOLVENTS, Resolventia, in the *Materia Medica*, remedies proper to reſolve and diſſipate tumours and gatherings; to ſoften indurations, and, by their tenuity and warmth, evacuate redundant or peccant humours through the pores.

Under this claſs come various unguents, emplaſters, &c.

RESOLUTION, Resolutio, or *Solutio*, in *Phyſics*, the reduction of a body into its original or natural ſtate, by a diſſolution or the ſeparation of its aggregated parts.

Thus ſnow and ice are ſaid to be reſolved into water; and a compound is reſolved into its ingredients, &c.: water reſolves into vapour by heat; and vapour is again reſolved into water by cold.

Some of the moderm philoſophers, particularly Mr. Boyle, M. Mariotte, Boerhaave, &c. maintain that the natural ſtate of water is to be congealed, or in ice; inaſmuch as a certain degree of heat, which is a foreign and violent agent, is required to make it fluid: ſo that near the pole, where this foreign force is wanting, it conſtantly retains its fixed or icy ſtate. On this principle, the reſolution of ice into water muſt be allowed an improper expreſſion.

Resolution, in *Chemiſtry*, is the reduction of a maſs, or mixed body, into its component parts, or firſt principles, by proper analyſis.

The reſolution of bodies is performed variouſly; by diſtillation, ſublimation, diſſolution, fermentation, &c. See each operation under its proper article. See alſo Dissolution and Solution.

Resolution, in *Ethics*, is that paſſion which encounters difficulties and dangers; but when it has to do more peculiarly with dangers, it is called boldneſs. Deſire, joy, and ſorrow, enter into its conſtitution; but joy is much the principal ingredient. When reſolution degenerates into a concern to maintain our miſtakes, humours, or vices, it is more properly denominated obſtinacy. See Passions.

Resolution, in *Logic*, is a branch of *method*, called alſo *analyſis*.

The buſineſs of reſolution is to inveſtigate or examine the truth or falſehood of a propoſition, by aſcending from ſome particular known truth, as a principle, by a chain of conſequences, to another more general one in queſtion. Reſolution, or the analytic method, ſtands in direct oppoſition to *compoſition*, or the ſynthetic method; in which laſt we deſcend from ſome general known truths to a particular one in queſtion.

For an inſtance of the method of reſolution; ſuppoſe the queſtion this: Whether, on the ſuppoſition of man's exiſtence, we can prove that God exiſts?

To reſolve this, our method is thus: Mankind did not always exiſt. It is evident, from a thouſand conſiderations, the ſpecies had a beginning; and that, according to all hiſtory, not ſix thouſand years ago; but if it had a beginning, there muſt be ſome cauſe of its beginning; ſomething to induce it to exiſt then more than it did before; in effect, there muſt be a cauſe or author of its exiſtence; for from nothing, nothing ariſes: this cauſe, whatever it is, muſt, at leaſt, have all the faculties we find in ourſelves; for none can give more than he has: nay, he muſt have others, which we have not, ſince he could do what we cannot do, *i. e.* create, make man exiſt, &c. Now, this cauſe either exiſts ſtill, or has ceaſed to do ſo: if the former, he did not exiſt from eternity; for what is from eternity is neceſſary, and can neither by itſelf, nor any other cauſe, be reduced to nothing: if the latter, it muſt have been produced from ſome other; and then the ſame queſtion will return upon the producer. There is then ſome firſt cauſe, and this cauſe has all the properties and faculties we have; nay more, has exiſted from eternity, &c. Therefore, from the ſuppoſition of man's exiſtence, it follows that there is a God.

Resolution, or *Solution*, in *Mathematics*, is an orderly enumeration of ſeveral things to be done, to obtain what is required in a problem.

Wolfius makes a problem to conſiſt of three parts. The *propoſition* (which is what we properly call the *problem*), the *reſolution*, and the *demonſtration*.

The general tenor of all problems is, thoſe things being done which are injoined by the reſolution, the thing is done which was to be done.

As ſoon as a problem is demonſtrated, it is converted into a theorem; of which the reſolution is the hypotheſis; and the propoſition the theſis.

The proceſs of a mathematical reſolution, ſee in the following article.

Resolution, in *Algebra*, or *algebraical*, is of two kinds; the one practiſed in numerical problems, the other in geometrical ones.

Resolution *of Equations*, is the determination of the values of the unknown letters or quantities of which it is compoſed; in order to which it is neceſſary, firſt, to exterminate or eliminate all the unknown quantities but one out of the equation, and then the value of the remaining quantity is to be found by the proper rules for this purpoſe, *viz.* by the rules given for *ſimple*, *quadratic*, *cubic*, or *biquadratic equations*, according to which of theſe it may belong; or, by the general method of *approximation*, for which ſee the reſpective articles. But as all theſe caſes have reference only to one unknown quantity, it will not be amiſs, in this place, to explain ſome of thoſe methods which are moſt commonly employed for reducing equations to one unknown.

Firſt, it may be obſerved, that in any determinate problem there are always as many equations independent of each other, as there are unknown quantities; if there are not ſo many, the queſtion is *indeterminate*, and if there be more, it is *impoſſible*.

We cannot, in a limited article like the present, give all the methods that may be employed for exterminating the unknown letters; these being extremely various, and depending much upon the practice and proficiency of the analyst himself, and the manner in which those quantities are involved; but the most applicable and general methods are the three following, *viz.*

1. Find the value of one and the same unknown quantity in each equation, and put all these values equal to each other, which will eliminate one of the quantities, and reduce the number of equations to one less. Then do the same in these new equations; and again in the last; and so on, till there be but one equation and one unknown quantity, the value of which must be found by the proper rules, as above referred to.

2. Find the value of one of the unknown quantities in one of the equations, in terms of the other quantities; then substitute this value for that quantity in all the other equations; again, find the value of one of the remaining quantities, and substitute its value as before; and so on, till there remains but one equation and one unknown quantity, whose value is to be found as before.

3. Multiply each of the equations by such numbers as will render the co-efficients of one of the letters the same in all; then, by adding or subtracting these equations according as the equal co-efficients have unlike or like signs, the quantity whose co-efficients were equal will disappear; which being repeated again upon the remaining quantities, there will ultimately be found only one equation and one unknown quantity. And it may be proper to observe, that in all these cases, if any of the unknown quantities have fractional co-efficients, the whole equation in which they are found should be multiplied by such a number as will convert these fractions into integers.

Thus, in the equations

$$\begin{aligned} \tfrac{3}{5}x + \tfrac{2}{15}y &= 10 \\ \tfrac{1}{2}x + 3y &= 95 \end{aligned}$$

multiply the first by 15, and the latter by 2, gives

$$\begin{aligned} 9x + 2y &= 150 \\ x + 6y &= 190 \end{aligned}$$

the solution of which, by each of the preceding rules, will be as follows.

Or, putting letters instead of the above numerical co-efficients, in order to render the solution more general, let there be given

$$\left.\begin{aligned} ax + by &= c \\ dx + ey &= f \end{aligned}\right\} \text{to find } x \text{ and } y.$$

1st method. $\left.\begin{aligned} ax &= c - by \\ dx &= f - ey \end{aligned}\right\}$ by transposition.

$$x = \frac{c - by}{a} = \frac{f - ey}{d} \text{ by division.}$$

$$dc - dby = af - aey, \text{ by multiplication.}$$

$$(ae - db)\,y = af - dc$$

$$y = \frac{af - dc}{ae - db}$$

And in the same manner we find,

$$x = \frac{ec - bf}{ae - db}$$

2d method. $\left.\begin{aligned} ax + by &= c \\ dx + ey &= f \end{aligned}\right\}$ to find x and y.

$$x = \frac{c - by}{x} \text{ as above.}$$

$$\frac{dc - dby}{a} + ey = f, \text{ by substit.}$$

$$dc - dby + aey = af, \text{ by multiplication.}$$

$$(ae - db)\,y = af - de$$

$$y = \frac{af - dc}{ae - db} \text{ as before.}$$

$$x = \frac{ec - bf}{ae - db}$$

3d method. $\left.\begin{aligned} ax + by &= c \\ dx + cy &= f \end{aligned}\right\}$ to find x and y.

$$dax + dby = dc, \text{ mult. by } d.$$

$$adx + acy = af, \text{ mult. by } a.$$

$$(db - ac)\,y = dc - af$$

$$\left.\begin{aligned} y &= \frac{dc - af}{db - ae} = \frac{af - dc}{ae - db} \\ x &= \frac{bf - ec}{db - ae} = \frac{ec - bf}{ae - db} \end{aligned}\right\} \text{as before.}$$

This will, in some measure, illustrate the preceding rules, which we shall not insist upon any further; but, in the following examples, shall avail ourselves of any advantages that the equations present, in order to arrive at the solution in the easiest manner possible.

Examples.

1. Given $\left.\begin{aligned} x^2 + y^2 &= a \\ xy &= b \end{aligned}\right\}$ to find x and y.

$$x^2 + y^2 = a$$

$$2xy = 2b, \text{ doubling the 2d.}$$

$$x^2 + 2xy + y^2 = a + 2b, \text{ by addition.}$$

$$x^2 - 2xy + y^2 = a - 2b, \text{ by substit.}$$

$$\left.\begin{aligned} x + y &= \surd\,(a + 2b) \\ x - y &= \surd\,(a - 2b) \end{aligned}\right\} \text{by extraction.}$$

$$x = \frac{\surd\,(a + 2b) + \surd\,(a - 2b)}{2}$$

$$y = \frac{\surd\,(a + 2b) - (a - 2b)}{2}$$

2. Given $\left.\begin{aligned} x + y &= a \\ xy &= b \end{aligned}\right\}$ to find x and y.

$$x^2 + 2xy + y^2 = a^2, \text{ by squaring.}$$

$$4xy = 4b, \text{ mult. by 4.}$$

$$x^2 - 2xy + y^2 = a^2 - 4b, \text{ by substit.}$$

$$x - y = \surd\,(a^2 - 4b), \text{ by extract.}$$

$$x + y = a, \text{ 1st equat.}$$

$$x = \frac{a + \surd\,(a^2 - 4b)}{2}$$

$$y = \frac{a - \surd\,(a^2 - ab)}{2}$$

3. Given $\left.\begin{aligned} x - y &= a \\ xy &= b \end{aligned}\right\}$ to find x and y.

$$x^2 - 2xy + y^2 = a^2, \text{ squaring.}$$

$$4xy = 4b, \text{ mult. by 4.}$$

$$x^2 + 2xy + y^2 = a^2 + 4b, \text{ by adding.}$$

$$x + y = \surd\,(a^2 + 4b), \text{ by extract.}$$

$$x - y = a$$

$$x = \frac{a + \surd\,(a^2 + 4b)}{2}$$

$$y = \frac{a - \surd\,(a^2 + 4b)}{2}$$

4. Given

4. Given $\left.\begin{matrix} x - y = a \\ x^2 + y^2 = b \end{matrix}\right\}$ to find x and y.

$x^2 - 2xy + y^2 = a^2$, fquaring.
$2x^2 \qquad + 2y^2 = 2b$, doubling.
$x^2 + 2xy + y^2 = 2b - a^2$, fubtr.
$x + y = \sqrt{(2b - a^2)}$
$x - y = a$

$$x = \frac{a + \sqrt{(2b - a^2)}}{2}$$

$$y = \frac{a - \sqrt{(2b - a^2)}}{2}$$

This method of refolution will apply in many problems, and fometimes faves confiderable labour.

5. Given $\left.\begin{matrix} x^2 + xy = a \\ y^2 + xy = b \end{matrix}\right\}$ to find x and y.

$x^2 + 2xy + y^2 = a + b$, by adding.
$x + y = \sqrt{(a + b)}$, by extract.
$(x + y)\,x = x\sqrt{(a + b)} = a$
$(x + y)\,y = y\sqrt{(a + b)} = b$

$$x = \frac{a}{\sqrt{(a + b)}}, \text{ and } y = \frac{b}{\sqrt{(a + b)}}.$$

6. Find three numbers in arithmetical progreffion, whofe fum is a, and fum of their fquares b.

Let $x - y$, x and $x + y$, be the numbers required.

Then $x - y + x + x + y = 3x = a$
$(x - y)^2 + x^2 + (x + y)^2 = 3x^2 + 2y^2 = b$

$$x^2 = \frac{a^2}{9} = \frac{b - 2y^2}{3}$$

Whence $a^2 = 3b - 6y^2$

and $$y = \sqrt{\frac{3b - a^2}{6}}, \text{ and } x = \frac{a}{3}.$$

And a fimilar fubftitution, *viz.* one which anfwers one of the conditions of the queftion, may frequently be employed to great advantage.

7. Sometimes it will be convenient to fubftitute for the fums and differences of numbers, as in the following example.

Given $\left.\begin{matrix} x + y = a \\ x^4 + y^4 = b \end{matrix}\right\}$ to find x and y.

Let $x + y = 2m$ and $x - y = 2n$ $\Big\}$ then $\left\{\begin{matrix} x = m + n \\ y = m - n \end{matrix}\right.$

$$(m + n)^4 + (m - n)^4 = b,$$
$$\text{or } 2m^4 + 12m^2n^2 + 2n^4 = b;$$

but $2m = a$, or $m = \frac{a}{2}$; therefore m is known, and the above becomes

$$2n^4 + 12m^2n^2 = b - 2m^4$$
$$n^4 + 6m^2n^2 = \tfrac{1}{2}b - m^4$$
$$n^2 = -3m^2 \pm \sqrt{(\tfrac{1}{2}b + 8m^4)}$$
$$\text{and } n = [3m^2 \pm \sqrt{(\tfrac{1}{2}b + 8m^4)}]^{\frac{1}{2}}.$$

Whence m and n being known, x and y are alfo known; for $x = m + n$, and $y = m - n$.

8. Sometimes it is advantageous to confider one of the quantities as an unknown multiple of the other; thus:

Given $xy = x^2 - y^2 = x^3 + y^3$, to find x and y.

Make $y = zx$, then thefe become

$$\left.\begin{matrix} zx^2 = x^2 - z^2x^2 \\ zx^3 = x^3 + z^3x^3 \end{matrix}\right\}$$
$z = 1 - z^2$, from the firft,
$z^2 + z = 1$, or $z = -\frac{1}{2} + \frac{1}{2}\sqrt{5}$;

whence z is a known quantity. Now,

$z = x + z^3x$, from the fecond,

$$x = \begin{cases} \dfrac{z}{1 + z^3} = \dfrac{-\frac{1}{2} + \frac{1}{2}\sqrt{5}}{1 - (\frac{1}{2} - \frac{1}{2}\sqrt{5})^3} \\[2ex] \dfrac{-\frac{1}{2} + \frac{1}{2}\sqrt{5}}{-1 + \sqrt{5}} = \frac{1}{2} \end{cases}$$

$y = zx = -\frac{1}{4} + \frac{1}{4}\sqrt{5}$, as required.

Sometimes it faves confiderable labour, to find the fum, product, or difference, of the two quantities, inftead of the quantities themfelves; thus:

9. Given $x^2 + y^2 - x - y = a$
$xy + x + y = b$;

by addition $x^2 + xy + y^2 = a + b$
$x^2 + 2xy + y^2 = a + b + xy$
$x + y = \sqrt{(a + b + xy)}$;

but $x + y = b - xy$;

therefore $b^2 - 2bxy + x^2y^2 = a + b + xy$
$x^2y^2 - (2b + 1)\,xy = a + b - b^2$:

whence $$xy = \frac{2b + 1}{2} \pm \sqrt{\left(\frac{2b + 1}{2}\right)^2 + a + b - b^2}.$$

Now make $xy = p$ a known quantity, and we have, from the fecond equation,

$$p + x + y = b,$$
$$\text{or } x + y = b - p$$
$$xy = p$$

whence $x^2 - 2xy + y^2 = (b - p)^2 - 4p$
$x - y = \sqrt{[(b - p)^2 - 4p]}$
$x + y = b - p$

therefore $$x = \frac{b - p + \sqrt{[(b - p)^2 - 4p]}}{2}$$

$$y = \frac{b - p - \sqrt{[(b - p)^2 - 4p]}}{2}.$$

Thefe, and a variety of other artifices peculiar to certain equations, will occur to the practical analyft; of which, numerous examples may be feen in Bland's Algebraical Problems, as alfo in Bonnycaftle's and Euler's Algebra.

RESOLUTION *of a geometrical Problem algebraically.* The procefs in the former article is to be obferved throughout; but as it rarely happens we come at an equation in geometrical problems by the fame means as in numerical ones, there are fome farther things to be noted: 1ft, then, fuppofe the thing done, which was propofed to be done. 2. Examine the relations of all the lines in the diagram, without any regard to known or unknown, in order to find which depends on which; and from which being had, what others are had, whether by fimilar triangles, or rectangles, &c. 3. To obtain the fimilar triangles or rectangles, the lines are to be frequently produced, till they become either directly or indirectly equal to given ones, or interfect others, &c. Parallels and perpendiculars to be frequently drawn; points to be frequently connected; and angles to be made equal to others. If thus you do not arrive at a neat equation, examine the relation of the lines in another manner.

Sometimes

Sometimes it is not enough to feek the thing directly, but another thing muft be fought, whence the firft may be found.

The equation being reduced, the geometrical conftruction is to be deduced from it, which is done in various manners, in the various kinds of equations. See APPLICATION *of Algebra to Geometry*.

RESOLUTION, *Problematical*. See PROBLEMATICAL.

RESOLUTION, in *Medicine*, the termination of an inflammation, without any change in the texture of the part inflamed, in contradiftinction to the termination in fuppuration or gangrene. The great object of medicine, in all inflammatory difeafes, in the commencement, is to obtain the refolution of the inflammation, fo that the ftructure and functions of the part affected may not be injured by the difeafe: and the means of obtaining a refolution, when the inflammation is feated in an internal part, are evacuations of blood by the lancet, cupping, or leeches; and of ferum, by purging the bowels, applying blifters in the vicinity, &c.; and when the inflammation is external, by local evacuations by fimilar means, and by the application of cold fubftances. See INFLAMMATION.

RESOLUTION, in *Mufic*, is when a canon or perpetual fugue is not written all on the fame line, or in one part; but all the voices that are to follow the guida, or firft voice, are written feparately, either in fcore, *i. e.* in feparate lines, or feparate parts, with the paufes each is to obferve, in the beginning, and in the tone proper to each.

The refolution of difcords, in mufic, is generally by their defcent upon concords; except the *tritonus*, or fharp 4th, and the *note fenfible*, or fharp 7th of a key, which afcend, while the bafe defcends or remains ftationary.

RESOLUTION, in *Surgery*, the moft favourable manner in which the procefs of inflammation can terminate, confifting of a gradual abatement of the pain, rednefs, fwelling, throbbing, and heat of the part, without any formation of matter, and without any floughing. Alfo, the difperfion of fwellings and indurations, through the medium of abforption.

RESOLUTION *of Motion*, in *Mechanics*. See MOTION.

RESOLUTION *Bay*, in *Geography*, a name given by captain Cook to the port of Madre de Dios, fituated near the middle of the W. fide of St. Chriftina, one of the Marquefas iflands, in the South Pacific ocean, and under the higheft land in the ifland, in S. lat. 9° 55′ 30″, W. long. 139° 8′ 40″, and N. 15° W. from the W. end of La Dominica. The fouth point of the bay is a fteep rock of confiderable height, terminating at the top in a peaked hill, above which may be feen a path-way leading up a narrow ridge to the fummit of the hills. The north point is not fo high, and rifes with a more gentle flope. They are a mile from each other in the direction of N. by E., and S. by W. In the bay, which is near three quarters of a mile deep, and has from 34 to 12 fathoms water, with a clean fandy bottom, are two fandy coves, divided from each other by a rocky point. In each is a rivulet of excellent water. The northern cove is the moft commodious for wooding and watering. Here is the little water-fall mentioned by Quiros, Mendana's pilot; but the town, or village, is in the other cove. There are feveral other coves or bays on this fide of the ifland; and fome of them, efpecially to the northward, may be miftaken for this: therefore the beft direction is the bearing of the weft end of La Dominica. Cook's Voyage, vol. i. p. 307.

RESOLUTION *Ifland*, one of the newly-difcovered Society iflands, in the South Pacific ocean. S. lat. 17° 24′. W. long. 141° 15′.—Alfo, an ifland in the North Atlantic ocean, 60 miles in circumference, fituated on the N. fide of the entrance into Hudfon's ftraits. N. lat. 61° 40′. W. long. 65°.

RESOLUTION *Port*, a bay or harbour of the ifland of Tanna, in the South Pacific ocean. S. lat. 19° 32′. E. long. 169° 40′.

RESONANCE, in *Mufic*, is founding again, repeating or continuing the found. The refonance of a ftring, a bell, or other fonorous body, ceafes with the vibration.

It expreffes the found returned by the air inclofed in the bodies of ftringed mufical inftruments, as lutes, &c.; or even in the bodies of wind inftruments, as flutes, &c.

Elliptic and parabolic vaults refound ftrongly, *i. e.* they ftrongly reflect or return the found. See ECHO.

The mouth, and the parts thereof, as the palate, tongue, teeth, nofe, and lips, Monf. Dodart obferves, contribute nothing to the tone of the voice; but their effect is very great as to the refonance.

Of this we have a very fenfible inftance in that vulgar inftrument called *Jews-harp*, or *trompe de Bearn*: for if you hold it in your hand, and ftrike the tongue or fpring thereof, which yields all the found of the inftrument, it fcarcely makes any noife at all; but, holding the body of the inftrument between the teeth, and ftriking the fpring as before, it makes a mufical buzz, which is heard to a good diftance, and efpecially in the lower notes.

So alfo in the hautboys, the tone of the reed is always the fame; being a fort of drone: the chief variety is in the tone of the refonance, produced in the mouth by the greater or lefs aperture, and the divers motions of the lips.

RESORT. See RESSORT.

RESOUZE, in *Geography*, a river of France, which runs into the Saone, near Pont de Vaux, in the department of the Ain.

RESP, a difeafe in fheep, the fame as red-water. See RED-*Water*.

RESPECT, in *Ethics*, denotes that favourable impreffion which the goodnefs of a character has made upon the perfon contemplating it, united with a fhare of good fenfe. An union of both thefe qualities is neceffary to create refpect. Goodnefs alone is not fufficient to produce it; for if it be feated in a mind that indicates extreme imbecility, it cannot be deemed refpectable. On the other hand, fuperior fenfe in a mind deftitute of goodnefs, will not infpire refpect: it will either wafte itfelf in idle fpeculations, which renders it indifferent to us; or it may degenerate into low cunning, which renders it hateful. Should it be connected with power in a wicked and perverfe mind, it will excite horror and difmay, which are very remote from refpect.

RESPECTU *computi vicecomitis habendo*, in *Law*, a writ for the refpiting of a fheriff's accompt, upon juft occafion, directed to the treafurer and barons of the exchequer.

RESPECTUANDO HOMAGIO. See HOMAGIO.

RESPIRATION, in *Phyfiology*, that function of animal bodies, in which the air, either in its elaftic ftate, as it conftitutes the atmofphere, or held in folution in water, is brought into contact with fome organ or organs, undergoing alterations in its own conftitution, and producing changes in the nature of the animal fluids, which are effential to the continuance of life. In the mammalia, birds, and reptiles, the refpiratory organs confift of lungs, that is, of membranous cavities, differently conftructed in the three claffes, but agreeing in the circumftance of alternately receiving and emitting a portion of atmofpherical air. This alternate ingrefs and egrefs of air conftitutes properly what is called in common language *breathing*, to which the philofophical term *refpiration* is fynonimous. We extend the term to animals of the lower claffes, which have no lungs, and fome of of which do not even *breathe*, that is, do not receive and emit air at all. In confequence of the medium in which fifhes are immerfed, they cannot take in the atmofpheric air in its elaftic ftate, and they confequently have an apparatus, altogether different from that which exifts in the three claffes already named, for the purpofe of producing analogous effects in their economy. They are furnifhed with a paffage communicating with the fauces or œfophagus, and terminating in the external furface of the body, through which a part of the water received into the mouth is forcibly propelled. In this paffage, the branchiæ or gills are fituated; and the blood, which circulates in their fringed extremities, is thus expofed to the action of a quantity of air, which the water always holds in folution. Cruftaceous animals, and many of the mollufca, have organs more or lefs fimilar in ftructure and functions to the gills of fifhes. Infects, both in their larva and perfect ftates, poffefs numerous ramified tubes, diftributed over their whole body, and provided with open mouths, which admit the paffage to and fro of the external air. Although the ftructure of the organs in fifhes and infects is fo different from that which we find in mammalia, birds, and reptiles, they perform an analogous office, anfwer the fame general purpofes in the animal economy, and are confidered equally in the light of organs of *refpiration;* this term being employed now to denote the general effect produced by thefe various organizations, without any reference to the means through which it is produced; although it was originally applied to the paffage of the air to and from the lungs, when the refults of that procefs were unknown.

Is refpiration, confidered in its moft extenfive fenfe, a function neceffary to the exiftence of all animals? The refults of all the inveftigations hitherto made, induce us to anfwer this queftion in the affirmative; but the point is not yet demonftrated in all cafes.

In Cuvier's clafs of zoophytes, excepting the echinodermata, no refpiratory apparatus has been found; nor has any been yet difcovered in the inteftinal worms, or in fome of the external worms, as the leech, earth-worm, and others. It may be doubted, fince the analogy on which we ground our opinion of the neceffity of air to animal exiftence is fo very ftrong, whether the apparent exception afforded by the animals juft enumerated may not arife from our imperfect knowledge of their organization, and whether more accurate inquiries may not either difclofe to us in thefe cafes fome particular organ of refpiration, or fhew us that the function is performed by the external furface of the body in general. We know, in fact, by direct experiment, that fome of thefe animals produce changes in the air, and cannot live when debarred from its accefs.

The differences which animals exhibit in their mode of breathing, or in the manner of effecting the changes which their nutritive fluid undergoes from the action of the atmofphere, depend on other circumftances in their organization. Vegetables, and animals which have no circulation, *refpire* by their whole furface, or by means of veffels, which convey air to all points of their interior. Thofe only which have a true circulation breathe by a particular organ. The heart being in them a common point of departure and return for the blood, the veffels containing that fluid could eafily be fo arranged as to convey it to the lungs, after it had circulated through the body: this was obvioufly impracticable in inftances, when the nutritive fluid is every where uniformly expanded, without being contained in veffels. Hence refpiration by lungs or gills is a function dependent on that of circulation, and may be regarded as a remote confequence of thofe faculties which characterife animals.

Refpiration prefents to our obfervation two very different kinds of phenomena: 1ft, the motions of the lungs, gills, or other inftruments of breathing, or of parts connected with them, by which the former are alternately dilated and contracted for the admiffion and expulfion of air, and the latter are expofed to a current of water; and 2dly, the changes produced in the blood or other animal fluids, and in the air or water, in confequence of their mutual expofure in thefe organs. The firft may be termed the *mechanical*, and the fecond the *chemical* phenomena of refpiration. The former, including all the modifications which breathing undergoes in laughing, crying, and fighing, in coughing, fneezing, hiccoughing, in ftraining or holding the breath, &c. have been fully confidered under the article LUNG; in which the anatomy of the organs of refpiration in man is alfo fully detailed. In the articles MAMMALIA, BIRDS, FISHES, REPTILES, INSECTS, and VERMES, the breathing organs, and their mechanical phenomena in animals, are confidered. The chemical phenomena are the object of the prefent article.

The functions of the refpiratory organs are clofely connected with the other great proceffes of the animal economy. The heart, brain, and lungs, more particularly influence each other, and prefent, in their mutual relations, numerous and highly interefting confiderations for the phyfiologift. On thefe points we refer to HEART, LUNGS, and NERVOUS *Syftem*.

In the following article we fhall fpeak, 1ft, of the quantity of air received into the cheft; 2dly, of the changes which this undergoes in breathing, as they have been made out by refearches on the refpiration of man and the mammalia; 3dly, of the changes produced in the blood; 4thly, of the various explanations of the mode in which thefe changes are produced; 5thly, of the refpiration of the different gafes; 6thly, of the chemical phenomena of refpiration in other animals, and 7thly, of animal heat.

I. *Number of Refpirations, and Quantity of Air refpired.*—"It appears," fays Dr. Thomfon (Syftem of Chemiftry, v. 5. p. 732.), "that the number of refpirations made in a given time differs confiderably in different men. Dr. Hales reckons them at 20 in a minute. A man, on whom Dr. Menzies made experiments, breathed only 14 times in a minute. Mr. Davy informs us that he breathes between 26 and 27 times in a minute. I myfelf make about 19 refpirations at an average. The average of all is 20. Now 20 in a minute make 28,800 in 24 hours."

In his "Inquiry," p. 102, et feq. Mr. Ellis has brought together, from the moft authentic fources, a ftatement of the facts hitherto collected concerning the quantity of air ordinarily infpired. To afcertain this point, many modes of experiment have been adopted, and the conclufions which have been drawn from them very widely differ. Borelli eftimated the bulk of air taken in at a fingle infpiration at 15 cubic inches (de Mot. Animal.); Mr. Kite from 12 to 17 (Effay on Apparent Death, p. 24.); Dr. Goodwyn at 14 (Connection of Life with Refpiration, p. 28, et feq.); Mr. Davy from 13 to 17 (Refearches, p. 410 and 433.); and Drs. Jurine, Hales, Haller, and Sauvages, at 40 cubic inches. With the conclufion of thefe latter authors the experiments of Dr. Menzies nearly coincide, and as the methods which he adopted feem lefs liable to objection than thofe of any other author, it may not be improper fhortly to give the detail of them. He procured an allantoid, and fixed to it a machine confifting of two pretty large tubes, joined at right angles, nearly in the form of a common brafs cock. One end of the horizontal tube was connected with the allantoid, and the other received into the mouth, while the upright tube, which rofe from its centre, communicated

with

with the atmosphere. The tubes were large, and valves, made out of an allantoid, were affixed to the end of the upright tube, and to that attached to the allantoid, so that the air, when expelled from the lungs, should not escape into the atmosphere, nor return from the allantoid, after having once entered it. Precautions were taken also, by covering the mouth and nostrils, to prevent any air from passing in or out of the lungs, except by the tubes above mentioned. Things being thus prepared, he began to respire, and did not remove his mouth from the tube till he had filled the allantoid, taking care to stop his nostrils during expiration. The allantoid was filled, in repeated trials, by about 56 expirations, as natural as possible; and as its capacity was 2400 cubic inches, the average bulk of air thrown out of the lungs by each expiration, was 42.8 cubic inches. He then fixed another allantoid, whose capacity had been previously ascertained, to the end of the upright tube; and having filled it with atmospheric air, he inspired the air from one allantoid and expired it into the other, and the quantities were found to be nearly the same. Several persons of the middle size repeated this experiment with nearly the same result; the difference being scarcely ever more than one or two cubic inches. By another mode of experiment, first proposed by Boerhaave, of plunging a man into a tub of water up to his chin, and judging of the dilatation of the lungs from the ascent and descent of the water, he obtained, by several trials, nearly the same results; and when these same men were made to breathe from and into the allantoids, in the manner above described, the correspondence by the two methods was almost complete. (Menzies on Respiration, p. 21, et seq.) As there seems no obvious source of inaccuracy in the processes here employed, and their results so remarkably coincide; and as they present the average bulk deduced from 56 respirations, we may conclude, says Dr. Bostock, that 40 cubic inches is the quantity of air employed in an ordinary act of respiration. Essay on Respiration, p. 34. Inquiry into the Changes, &c. § 85.

Messrs. Allen and Pepys endeavoured to determine the quantity of air received into the lungs in an ordinary inspiration: 3460 cubic inches of atmospheric air were passed through the lungs in 11 minutes, by 58 respirations. As, on ordinary occasions, the person breathed 19 times in a minute, it is inferred that, by multiplying the time consumed in the experiment by the number of natural respirations in a minute, and dividing the whole bulk of air by the product, we obtain the true bulk of air received into the lungs at each natural inspiration; thus $11 \times 19 = 209$; and $\frac{3460}{209} = 16.5$ cubic inches, the quantity of a single natural inspiration. (Phil. Transf. 1808, p. 256.) Mr. Ellis justly observes, that not only do the efforts of the mind, and the operations of the apparatus, interfere greatly with the natural actions of the respiratory organs, but the gross quantity of air received in 58 preternatural inspirations can never with justice be assumed as a true measure of the quantity breathed in 209 natural respirations. The experiments of Dr. Menzies therefore still seem the most unexceptionable on this subject.

The difficulty in arriving, by experiment, at certain conclusions respecting the volume of air taken into the lungs in each inspiration, may arise from a difference in the state or capacity of those organs in different individuals; from the relative vigour or debility of the muscular powers carrying on the respiratory function; from the circumstances in which the animal is placed; the composition of the air itself; or the manner in which it is breathed. In many modes of experiment also, the friction between the air and apparatus employed, or the resistance which this latter may create to the ordinary process, will greatly vary the result: and considerable errors must likewise have arisen from the variation in bulk, occasioned by the change of temperature, which the air, during its respiration, suffers; from the difficulty of breathing in a natural manner when the mind is directing that process; and from the embarrassments opposed to the natural action of the respiratory organs by the contrivances adapted to them.

It will not be denied, that the size and capacity of the chest must, in a certain degree, regulate the quantity of air which is taken into, or expelled from it; and since respiration is neither wholly a voluntary nor an involuntary act, but, within certain limits, partakes of the nature of both, and is carried on by the exertion of muscular powers, the bulk of respired air must vary also, either from an alteration in the action of these powers, or from a change in the will of the agent who exerts them. This may be illustrated by considering the different quantities of air taken into the lungs in different states of natural and forced respiration. Dr. Goodwyn, supposing a person at death to make a *complete* expiration, endeavoured to ascertain the bulk of air then remaining in the lungs, which he estimated at 109 cubic inches. (Connection of Life with Respiration, p. 27.) This estimate he formed by measuring the capacity of the chest, in subjects who had died a natural death by disease, previous to which the expiratory powers must have been much weakened, and unable, in consequence, to expel so much air as when in a state of health and vigour; and in such cases, therefore, expiration might be final without being complete. Mr. Cruickshank observes, accordingly, that the lungs in the dead body, (though expiration is the last action of life,) always retain more air than is given out at several expirations. (On Insensible Perspiration, p. 97.) By a very different mode of experiment, we find Mr. Davy to conclude that his lungs, after a forced expiration, contain only 32 cubic inches of air, when it is reduced to the temperature of 55°, but which, by the heat of the lungs, and saturation with moisture, are increased to 41 cubic inches; and, after a natural expiration, they contained 118 cubic inches (Researches, p. 409, 410.); so that the difference between the two states of natural and forced expiration is 77, which is somewhat more than Dr. Menzies allows, who remarked that many men, after an ordinary expiration, could still expel from their lungs 70 cubic inches of air. (Diss. on Respiration, p. 31.) Mr. Davy adds, that his estimate of 118 cubic inches, as the capacity of the lungs after natural expiration, agrees very well with that of Dr. Goodwyn, who makes it about 109; and, on the supposition that the general debility which precedes the ordinary extinction of life, so weakens the expiratory muscles, as to disable them from making so complete an expulsion of the air, as they can effect when in health and vigour, the agreement is very striking; for nearly the same quantity of air would, in that case, remain in the lungs at the period of natural death, as after that of ordinary expiration.

Messrs. Allen and Pepys found that the healthy lungs of a stout man, five feet ten inches high, contained 108 cubic inches of air after death. Phil. Transf. 1809, p. 410, et seq.

Dr. Bostock conceives, that Dr. Goodwyn's estimate of 109 cubic inches of air remaining in the lungs after complete expiration, is not very remote from the truth; and he objects to Mr. Davy's mode of ascertaining the residual air of the lungs after a forced expiration, from a supposition that the hydrogen gas which he inspired for that purpose was not, in consequence of its low specific gravity, uniformly

formly diffused through all the cavities of the lungs; and therefore, that the proportions of the gas discharged could furnish no accurate estimate of those which were retained. (Essay, p. 17—25.) But Mr. Dalton has shewn, that hydrogen gas and atmospheric air intermix, when the former is kept in a phial above the latter, and communicating only by the small tube of a tobacco-pipe; and both in a state of rest. (Manchester Memoirs, vol. i. new series.) How much more readily then may this be expected to take place, where the gases are exposed to so large a surface, such great agitation, and increased temperature, as they must have been in the experiments of Mr. Davy. Neither is the small quantity of air, which Mr. Davy assigns, so incompatible, as Dr. Bostock supposes, with the anatomical structure of the thorax; for if we call to mind the space which the heart and the lungs occupy, and recollect, that, under a violent exertion, the chest is made to contract in every direction, and more especially by the ascent of the diaphragm nearly to the fourth or fifth rib, there is no difficulty in imagining the quantity of air in the lungs, in such circumstances, to be nearly that which Mr. Davy's experiments assign.

From a review, therefore, of all the facts and experiments above stated, we venture to draw the following conclusions, as approaching nearest to the truth. First, then, according to Mr. Davy, the lungs contain, after a forced expiration, a bulk of air equal to about 41 cubic inches; and according to the same author and Dr. Goodwyn, they contain, after a natural expiration, from 109 to 118 cubic inches; therefore the state of forced is to that of natural expiration, as 41 to 118. Secondly, according to Dr. Menzies, 40 cubic inches of air are received into the lungs at each ordinary inspiration; therefore the state of natural expiration to that of natural inspiration will be as 118 to 158. Mr. Davy found likewise, that by a forced expiration after a forced inspiration, he could expel from his lungs 190 cubic inches of air, and Dr. Menzies often found it to amount to 200 inches; therefore the state of greatest exhaustion of the lungs is to that of greatest repletion, as 41 to 231. But the 41 cubic inches of air, when inspired at temperature 55°, occupied a bulk equal only to 32; and therefore, by the same rule of proportion, 190 cubic inches, inspired at the same temperature, will be increased to 241.5; consequently, the greatest diminution of the capacity of the chest to its greatest expansion will be as 41 to 241, in the case of Mr. Davy. But these numbers must be considered as indicating proportions only, the absolute quantities being different in different persons. These facts decidedly shew how much the volume of air in the lungs will, at all times, depend on the relative capacity of those organs, on the more or less vigorous state of the expiratory powers, and on the degree of voluntary exertion with which the function may be performed.

The circumstances in which the animal may happen to be placed, will render this variation still more striking. Thus, from the experiments of Mr. Kite (On Apparent Death, p. 27. 29.) and Mr. Coleman (On Suspended Respiration, p. 7, et seq.), we learn, that in the act of drowning, animals are able to expel almost all the air which their lungs contain, by which those organs are brought into a state of collapse. Dr. Goodwyn, on the other hand, found, that in three executed persons, the lungs were expanded almost to their utmost extent, containing 250, 262, and 272 cubic inches of air (Essay, p. 25.); and Mr. Coleman observes, that when, previous to their suspension, he secured the trachea of animals by a ligature at the instant an inspiration was made, in less than four minutes they ceased to struggle, though the whole of the air was confined within the lungs, and no obstruction to the passage of the blood existed from their collapse (p. 111—138). Dr. Baillie also has often observed the lungs filling the chest, and distended with air and mucus, in persons who have died asthmatic; so that to die and to expire are by no means synonimous terms,—an observation long since made by Mayow, who remarked, that if air be drawn into the lungs, and the mouth and nostrils afterwards closed, "quamvis inflati maneant pulmones, mori tamen necesse erit, quia non licet expirare." (Tractat. Quinque, p. 300.) If indeed we reflect, that during submersion in water no fresh air can enter into the lungs, but that all which they contain may freely escape; and if we consider, that before suspension by the neck in the human subject, a deep inspiration, under the influence of fear, as Dr. Goodwyn observes, is made, and that no air can afterwards pass out, if the cord completely close up the trachea; it is reasonable to expect, that this variation in the bulk of air contained in the lungs should obtain, under the very different circumstances in which respiration is brought to a stand.

How much the composition of the air itself, and the manner in which it is breathed, will vary the bulk of residual air in the lungs, we may collect from the experiments of various authors. Dr. Hales moistened a bladder, and fixed to it a fosset, both of which would contain 74 cubic inches of air. Having blown up the bladder, he put the small end of the fosset into his mouth, and, at the same time, pinched his nostrils close, that no air might escape through them, and he then breathed to and fro. the air contained in the bladder. In less than half a minute, he found a considerable difficulty of breathing, and was forced after that to draw his breath very fast; and at the end of the experiment, the suffocating uneasiness was so great as to oblige him to take away the bladder from his mouth. Towards the end of the minute, the bladder was become so flaccid that he could not blow it above half full, with the greatest expiration that he could make. (Statical Essays, vol. i. p. 238.) When also Mr. Davy respired atmospheric air in a natural manner, he took in, he says, only 13 cubic inches and expelled 12.7, so that only about $\frac{1}{13}$d part of the original bulk was retained; when he made one respiration of 100 cubic inches of air, the diminution was to 99, or $\frac{1}{100}$; when, after a complete exhaustion of his lungs, he respired 141 cubic inches of air, once only for one-fourth of a minute, they were reduced to 139, or $\frac{1}{70}$th nearly; and when 161 cubic inches were breathed for about a minute, their bulk was diminished to 152, or $\frac{1}{18}$th (Researches, p. 432—435.);—in every case, the diminution augmenting with the repetition of the respiration, and consequent impurity of the air, and distress of the respiratory organs. So likewise, when Dr. Henderson breathed from and into the gasometer 600 cubic inches of air for four minutes, they were reduced to 570, or lost $\frac{1}{20}$th of their bulk; and he adds, that he held on respiring until the sense of oppression about the chest obliged him to desist. (Nicholson's Journal, May 1804.) These distressing symptoms, brought on by the repeated breathing of the same quantity of air, were felt in a still greater degree by Mr. Kite; for on respiring 591 cubic inches of atmospheric air from and into a bladder, he experienced, in one minute, great anxiety at the breast, which in half a minute more became intolerable; his face swelled, became black, and felt excessively hot, and sparks of fire danced before him; loss of sight, giddiness and confusion of the senses succeeded, and at the end of little more than two minutes, he fell back into a chair. He was relieved by fresh air, but remained confused and giddy (Essay on Apparent Death, p. 25.) The amount of the diminution

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of refpired air, fays profeffor Pfaff, depends not only on the *time* during which a given volume of air is refpired, but principally on the magnitude of the volume of air itfelf; it muft be proportionally lefs the greater the quantity infpired. He breathed 144 cubic inches of air once only in the time of ten or twelve feconds, and the diminution was four cubic inches, or $\frac{1}{36}$th of the primitive volume; when he refpired the fame volume of air twice, during twenty feconds, it loft eight cubic inches, or $\frac{1}{18}$th; and when it was thrice refpired, during thirty feconds, the diminution amounted to twelve cubic inches, or $\frac{1}{12}$th of the primitive volume. (Nicholfon's Journal, December 1805.) Now, in all thefe cafes, the volume of air refpired was precifely the fame, and could not, therefore, affect the ratio of diminution: but as the times were doubled and tripled, fo nearly were the degrees of diminution. But the more frequently the fame air is breathed, the more unfit does it become for refpiration; and to this change of compofition, more than to the time, or the magnitude of the volume of air, is the increafed degree of diminution to be afcribed.

This will perhaps appear more ftriking, if we attend to what happens in refpiring nitrous oxyd, which is compofed of the fame elements as atmofpheric air, but contains a much larger proportion of oxygen. After exhaufting his lungs, Mr. Davy infpired 108 cubic inches of this gas, which, when expired, were reduced to 99, or had loft $\frac{1}{12}$th of their bulk. When he made two refpirations of the fame quantity of the oxyd, the diminution was to 95, or about $\frac{1}{8}$th; and when he refpired 102 cubic inches of nitrous oxyd, mixed with $\frac{1}{30}$th of common air, for half a minute, the volume of air, after the feventh expiration, was reduced to 62, or had fuffered a lofs equal to $\frac{1}{2.55}$. (Refearches, pp. 394. 416.) Hence it appears, that in the natural refpiration of atmofpheric air, only a fmall diminution of its bulk takes place: that this diminution increafes as the air becomes vitiated by repeated refpirations, or is breathed in a preternatural manner: and that when a gas of the fame elementary materials, but combined in very different proportions, is fubftituted into the place of pure atmofpheric air, the diminution increafes in a tenfold degree. Now, the repeated breathing of the fame atmofpheric air, has been fhewn to bring on the moft diftrefsful fymptoms, and at length an utter inability to continue refpiration; and Mr. Davy tells us, that after a voluntary exhauftion of his lungs, he could refpire the nitrous oxyd with accuracy, when ftooping, for about half a minute, but, even then, ftrong fenfations were produced, with fulnefs about the head rather alarming: that if the refpiration extended to three-fourths of a minute, he could not rely on the accuracy of any experiment; and that the determination of blood to the head became, in lefs than a minute, fo great as often to deprive him of voluntary power over the mufcles of his mouth. (Refearches, p. 392.) But refpiration is a function carried on by the exertion of mufcular powers, in a great degree obedient to the will; and the quantity of refidual air in the lungs in preternatural refpiration will at all times be much influenced by the manner in which the will exerts itfelf, and the degree in which the mufcles are able to act. When, therefore, the power of the will over the mufcles is in any degree diminifhed, or is wholly loft, or the mufcles themfelves are much weakened, a proportional derangement will take place in the refpiratory function; and as, in the natural condition of the body, expiration is fubfequent to infpiration, the ability to infpire will laft longer than the ability to expire: confequently the ceffation of the procefs is brought about by a failure in the expiratory powers. But if the expiratory powers are unable to expel the air from the lungs, it muft remain in thofe organs; and hence we fee in all the foregoing examples, that the diminution in the volume of expired air was greater in proportion as the refpiratory organs fuffered diftrefs or oppreffion, and amounted even to more than one-third of the air infpired, when all voluntary powers ceafed. Inquiry, &c. § 86—92.

From the above data it may be eftimated, that by each ordinary expiration one-feventh part of the whole contents of the lungs is difcharged, and that by the moft violent expiration fomewhat more than four-fevenths of the air contained in them is evacuated. Suppofing that each refpiration occupies about three feconds, a bulk of air nearly equal to three times the whole contents of the lungs will be expelled in a minute, or about 4114 times their bulk in 24 hours. The quantity of air refpired during the diurnal period will be 1,152,000 cubic inches, or $666\frac{1}{2}$ cubic feet.

II. *Changes produced in the Air.*—Although the ancients were not unacquainted with the general fact, that refpiration produces a change in the air received into the lungs, the firft accurate notions refpecting this change, were furnifhed by the experiments of Boyle. He not only proved, by means of the air-pump, the abfolute neceffity of air to the fupport of animal life, but he farther difcovered, that the action of the lungs is quickly fufpended, unlefs they are furnifhed with a regular fupply of frefh air. (Works, v. 1. p. 99, et feq.) "Animals, whofe hearts have two ventricles, and no foramen ovale," fays Mr. Derham, "as birds, dogs, cats, and mice, die under the action of the air-pump in lefs than half a minute, counting from the very firft exfuction, particularly in a fmall receiver." (Phyfico-Theology, p. 8.) The fame pofition is corroborated by an experiment, exhibited before the Royal Society by Dr. Hooke. He cut away the ribs, diaphragm, and pericardium of a dog, whereby the lungs and heart were brought into view; and then dividing the windpipe, he introduced into it the nozzle of a pair of double bellows, and made, at the fame time, feveral fmall punctures through the outer coat of the lungs. By blowing in a ftream of frefh air, which continued to efcape through the fmall apertures made in the lungs, he was enabled to keep thofe organs fully diftended. As long as he fupplied the lungs with air, the actions of life continued, and the heart beat very regularly; but, on intermitting the fupply, the dog would immediately fall into dying convulfive fits; and revive again as foon as the lungs were filled with a ftream of frefh air. The circulation through the lungs continued both during their diftended and collapfed ftate, and as well when they were kept at reft, as during their ftate of motion; whence he concluded, that neither the motion of the lungs, nor the ceffation of their motion, nor the ftopping of the circulation of the blood through them, was the immediate caufe of death; but the want of a fufficient fupply of frefh air. Lowthorp's Abridg. Phil. Tranf. v. 3. p. 66.

From thefe facts it was naturally concluded, that the air had undergone fome important change during its continuance in the pulmonary veficles, and a variety of hypothefes and conjectures were formed to account for this alteration. The knowledge which was then obtained refpecting the air was, however, almoft entirely confined to its mechanical properties, fo that the theories of refpiration, formed during this period, were neceffarily crude and imperfect. Boyle perceived that the air, in paffing through the lungs, became loaded with a quantity of aqueous vapour, and he farther fuppofed, that it acquired, what he calls, recrementitious fteams (Works, v. 3. p. 371, et feq.); but refpecting ſpecting the nature of theſe ſteams he forms no conjecture. He obſerved alſo, that the air in which an animal had reſpired for ſome time, was conſiderably diminiſhed in volume, an effect which he attributed to the loſs of part of its elaſticity or ſpring. The contemporaries of Boyle, for the moſt part, coincided with him in his ideas reſpecting reſpiration; there were, however, ſome philoſophers, who ſuppoſed, that beſides the addition of theſe vapours, the air, during its continuance in the lungs, imparted ſomething to the blood. Among theſe, the firſt in point of genius and originality was Mayow of Oxford. He inveſtigated the properties of the air, and the effects produced upon it by reſpiration, with great acuteneſs, and concluded, that a peculiar volatile ſpirit, which was one of the conſtituents of the atmoſphere, was abſorbed by the blood during its paſſage through the lungs. Borelli, Lower, Willis, and others, adopted opinions in many reſpects ſimilar to that of Mayow; they imagined, that either a portion of the whole maſs of air, or ſome particular conſtituent of it, was abſorbed by the blood, and by this means converted this fluid from the venous to the arterial ſtate. But ſo little real knowledge was at this time poſſeſſed reſpecting the compoſition of the atmoſphere, that they entirely failed in their attempts to aſcertain the nature of the matter abſorbed, and their hypotheſes appeared ſo extravagant, and ſo little founded upon truth, that their doctrines fell into diſcredit, became neglected, and at length were totally forgotten. De Motu Anim. p. *2a*. prop. 113. De Corde, p. 159—165. Willis, Pharm. Rat. p. ii. p. 34.

Dr. Hales devoted much of his attention to this ſubject, and performed many experiments with a view to illuſtrate the manner in which the air is affected by the lungs; he concludes nearly as Boyle had done, that it acquires a noxious vapour, and that its elaſticity is diminiſhed. (Statical Eſſays.) The learned Boerhaave confeſſes his inability to explain the changes which the air experiences by reſpiration. (Prælect. t. 5. p. 169, et ſeq.) The opinion of Haller was not materially different from that of Boyle and Hales; he had collected all the different theories which have been advanced upon this ſubject, and after reviewing them with his accuſtomed candour and perſpicuity, he concludes, that the air, when it is emitted from the pulmonary veſicles, is combined with a quantity of water, and a peculiar noxious vapour, and has its elaſticity diminiſhed. (Notæ ad Boerhaav. Prælect. t. 5. p. 170. Element. Phyſiol.) Such was the imperfect ſtate of our knowledge, when Haller wrote his Elements of Phyſiology! This noble monument of induſtry and genius was ſcarcely publiſhed, when Dr. Black commenced his experiments upon fixed air, and among other intereſting diſcoveries, ſatisfactorily proved, that this peculiar gaſeous ſubſtance is generated in the lungs during reſpiration.

"So early as the year 1757," ſays this diſtinguiſhed philoſopher, "I convinced myſelf, that the change produced in wholeſome air by breathing it, conſiſts chiefly, if not ſolely, in the converſion of part of it into fixed air; for I found, that by blowing through a pipe into lime-water, or a ſolution of cauſtic alkali, the lime was precipitated, and the alkali rendered mild." (Black's Lectures, by Robiſon, v. 2. p. 87.) At a later period, Mr. Bewley detected the formation of carbonic acid in reſpiration by a method ſomewhat ſimilar: he found, that on breathing through an infuſion of litmus, the ſame change to a red colour was produced in it, as when it was expoſed to the action of fixed air; and when, by adding a few drops of the water of potaſſa, the blue colour was reſtored to the infuſion, it could again be made to diſappear by ſuperſaturating it with the acid expired from the lungs. Prieſtley on Air, v. 5. p. 383.

The particular ſubſtance which conſtituted the wholeſome part of atmoſpheric air, was not, however, known to Dr. Black at the time his experiments were made: and long before the compound nature of the atmoſphere was aſcertained, it had been ſuppoſed by many philoſophers, that, to uſe the language of biſhop Berkeley, "there was no ſuch thing as a pure ſimple element of air. There is," he adds, "ſome one quality or ingredient in the air on which life more immediately and principally depends. What that is, though men are not agreed, yet it is agreed it muſt be the ſame thing that ſupports the vital and the common flame; it being found that when air, by often breathing in it, is become unfit for the one, it will no longer ſerve for the other. This quality of the air is neceſſary both to vegetables and animals, whether terreſtrial or aquatic; neither beaſts, inſects, birds, nor fiſhes, being able to ſubſiſt without air: and when air is deprived of this ingredient, it becometh unfit to maintain either life or flame, even though it ſhould retain its elaſticity." (Siris, § 143, et ſeq. 2d edition.) Dr. Hooke aſſerted, that this ingredient or ſubſtance, inherent in, and mixed with the air, is like, if not the very ſame, with that which is fixed in ſaltpetre, by which, during combuſtion, inflammable bodies are diſſolved. (Micrographia, p. 103.) The ſame opinion was afterwards held by Willis, Lower, and Mayow, all of whom likewiſe conſidered the nitrous quality of the air to act an important part in reſpiration. The laſt author, in particular, made experiments preciſely ſimilar to thoſe which have lately been brought forward to prove, that both by the burning of a candle, and other combuſtible bodies, and by the reſpiration of animals, the nitro-aërial particles of the air were exhauſted, whereby the volume of air was diminiſhed, and the reſidual air was unable afterwards to ſupport either life or flame. (Tractat. Quinque, p. 98, et ſeq.) The exhibition, however, of this peculiar, or nitro-aërial, part of the air in a diſtinct and ſeparate form, we owe to the genius of Scheele and Dr. Prieſtley, who diſcovered, independently of each other, in the year 1774, pure or dephlogiſticated air or oxygen gas. The atmoſphere, which, until this period, had been regarded as a homogeneous elementary body, was diſcovered by theſe celebrated experimenters, to be compounded of two aëriform fluids, poſſeſſing diſtinct properties, and having totally different purpoſes in the economy of nature. Theſe ſubſtances, which have ſince obtained the names of oxygenous and azotic gaſes, were found to exiſt in the atmoſphere, in the conſtant proportion of about 22 to 78. This great diſcovery, and the uſe which he made of it, enabled Dr. Prieſtley to propoſe the firſt conſiſtent explanation of the phenomena of reſpiration that had ever been offered to the public; and, although the theoretical opinions on which that explanation was partly founded, no longer exiſt, yet it ſhould never be forgotten that his experiments and diſcoveries firſt pointed out the true path of inveſtigation; and have contributed, in a pre-eminent degree, to advance our knowledge of this moſt important function. The cauſe of the unfitneſs of air, beyond a certain extent, to ſupport life and flame, he proved to ariſe from the deſtruction of its pure part, or what has ſince been called its oxygen gas; and he concluded, that, in reſpiration, combuſtion, and calcination, which, in conſequence of his peculiar theory, he ſtiles phlogiſtic proceſſes, it underwent preciſely the ſame changes. Philoſ. Tranſ. 1776. Obſ. on Air, v. 3. p. 9.

About a year after the publication of Dr. Prieſtley's experiments, the celebrated and unfortunate Lavoiſier preſented

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sented a memoir on respiration to the French Academy of Sciences. (Mem. de l'Acad. des Sciences, 1777.) After paying a tribute of respect to the genius of Dr. Priestley, he proceeds to an accurate examination of his experiments, and the conclusions which were deduced from them. He agrees with the doctor in supposing, that the proportion of oxygen is diminished in air which has been respired, but upon a careful analysis of the residue, he finds it to differ from the air left after the calcination of metals, which is merely azotic gas, in containing a quantity of carbonic acid. He also observed, that the bulk of the air was somewhat diminished, and we learn in general from these experiments, that the changes produced in air by respiration, consist in the removal of part of the oxygen, in the addition of a quantity of carbonic acid gas, and in the diminution of its volume. He supposes that the azote is not affected by the process, and that it serves merely to dilute the oxygenous part of the atmosphere.

In this paper, M. Lavoisier does not mention the aqueous vapour which is so evidently discharged from the lungs by respiration; it is impossible that it could have been overlooked by so accurate an observer; we may therefore conjecture, that he omitted to mention it, because at this period he considered it as only diffused through the air expired from the lungs, by the process of evaporation, and not formed in consequence of the operation of any chemical affinities.

The conclusions of this philosopher respecting the changes produced by respiration upon the air taken into the lungs, are for the most part acquiesced in by modern physiologists, and the researches which have been since made upon this subject are principally directed, either to ascertain with more precision the proportion of the respective ingredients in the air of expiration, or to frame hypotheses to account for the operation of the lungs in effecting these changes.

Among the investigations, however, of a date subsequent to this memoir of Lavoisier, those of Messrs. Allen and Pepys, published in the Philosophical Transactions, 1808 and 1809, deserve peculiar mention, on account of their great accuracy, and the satisfactory manner in which they have consequently enabled us to determine some doubtful points.

Quantity of Oxygen consumed.—"A difficult and interesting question," says Dr. Bostock, "respecting the consumption of oxygen, is the absolute quantity of this gas consumed by respiration in a given time. The first calculations which were made upon this subject, in consequence of the imperfect nature of the apparatus employed, and of the want of a sufficient dexterity in the management of pneumatic experiments, were unavoidably vague and inaccurate. The difficulty was much increased by a circumstance first noticed by Dr. Crawford, and afterwards more fully investigated by M. Jurine of Geneva, and M. Lavoisier, that the respiration of the same animal in different states of the system, and under the operation of different external circumstances, affects the air in very different degrees. This curious fact, which affords an insight into some of the most important operations of the animal economy, must unavoidably produce great differences in the results of the best conducted experiments, and will render it impossible for us to arrive at more than an approximation to the truth. The circumstances which have been discovered to influence the chemical effects of the respiration are, the temperature of the air respired, the degree of muscular exertion, the state of the digestive organs, and the condition of the system as affected by fever; it is highly probable that other circumstances will be discovered, by multiplying and varying our experiments upon the living body."

An experiment performed by Lavoisier, upon a guinea pig, seems to have been the first in which a perfect apparatus, and the necessary degree of accuracy, were employed. (Mem. de l'Acad. des Sciences, 1780, p. 401—8.) The animal was confined over mercury, in a jar containing 248 cubic inches of gas, consisting principally of oxygen. In an hour and a quarter, the animal breathed with much difficulty, and being removed from the apparatus, the state of the air was examined. Its bulk was found to be diminished by eight cubic inches, and of the remaining 240 inches, 40 were absorbed by caustic potash, and consequently consisted of carbonic acid gas. Taking 100 parts of this air, these numbers will be as follows; the air was diminished to 96.5, or by 3.5 cubic inches, and of the remainder, 16.5 were converted into carbonic acid gas, and absorbed by potash, which reduces the quantity of air to 80 cubic inches. Towards the conclusion of the experiment, the air would be necessarily much less fit for performing the functions of the lungs than the air of the atmosphere, in consequence of the carbonic acid gas which it contained; but as the air employed was originally much purer than the atmosphere, the author supposes, that the quantity of oxygen destroyed, was probably about the same which would have been consumed under the ordinary circumstances of respiration.

The same philosopher performed a second experiment upon the same species of animal, with still more accuracy, in which pure oxygen was employed. (Ann. de Chimie, t. 5. p. 261, et seq.) This experiment continued during an hour and a half, and the animal being then removed from the jar, the air was analysed as in the former case: 1728 cubic inches of air were found to be reduced to 1673, *i. e.* had suffered a diminution of 55 inches, caustic potash absorbed about 229.5 inches, leaving a residue of pure oxygen. These numbers, estimated as in the former case, will be nearly as follows; 100 inches were reduced to 96.82, or by 3.18 inches, the potash absorbed about 19 inches, reducing the whole quantity of air to 77.82 parts. The quantity of carbonic acid was here somewhat greater than in the former experiment, which may be attributed to the air employed being pure oxygen, and to the process having been continued for a somewhat longer space of time than in the former instance. Upon the whole, the results correspond as nearly as can be expected, from the very delicate nature of the experiments.

Dr. Menzies first attempted to ascertain the quantity of oxygen consumed by a man, in the course of a day. He found by experiment, that one-twentieth part of air, which had been once respired, is converted into carbonic acid gas: this he concludes must have been oxygen, as that part of the air alone is affected by respiration. He conceives that 720 cubic inches of air are respired in a minute, of which consequently 36 will be consumed. From these data he estimates, that in the space of 24 hours, 51,840 cubic inches, or 17625.6 grains of oxygen, are consumed and converted into carbonic acid gas. In this calculation several important particulars appear to have been overlooked, and accordingly it will be found to differ from the results of the more accurate experiments, which have been since performed by M. Lavoisier, and Mr. Davy.

The experiments which were made by M. Lavoisier, in conjunction with his friend M. Seguin, were conducted with every possible attention to accuracy, and with an apparatus more complete than any which has ever been employed in physiological researches. An account of them is detailed in two papers in the memoirs of the Academy of Sciences

Sciences for the years 1789 and 1790; but notwithstanding the peculiar advantages under which they were performed, their results will not be found in all instances to coincide. M. Seguin was himself the subject of the experiments. The authors begin by pointing out the different effects which are produced by respiration, under the different circumstances in which the body is placed; and they farther remark, that individuals may probably differ in the absolute quantity of oxygen which they consume in the same circumstances. Making a due allowance for these variations, they conclude, that the mean consumption of oxygen by a man, during 24 hours, is somewhat more than 22 French cubic feet, or 46037.38 English cubic inches; a quantity of gas which will weigh 15661.66 grains troy.

Lavoisier was still continuing to pursue his experiments on this subject, and had constructed a very expensive apparatus, for ascertaining with still more precision the amount of the several changes produced by respiration, when he fell a sacrifice to the fury of Robespierre, and received sentence of death. He had already performed a number of experiments with his new apparatus, and earnestly requested a respite of a few days, in order to prepare them for publication; but his request was not granted. M. de la Place, who pronounced his eulogy, has fortunately given us the most important results: they will be found to differ in some particulars from the former experiments, though, with respect to the quantity of oxygen consumed, they nearly coincide. It is stated that a man in 24 hours consumes 15592.5 grains.

There are some experiments on this subject by Mr. Davy, which appear to have been executed with great accuracy. From a number of trials made upon his own respiration, he found, that 100 cubic inches of atmospheric air, after having once passed through the lungs, had lost between four and five parts of oxygen: hence he calculates, that 31.6 cubic inches of oxygen are consumed in a minute; this will give 45,504 inches in 24 hours, a quantity which will weigh 15471.36 grains. This estimate coincides nearly with that of M. Lavoisier, though it was obtained by a different process, and by the use of a different apparatus. We may, therefore, conclude, that between 45 and 46,000 cubic inches, or about 15,500 grains = 2 lbs. 8 oz. troy, is the average quantity of oxygen consumed by a man in 24 hours. Davy's Researches, p. 431—434. Essay on Respiration, p. 78—84.

In the series of experiments lately performed by Messrs. Allen and Pepys, an apparatus was employed, in which the volume of the air respired could be measured with great accuracy, and in which a large quantity (3 or 4000 cubic inches) could be respired; so that the source of error, to which experiments on a smaller scale are liable, from the influence of the residual air in the lungs, is much diminished. They caused a person to inspire, from a gasometer, 3460 cubic inches of atmospheric air, which were afterwards expired into another gasometer; and to both gasometers graduated scales were affixed, by which the quantities of air received and expelled could be accurately measured. The time occupied in the experiment was 11 minutes: about 58 respirations were made; and the deficiency in the whole volume of air, at the close of the experiment, amounted only to 23 cubic inches. One hundred parts of the expired air afforded, on analysis, 8.5 carbonic acid, 12.5 oxygen, and 79 nitrogen gas. (Phil. Transf. 1808, p. 254.) In an experiment on the respiration of another subject, the changes produced in the air were the same, but the quantity consumed was very different. The thermometer (Fahr.) being at 56°, and the barometer at 30°.3, 3300 cubic inches of atmospheric air were inspired, and 3311 expired in $5\frac{1}{2}$ minutes. One hundred parts of the expired air consisted of 8.5 carbonic acid, 12.5 oxygen, and 79 azote. When, therefore, twice the quantity of air was passed through the lungs in a given time, as great a proportion of its oxygen was consumed, and as much carbonic acid formed, as in a subject in whom only half the quantity was breathed. The experiment was repeated several times; and in one instance, 9890 cubic inches of air were breathed for $24\frac{1}{2}$ minutes, with the loss of only 18 cubic inches; and 100 parts of the expired air then afforded, on analysis, 8 carbonic acid, 13 oxygen, and 79 nitrogen. (Ibid. 257.) Now the air employed in these experiments contained, in 100 parts, 21 oxygen and 79 nitrogen; and in the numerous analyses, which were made of this air after its respiration, the portion of oxygen that disappeared was exactly replaced by that of carbonic acid produced; so that, in every instance, these two gases formed together $\frac{21}{100}$ths of the respired air, the remaining 79 parts being pure nitrogen gas. It is, therefore, concluded, that the quantity of carbonic acid gas emitted is exactly equal, bulk for bulk, to the oxygen consumed. Ibid. p. 279.

In subsequent experiments on the respiration of a guinea pig, these chemists found, that when 310 cubic inches of atmospheric air were breathed for 25 minutes by this animal, its volume experienced no variation whatever; and the portion of its oxygen, which disappeared, was replaced by an equal bulk of carbonic acid. (Phil. Transf. 1809, p. 414.) Three experiments were made on the respiration of the guinea pig, in two of which the time occupied was 25 minutes, and in the third one hour. The animal was confined in a certain volume of air, which was changed successively, so that the same air may have been breathed more than once; while in the experiments of these gentlemen on human respiration, just detailed, the air was only once breathed. In all the three experiments with the guinea pig, 100 parts of the air breathed contained the same constituent elements, *viz.* 5 carbonic acid, 16 oxygen, 79 azote. (Phil. Transf. 1809, p. 413, et seq.) Wherefore, they justly conclude, that when atmospheric air alone is respired, even by an animal subsisting wholly on vegetables, no other change takes place in it than the substitution of a certain portion of carbonic acid gas for an equal volume of oxygen. Ibid. p. 427.

In respiration as nearly natural as possible, these gentlemen estimate the quantity of oxygen consumed on an average at 26.6 cubic inches, at the temperature of 50°, and barometrical pressure of 30°.4.

The changes occurring in respiration are influenced by various causes, which modify the actions of the capillary vessels. Crawford established by experiment, that less oxygen is consumed at a high than at a low temperature (Experiments on Animal Heat, p. 307.); and this was confirmed in the experiments of Lavoisier and Seguin (Mem. de l'Acad. des Sciences, 1789, p. 575.); a man consuming, at the temperature of 54°, 1344 cubic inches of oxygen in an hour, while, in an atmosphere at the temperature of 79°, he consumed only 1210 cubic inches. Crawford observed also, that in an animal placed in a warm medium, the venous blood approached to the arterial in colour. Hence it appears, that the high temperature counteracts those chemical changes which the blood undergoes in the extreme vessels; and that the diminution in the consumption of oxygen by respiration is owing to this cause, and not, as has been supposed, to the rarity of the air at the high temperature. If the consumption of oxygen were diminished from the latter cause, the blood ought to be even more completely venous

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than uſual. The fact formerly known, that the conſumption of oxygen is influenced by the food and the ſtate of digeſtion, was confirmed and more accurately demonſtrated by Lavoiſier and Seguin. They found, that during digeſtion the conſumption of oxygen was increaſed to 1800 or 1900 cubic inches in an hour. Exerciſe, too, increaſed the proportion conſumed. It is ſtated that Seguin, in continuing the exerciſe of raiſing a weight of 15 pounds to a height of 613 feet during a quarter of an hour, conſumed 800 cubic inches, which is at the rate of 3200 in an hour; and the ſame exerciſe, made during digeſtion, occaſioned a conſumption equal to 4600.

Notwithſtanding, however, ſays Mr. Ellis, the neceſſity of oxygen gas to the continuance of reſpiration, and the great quantity of it that is thus daily conſumed, many facts tend to prove, that, by the very conſtitution of that function, a neceſſary limit is placed to its conſumption: and that this limit is determined, not by the purity of the air employed, but by ſome circumſtances inherent in the animal ſyſtem. It has been found, that the growth of vegetables is retarded by a great ſuperabundance of oxygen (Ellis's Inquiry, § 14–40.); and that, although inſects will live a conſiderable time in this gas, yet their breathing becomes oppreſſive, and they die (ibid. § 53.) long before the whole of it is conſumed. There can be little doubt but that the other claſſes of inferior animals would, under the ſame circumſtances, ſuffer in the ſame manner. In the experiment alſo made by Lavoiſier on the guinea pig, already deſcribed, the animal is ſaid to have breathed with much difficulty, although not more than one-fifth of the oxygen gas was conſumed: but ſome experiments of the ſame author, at a later period, ſeem in oppoſition to this fact. In comparing together the phenomena of combuſtion and reſpiration, he obſerves, that much more combuſtible matter is conſumed in a given time in vital air, than in that of the atmoſphere, but that the ſame circumſtance does not hold in reſpiration: for whether animals reſpire oxygen gas in its pure ſtate, or mixed with a proportion, more or leſs conſiderable, of nitrogen gas, the quantity of oxygen which they conſume is always the ſame. If a guinea pig, he adds, be kept for ſeveral days in oxygen gas, or in a mixture compoſed of fifteen parts nitrogen and one of oxygen, preſerving conſtantly theſe proportions, the animal in both caſes continues in his natural ſtate: his reſpiration and circulation do not ſenſibly appear to be either accelerated or retarded: his temperature remains the ſame, and he has only, when the proportion of nitrogen gas is too great, a ſlight diſpoſition to drowſineſs. Mem. de l'Acad. 1789.

The reſults of Mr. Davy's experience, however, do not correſpond with theſe concluſions of Lavoiſier. He introduced a mouſe into a jar containing an atmoſphere compoſed of 10.5 cubic inches of oxygen, and three inches of nitrogen gas. In half an hour the animal appeared to ſuffer much, and, in about an hour, lay down on his ſide, as if dying: in an hour and a quarter he was withdrawn from the jar alive, but motionleſs. The reſidual air, on being analyſed, was found to have loſt only 2.1 cubic inches of its oxygen gas, and conſequently 8.4 inches of that gas ſtill remained. Another mouſe, which was put at the ſame time into a jar containing 15.5 cubic inches of atmoſpheric air, was taken out through the mercury alive, but unable to ſtand, in 50 minutes: and on analyſing the reſidual air, 2.7 cubic inches of its oxygen were conſumed. Hence it appears, that the mouſe in atmoſpheric air conſumed nearly one-third more of oxygen in 50 minutes, than the other mouſe did in an hour and a quarter, when placed in a jar containing ſo large a portion of oxygen. (Reſearches, p. 443.) The reſults of theſe experiments on mice are corroborated by thoſe made by Mr. Davy on his own reſpiration; for he found, that he conſumed much leſs oxygen gas when he reſpired it pure, than when, for the ſame length of time, he breathed atmoſpheric air; and the quantity of carbonic acid formed in the firſt caſe, was but little more than half that obtained by the reſpiration, for the ſame time, of atmoſpheric air. (Ibid. 442.) Meſſrs. Allen and Pepys ſtate, on the contrary, that when pure oxygen gas is breathed, more of it is conſumed in a given time, and more carbonic acid formed, than in breathing atmoſpheric air. The experiments of Davy differ greatly therefore from thoſe of Lavoiſier as to the effects produced by the reſpiration of oxygen on the animal ſyſtem; for, while the latter philoſopher informs us, that this gas may be reſpired for many days without inconvenience, Mr. Davy has ſhewn that the animal dies long before the whole of it is conſumed. Truſting, therefore, to the accuracy of Mr. Davy's experiments, as in all reſpects ſupported by analogy, we infer, that an exceſs of oxygen gas in the air that is breathed, is not ſuited to the due maintenance of the reſpiratory function: and, on the other hand, the oppreſſive ſymptoms which the reſpration of impure air occaſions, as well as the reſults of Lavoiſier's experiments, in which nitrogen ſuperabounded, equally inſtruct us, that a deficiency of this gas is alike unſuited to it. Conſequently, we may conclude, that the atmoſphere, as it is naturally compoſed, is beſt adapted to the economy of the animal ſyſtem; but that this ſyſtem is, at the ſame time, ſo conſtituted, as to be able to bear great variations in the compoſition of the air without immediate injury to the powers of animal life.

When, however, this variation proceeds to a certain extent, the air is no longer capable of ſupporting vital action; but different animals, when confined in given volumes of air, poſſeſs the power of prolonging this action in very different degrees. Thus inſects, worms, fiſhes, and the amphibia, live until all the oxygen gas of the air is nearly or entirely conſumed (Ellis's Inquiry, § 53, et ſeq.); while birds die in a given quantity of air before they have conſumed two-thirds of its oxygen (ibid. § 84.), and a mouſe and guinea pig expire when about three-fourths of this gas have diſappeared. Dr. Prieſtley obſerved, that if a mouſe can ſtand the firſt ſhock of being put into impure air, or has been habituated to it by degrees, he will live a conſiderable time in air in which other mice will inſtantaneouſly die. (Experiments on Air, p. 257.) When, however, death does happen to animals in a given volume of air, it muſt ariſe either from the noxious operation of the nitrogen gas that is always preſent, or from that of the carbonic acid, which is formed; or it muſt proceed from the deficiency, or total abſence, of oxygen gas. Now, although nitrogen gas do not of itſelf ſupport life, yet we have no evidence that it exerts any injurious effects on the animal ſyſtem. In vegetation, and in the reſpiration of the inferior animals, it has been ſhewn to be wholly inactive; and when, in the experiment of Lavoiſier, it conſtituted $\frac{15}{16}$ths of the air employed, a degree of drowſineſs only ſeems to have been induced by it. That it is entirely paſſive, is ſtill farther confirmed by an experiment of Lavoiſier, who found that hydrogen gas, mixed in due proportion with oxygen, would ſerve the purpoſes of reſpiration as well as the air of the atmoſphere. We have no proof that nitrogen is able to enter the veſſels ſo as to produce any direct operation on the blood,—an effect which is ſtill farther forbidden by its incapacity of uniting with that fluid. We may therefore conclude, that nitrogen gas, when reſpired, neither ſuffers any change itſelf, nor produces any direct operation on the animal ſyſtem.

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The only other gas to which the death of animals, in these circumstances, can be ascribed, is carbonic acid, which, however, when formed by respiration, does not seem destructive to animal life. Dr. Goodwyn observes, that when the same air is breathed several times, so as to increase the quantity of carbonic acid, its noxious operation is to be attributed not to the presence of this acid, but to the deficiency or absence of oxygen gas (Connection of Life, &c. p. 66.); and when Spallanzani, by means of an alkaline substance, abstracted this acid as soon as formed by the respiration of birds and quadrupeds, he did not find that they lived longer in a given bulk of air than when it was suffered to remain. (Memoirs on Respiration, p. 318.) Dr. Higgins observes, that debility, convulsions, and death, follow the successive diminution of the oxygen gas of the air in respiration, long before the whole of that gas is consumed, although the carbonic acid that is generated be, in the mean time, carefully withdrawn. (Minutes of a Society, p. 160.) Indeed, we might in this, as in former examples, be led to suppose, that neither the carbonic acid formed in respiration, nor the nitrogen gas employed in that process, would exert any positively destructive operation on the animal powers, since both of them must, at all times, necessarily be present in the system; and seeing, moreover, that the abstraction of oxygen gas alone is sufficient to account for the fatal effects which ensue, it must be deemed unnecessary to resort to the supposed agency of any subordinate cause. Inquiry, &c. § 127—130.

Quantity of Carbonic Acid produced.—Having ascertained the proportion of oxygen which is consumed in respiration, it next remains for us to determine the quantity of carbonic acid gas which is produced. It appears that Dr. Black first demonstrated its existence in air emitted from the lungs, and that Lavoisier afterwards examined it with more accuracy, and found that the air, in which an animal had expired, contained about one-sixth of its bulk of carbonic acid gas. (Acad. des Sciences, 1777.) In the experiment which this philosopher performed with a more perfect apparatus, upon a guinea pig confined in oxygen, the carbonic acid amounted to nearly one-fifth of the bulk of the whole air employed, when the animal had been detained in the apparatus until the air was reduced into a state no longer fit for respiration. (Annales de Chimie, t. 5. p. 261, et seq.) These experiments, however, only prove what proportion of carbonic acid gas will render air incapable of supporting life, without acquainting us with the quantity of this gas produced under the ordinary circumstances of respiration.

M. Jurine of Geneva, appears to have been the first who attempted to calculate the absolute quantity of carbonic acid formed by the respiration of man; he imagined that it constituted about one-tenth part of the air emitted from the lungs. (Encycl. Method. Médécine, v. 1. p. 494.) Dr. Menzies instituted a set of experiments to discover the absolute quantity generated in a given time; he infers from them, that $\frac{1}{20}$th part of air which has been once respired, is carbonic acid, and estimates, that a man, in 24 hours, sends out from the lungs 51,840 cubic inches, or nearly 4lbs. troy; but this estimate is probably over-rated. Essay, p. 50.

The circumstances which have been already pointed out, as influencing the consumption of oxygen, have at least as powerful an effect upon the production of carbonic acid gas. Accordingly we shall find the calculations of the most accurate experimenters upon this subject so widely different from each other, that it seems scarcely possible to arrive at any tolerable degree of certainty.

M. M. Lavoisier and Seguin, in their first memoir of 1789, estimate the average quantity of carbonic acid gas, formed by a man in 24 hours, at 17720.89 grains troy; in their subsequent memoir, published in the following year, this quantity is diminished to 8450.24 grains; and in the eulogy of Lavoisier by La Place, it is stated, that Lavoisier, in his last experiments, reduced it still lower, to 7550.40 grains. Mr. Davy, on the contrary, whose experiments seem to have been performed with great exactness, though with a less complicated apparatus than that employed by the French chemists, supposes the carbonic acid formed in 24 hours to amount to 17811.38 grains (Researches, p. 434.), a quantity which is not very different from that first announced by Lavoisier.

Mr. Murray found that he expired 265 cubic inches of air in 30 seconds, and he discovered in this 16.57 cubic inches of carbonic acid. Making a deduction for the small quantity of this acid contained in the inspired air, he assumes 16 cubic inches as the quantity formed by respiration in 30 seconds. He calculated the quantity of oxygen consumed at 19 cubic inches: the ratio, therefore, between the calculated quantity of oxygen consumed, and the actual quantity of carbonic acid formed, was as 100 to 84.5. Syst. of Chemistry, v. 4. p. 494.

Messrs. Allen and Pepys conclude from their experiments, that the atmospheric air expelled from the lungs usually contains from 8 to 8.5 *per cent.* of carbonic acid, and that the proportion of acid in no case exceeds 10 *per cent.* They estimate the quantity of acid thrown off in 11 minutes at 302 cubic inches, which is about 27.45 *per* minute; and supposing the production uniform for 24 hours, the total quantity in that period would be 39,534 cubic inches, weighing 18,683 grains, or rather more than 11 oz. troy. Phil. Trans. 1808.

If a larger quantity of air be passed through the lungs in a given time, more carbonic acid is formed, but it still preserves the same ratio to the other component parts of the expired mass. Thus, 3300 cubic inches of air were inspired by one person in $5\frac{1}{2}$ minutes, and as each 100 parts contained 8.5 of carbonic acid, the whole acid formed in this time was 281.42 cubic inches. The first and last portions of a single expiration differ considerably in their proportions of carbonic acid, because the former consists principally of air contained in the fauces, trachea, and its larger branches, while the latter comes from the air-cells themselves. In small quantities of the first portions, given off by natural and easy expirations, the carbonic acid formed from three to five *per cent.* When an expiration was made as complete as possible, the utmost efforts being employed to press the air out of the lungs, 204 cubic inches were expelled, and the proportion of carbonic acid was 9.5. Now as the first portions contain only from three to five *per cent.*, the last must have contained more than the average, or 9.5. When 300 inches of atmospheric air were repeatedly breathed, until the laborious state of respiration compelled the operator to desist, 100 parts of the expired air contained 9.5 carbonic acid, 5.5 oxygen, and 85 azote. When a similar trial was repeated until the operator became insensible, 100 parts of the air contained 10 carbonic acid, 4 oxygen, and 86 azote. (Phil. Trans. 1808.) When 3260 cubic inches of gas, consisting of 97.5 oxygen, and 2.5 azote in 100 parts, were respired for 9 minutes and 20 seconds, the expired air measured 3193 inches, and contained, in 100 parts, 11 carbonic acid, 83 oxygen, 6 azote. Here, therefore, 37.64 cubic inches of carbonic acid were emitted from the lungs in one minute by the same individual, who produced 27.45 *per* minute, when he breathed common air. In another instance, 3420 cubic inches of similar air were breathed for 7′ 25″:

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the expired air meafured 3362. The firft 250 cubic inches confifted, in 100 parts, of 9 carbonic acid, 25 azote, 66 oxygen; the laft, of 12.5 carbonic acid, 5.5 azote, 82 oxygen: 100 parts of the whole expired air confifted of 12 carbonic acid, 6.5 azote, 81.5 oxygen. The whole quantity of carbonic acid gas emitted in this experiment was 396.78 cubic inches. Ibid.

The refult, which fhews a greater evolution of carbonic acid when oxygen is refpired, is totally adverfe to thofe obtained by Mr. Davy, and already mentioned. We do not therefore feel authorifed in determining whether, in general, an increafe in the quantity of oxygen employed augments the carbonic acid evolved, or whether the proportion of the latter depends on the condition of the refpiratory organs, or variations in the exercife of their functions.

If it fhould be allowed, as the greateft number of inveftigations on the fubject tends to prove, that the carbonic acid formed in refpiration be lefs in bulk than the oxygen gas, which difappears, yet the weight of the compound is increafed by the addition of carbon, derived from the animal fyftem. Lavoifier and Seguin eftimated the weight of oxygen gas confumed by a man in 24 hours, at 15661.66 grains; and that of carbonic acid produced in the fame fpace of time, at 17720.89 grains; the carbon conftituting $\frac{1}{8.6}$th of the weight of the acid formed. In the experiments of Mr. Davy, the volume of oxygen gas that difappeared every minute was 31.6 cubic inches, and that of carbonic acid produced 26.6 inches. But one cubic inch of oxygen gas weighs 0.3474 of a grain, and therefore 31.6 cubic inches will weigh 10.97784 grains: again, one cubic inch of carbonic acid weighs 0.476 of a grain, and therefore 26.6 cubic inches will weigh 12.4222 grains. From thefe facts it would feem, that the proportion of carbon in the carbonic acid of refpiration is much lefs than that which forms the fame acid in combuftion. For 100 parts of carbonic acid, formed by burning the diamond, contain, according to the very accurate refearches of Allen and Pepys (Phil. Tranf. 1807) 20.72 or 28.81 of carbon: and the proportion of carbon in 100 parts of acid is 28.77, when it is formed from charcoal and oxygen. (Murray's Chemiftry, ed. 3. v. 2. p. 487.) But there are fome points of the fubject requiring the elucidation of further refearches.

Alteration in the Bulk of the refpired Air.—On no point of the refpiratory procefs are the recorded refults of different inquiries more at variance with each other, than about the queftion of the change in volume of the air, and the amount of that change. At firft, it was generally believed, that the refpired air undergoes fome lofs; and this opinion maintained its ground until very lately, although experiments were publifhed, in which no fuch lofs was obferved. The moft accurate modern refearches are much in favour of the opinion, that the bulk of the atmofphere is not affected by breathing; and this view of the fubject is the moft generally entertained in the prefent day. Some think, that, although the volume of the refpired air is not affected in ordinary natural breathing, it may be altered under particular circumftances. The determination of the queftion concerning the volume of the air, is clofely connected with another refpecting its abforption by the blood. We fhall detail the facts and arguments on both fides, and point out that which has the moft numerous and ftrong proofs in its favour.

The diminution of bulk was early noticed by Boyle, who eftimated it at about $\frac{1}{30}$th of the air employed. Mayow, whofe genius enabled him to anticipate fo many important difcoveries of modern chemiftry, confined an animal in a glafs veffel inverted over water, and, by the aid of a fyphon, brought the water on the infide of the veffel to a level with that on the outfide. Having then marked the height of the water by pieces of paper affixed to the fide of the veffel, he obferved its gradual rife as the animal continued to breathe; and then, comparing the fpace occupied by the air at the commencement of the experiment, with that which it poffeffed when the animal ceafed to breathe, he found that it was reduced about $\frac{1}{14}$th part of its bulk. (Tractat. Quinque, p. 104.) In the experiments of Dr. Hales, the degree of diminution varied from $\frac{1}{13}$th to $\frac{1}{30}$th of the air employed. Statical Effays, v. 1. p. 230. v. 2. p. 320.

Lavoifier, in the firft memoir which he publifhed upon refpiration, afcertained the degree of diminution with more accuracy, and ftated, that air, when rendered unfit to fupport life, was reduced $\frac{1}{60}$th in bulk. (Mem. de l'Acad. 1777.) The experiments of Dr. Goodwyn afforded the fame refult.

The volume of air, taken into the lungs at a fingle infpiration, contained,

Phlogifticated air - - - - -	80
Dephlogifticated air - - - -	18
Fixed air - - - - - - -	2
	100

The volume of air, expelled from the lungs at the next fucceeding expiration, contained,

Phlogifticated air - - - - -	80
Dephlogifticated air - - - -	5
Fixed air - - - - - - -	13
	98

Connection of Life, &c. p. 51.

In the account which Lavoifier gives of the firft experiment upon the guinea pig, he found the diminution to amount to $\frac{1}{31}$ of the bulk of the air employed (Mem. de l'Acad. 1780, p. 401.); and in the fecond fet of experiments, the diminution was found to be $\frac{1}{32}$d part (Annales de Chimie, tom. v. p. 261.); the greater abforption, in thefe cafes, probably depending upon the greater purity of the air employed. In the experiments performed by Lavoifier, in conjunction with Seguin, upon the refpiration of man, though in other refpects fo remarkable for their accuracy, there is no mention made of this circumftance, nor is it noticed by La Place, in his account of the experiments in which Lavoifier was engaged, immediately previous to his execution. In thefe inftances we cannot determine whether Lavoifier conceived that no diminution actually took place, or whether he only neglected to notice it.

The general fact of the diminution of bulk in refpired air, has been fince confirmed by Mr. Davy, though the exact degree of abforption varied fo much in his different experiments, that it is difficult from them to fix upon a quantity which may indicate the ordinary amount of this diminution. In the confideration of this queftion, as in the preceding one refpecting the confumption of oxygen, and the production of carbonic acid, there are two diftinct objects of inquiry. We may examine the degree of diminution produced in a given quantity of air, in which an animal has been confined, until it is no longer fit for fupporting refpiration; and in the fecond place, we have to afcertain the amount of the diminution which takes place in air, that has only once paffed through the lungs, as is the cafe in the procefs of ordinary refpiration. The firft of thefe points only was examined by Lavoifier. Mr. Davy has made experiments upon both. In air which had only once paffed through the lungs, he found the diminution in different

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trials to vary from $\frac{1}{70}$th to $\frac{1}{100}$th: when he received the ſame air repeatedly into the lungs, it was found to be diminiſhed as much as $\frac{1}{18}$th of its original bulk. (Reſearches, p. 431—435.) The former experiments, however, alone indicate the effects of natural reſpiration, and taking an average of their reſults, the amount of the diminution will be about $\frac{1}{80}$th part of the whole air received into the lungs.

Mr. Murray of Edinburgh made ſome experiments on the alterations produced in the air by natural reſpiration, from which he *calculates* (for the quantity of air inſpired was not *meaſured*) that there is a loſs of 6 cubic inches in 265. Syſtem of Chemiſtry, vol. iv. p. 493, 494.

Meſſrs. Allen and Pepys, whoſe experiments we ſhall preſently allude to, as affording the ſtrongeſt arguments againſt a change of volume in the reſpired air, in natural breathing, met with a different reſult, when the circumſtances of the experiment were changed. In their fourteenth experiment, 300 cubic inches of atmoſpheric air were, in the ſpace of three minutes, paſſed eight or ten times through the lungs, until reſpiration became extremely laborious, and the operator was compelled to deſiſt. On analyſing the reſpired air, it was found to contain, in 100 parts, only 5.5 oxygen, 9.5 carbonic acid, and 85 parts of nitrogen gas. In the fifteenth experiment, which occupied alſo about three minutes, until the operator became quite inſenſible, the ſame quantity of air was employed, and afforded, by analyſis, nearly the ſame reſults; for it contained, in 100 parts, 4 of oxygen, 10 of carbonic acid, and 86 of nitrogen. In the former experiment we obſerve, therefore, an increaſe of 6 parts of nitrogen, and a loſs of 6 parts of oxygen; and in the latter, the oxygen had loſt 7 from 21, and the nitrogen had gained 7 upon 29. (Phil. Tranſ. 1808, p. 260.) Hence it is inferred, that when, as in theſe experiments, reſpiration is attended with diſtreſſing circumſtances, there is reaſon to conclude that a portion of oxygen is abſorbed. Ibid. p. 280.

In ſome experiments on the reſpiration of rabbits and of guinea pigs, Mr. Berthollet found that the bulk of acid gas produced did not quite equal that of the oxygen which diſappeared; ſo that the loſs of oxygen appeared to vary from 1.07 to 4.09 *per cent.*

We proceed to ſtate the reſult of thoſe inquiries, in which the volume of the air has been found not to undergo diminution in the act of breathing. Among the earlieſt experiments of Dr. Prieſtley on reſpiration is one, in which he confined a mouſe in a jar containing a given quantity of air, which was inverted over mercury. The animal was ſuffered to remain two or three days after he had died, in which time there was no ſenſible diminution of the air; but on paſſing lime-water into the jar, the air was diminiſhed $\frac{1}{23}$th part of its bulk; and when, in a ſubſequent experiment, the reſidual air was agitated in water, it was reduced between one-fifth and one-ſixth of the whole. Obſ. on Air, vol. v. p. 112, et ſeq.

Dr. Crawford found, alſo, that when the experiment was made over mercury, the diminution was not ſenſible; but that, if water of potaſſa was added to the reſidual air, it became mild, and the air was diminiſhed in the ſame degree as if the experiment had been made over water, or nearly one-fifth of its bulk. (On Animal Heat, p. 146.) The variations in theſe reſults, compared with thoſe before enumerated, ariſe, no doubt, from the more or leſs complete attraction of the carbonic acid by the fluids, over which the experiments were made; and, from the whole of them, we may collect, that when mercury is employed, which has no attraction for carbonic acid, the diminution is hardly ſenſible; but that, when this acid is completely abſtracted by an alkaline fluid, the loſs of bulk amounts nearly to one-fifth of the whole air employed. This inference correſponds very exactly with what occurs in vegetation, and in the reſpiration of the inferior animals.

In the year 1806, Mr. Dalton's attention was directed to this ſubject, and he ſatisfied himſelf, by numerous experiments, that the bulk of carbonic acid, formed in reſpiration, was exactly equal to that of the oxygen gas conſumed. On repeating theſe experiments, Dr. Thomſon obtained, in ſome caſes, nearly the ſame reſults; but, upon the whole, the bulk of oxygen that diſappeared was ſomewhat greater than that of the carbonic acid formed. The difference, however, varied conſiderably, and kept pace with the diminution in the whole bulk of air; whence he conſiders it to ariſe from the abſtraction of a part of the air by ſome other way than by reſpiration: and if this be allowed for, he believes the bulk of acid produced to be preciſely equal to that of oxygen gas loſt. Hence, ſays he, this oxygen muſt be changed into carbonic acid in the lungs; for oxygen gas, when changed into carbonic acid, does not ſenſibly alter its bulk. Syſtem of Chemiſtry, 3d edition. vol. v. p. 736, and 774.

Theſe concluſions have been completely confirmed by the very accurate experiments, already noticed, of Allen and Pepys. There was a loſs of 23 cubic inches only in 3460 breathed once, at 58 reſpirations, which occupied 11 minutes. In another experiment, 9890 cubic inches, of which the breathing occupied $24\frac{1}{2}$ minutes, loſt only 18. In ſubſequent experiments on the reſpiration of a guinea pig, theſe chemiſts found, that when 310 cubic inches of atmoſpheric air were breathed for 25 minutes by this animal, its volume experienced no variation whatever; and the portion of its oxygen, which diſappeared, was replaced by an equal bulk of carbonic acid. Theſe reſults were particularly ſatisfactory in their tendency to eſtabliſh the point, that the air undergoes no diminution; becauſe the time which they occupied was more conſiderable, and the chance of error, therefore, diminiſhed. The third trial with the guinea pig occupied one hour: the bulk of the atmoſpheric air, before the experiment, was 1060 cubic inches; after the experiment, 1061; the carbonic acid formed 53 cubic inches; the carbonic acid *per* minute, .88 of a cubic inch. (Phil. Tranſ. 1809, p. 414.) Wherefore they juſtly conclude, that when atmoſpheric air alone is reſpired, no other change is produced in it than the ſubſtitution of a certain portion of carbonic acid gas for an equal volume of oxygen.

The reſults of all the trials made by theſe gentlemen were not uniform, and the deficiency was ſometimes greater than what has been ſtated. The deficiency varied from 4 to 62 cubic inches in ten experiments; in each of which, between 3 and 4000 cubic inches of air were breathed once, the time employed being 10 or 11 minutes in each experiment. They conſider that the deficiency principally ariſes from the laſt expiration being made into a gaſometer, and conſequently meeting with more reſiſtance; ſo that the lungs are leſs completely evacuated than in the expiration into the open air, with which the experiment commenced.

The difficulty, which theſe gentlemen allude to, of bringing the lungs to the ſame ſtate exactly at the end as they were in at the beginning of the experiment, is evinced by the reſult of their thirteenth trial, which alſo affords a ſtrong argument againſt the diminution of bulk, which has hitherto been almoſt generally aſſumed as a reſult of the reſpiratory proceſs. In $5\frac{1}{2}$ minutes, 3300 cubic inches were inſpired, and 3311 expired; thus exhibiting an increaſe of 11.

Amid this conflict of authorities, we have no difficulty in in declaring it, as our decided opinion, that the experiments leaſt liable to error, moſt carefully performed, and therefore deſerving our greateſt confidence, are thoſe which contradict the notion of an abſorption of oxygen.

"In caſes," ſays Mr. Ellis, "where ſo many cauſes concur to render the apparent bulk of acid leſs than it ought to be, and leſs than that of the oxygen loſt, it is ſurely more reaſonable to give greater credit to thoſe reſults, which indicate an equality of volume between theſe gaſes, than to thoſe which declare a difference; ſince the former not only go with the latter to the fulleſt extent; but, purſuing the ſame track, have actually gone beyond them, and thereby reached a point, which the others have been unable to gain. In fact, to prefer thoſe experiments, which indicate a difference, to thoſe which prove an equality of volume, would be not only to halt in our progreſs, but to make a retrograde movement, and thus to ſuffer a negative inference to outweigh a poſitive proof." Further Inquiry, p. 279.

By the experiments of Meſſrs. Allen and Pepys, we have ſeen it proved, that when a guinea pig breathes a given quantity of air in a natural manner, no variation whatever was obſerved in the bulk of that air; and that in man, in whom many cauſes, not affecting the lower animals, contribute to produce error, when the reſpiration was nearly natural, the general average of the deficiency, in the total amount of common air inſpired, was only about ſix parts in 1000, and in one inſtance conſiderably leſs than two. The ſmallneſs of this deficiency, ſay theſe chemiſts, ſurpriſed us very much; and it probably ariſes from the difficulty, or, as they elſewhere term it, the impoſſibility of always bringing the lungs to the ſame ſtate after forcible expiration.

Under other circumſtances, as in the experiment recited above, of reſpiration continued until the operator became inſenſible, theſe gentlemen conceive that oxygen is abſorbed. To this inference, ſays Mr. Ellis, as far as it regards what is here called an abſorption of oxygen, we muſt beg leave to object. That the united volumes of oxygen and carbonic acid expired were leſs than the total volume of oxygen inſpired, we readily grant; but we deny that this fact affords any adequate proof of an abſorption of this latter gas. To the chemiſt, indeed, the mere fact of the diſappearance of a portion of oxygen may ſupply ſufficient evidence of its abſorption, in the ſenſe in which he may chooſe to employ that term; but the phyſiologiſt farther requires to know, by what organs or veſſels it is removed, in what courſe it is conveyed, and what uſes it is deſtined to ſerve. On none of theſe points, however, does he gain any information; and all the anatomical knowledge which he poſſeſſes of the ſtructure of the lungs, and of the properties of the living abſorbent ſyſtem, is adverſe to ſuch a doctrine. Should he apply to the chemiſt for a ſolution of his difficulties, he is told that oxygen does not chemically combine with other bodies, unleſs it be brought into actual contact with them; and he knows, that, in the preſent caſe, this contact is impoſſible, becauſe the membranes, both of the air-cells and blood-veſſels, are interpoſed between the air and the blood in the lungs. Even if, contrary to all experience and analogy, he were to concede to the chemiſt the exiſtence of pores or other paſſages in the cells and blood-veſſels, through which this oxygen might be attracted and combine with the blood, he is equally embarraſſed to diſcover the reaſon or mode in which it is again ſo ſpeedily expelled, or what uſeful purpoſe it can ſerve, ſince no portion of it is permanently retained. The ſcience of chemiſtry furniſhes no example of ſimilar operations,—of fluids which attract gaſes and combine them, ſo as to reduce their elaſticity, and then, without any apparent change of condition or circumſtances, almoſt inſtantly diſcharge them in a new and elaſtic form.

If, farther, we compare the reſults of the two ſeries of experiments made by Meſſrs. Allen and Pepys, the difficulties, in a phyſiological point of view, greatly accumulate upon us. For, if an *abſorption* of oxygen really take place in the lungs, how does it happen, that, in the firſt thirteen experiments, made with ſeveral thouſand cubic inches of air, and which occupied from ten to twenty-four minutes of time, a very ſmall loſs in the whole bulk of air, and not the ſmalleſt in its proportion of oxygen, occurred; while, in two other experiments, made with only 300 inches of air, and continued only for three minutes of time, a great deficiency in the whole bulk of air, and a loſs of one-third of its oxygen, took place. In all theſe experiments, except the twelfth, in which, inſtead of loſs, there was actually an increaſe of eleven cubic inches upon the bulk of air reſpired (Phil. Tranſ. 1808, p. 256.), the ſame perſon appears to have breathed, and the air was of ſimilar compoſition. Conſequently, the cauſe of variation in the reſult is to be ſought, not in any difference in the animal organs, or in the original compoſition of the air, but, probably, in ſome circumſtances of diſſimilarity, which accompanied the progreſs of the experiment.

Now the bare ſtatement of facts points out a great diſſimilarity, not only in the chemical reſults, but in the circumſtances accompanying the experiments, and in the effects which they produced in the ſyſtem. For in the firſt thirteen experiments, which occupied from ten to twenty-four minutes, and in which no loſs of oxygen occurred, the air was only *once* paſſed through the lungs, the breathing was nearly natural, the operator ſcarcely fatigued, and his pulſe not raiſed more than about one beat in a minute. (Ibid. 253.) But in the two experiments in which oxygen is ſaid to be abſorbed, the ſame air was paſſed *eight or ten times* through the lungs; and, in leſs than a minute, the operator found himſelf obliged to take deeper and deeper inſpirations. At laſt, the efforts to take in air became very ſtrong and ſudden, with a great ſenſe of oppreſſion and ſuffocation in the cheſt, indiſtinct viſion, buzz in the ears, loſs of recollection, and, at the end of three minutes, perfect inſenſibility. (Ibid. 260—262.) This difference in the effects produced in the ſyſtem, we do not heſitate to aſcribe to a difference in the *compoſition* of the air, which, in the firſt experiments, was reſpired in a natural ſtate, but, in the two laſt, by repeated breathing, was rendered more and more unfit to carry on reſpiration, until, at length, its power of ſupporting that function altogether ceaſed.

But becauſe under circumſtances, in which the mental and animal powers were in complete abeyance, the reſpiratory organs were not able to make ſo complete an expulſion of the inſpired air as they effect in their natural ſtate of health and vigour, are we, therefore, entitled at once to conclude, that all the air which was not expelled was really *abſorbed*? Setting aſide the anatomical difficulties in the caſe, let us, for a moment, look only to the chemical conſequences, to which ſuch a concluſion would conduct us. If the mere diſappearance of any gas, received into the lungs, be ſufficient evidence of its abſorption, then every gas, which is not returned, muſt be held to be abſorbed. Are we then prepared to admit that hydrogen and nitrogen gaſes are abſorbed by the blood? for, when their reſpiration is carried to its full extent, they, too, equally diſappear. This ſuppoſed abſorption, however, cannot proceed from the operation of chemical attraction, for little or no affinity ſubſiſts between theſe gaſes and the blood. Neither can it ariſe from the operation of the living ſyſtem; for it occurs only when

when the living powers are about to ceafe. To us there appears but one way of efcaping from thefe manifold difficulties, which is fimply to conclude, that the infpired air, which is not returned, is retained in the cells of the lungs. Such a fuppofition diffipates at once all anatomical and chemical difficulties, and explains why no air difappears in natural refpiration, when the expiratory powers are in full vigour and able to expel it, and why its difappearance increafes in proportion as the actions of thefe powers decline and ceafe.

It is, however, worthy of remark, that, in thefe laft experiments, not only was there a diminution in the whole bulk of air, but its relative proportions likewife varied; for, in 100 parts, the oxygen and carbonic acid amounted together only to about two-thirds of the ufual quantity of oxygen, and the deficiency was fupplied by a fuperabundance of nitrogen gas. We are not prepared to fay why, in this very embarraffed ftate of the refpiratory function, the relative proportions of the expired air fhould thus vary; but the fact proves only the retention of oxygen in the lungs, but not its abforption by the blood. Should it even be maintained that oxygen was abforbed, becaufe, in thefe two experiments, a portion of it difappeared, then, by the fame mode of reafoning, we muft alfo contend, that, in the thirteen preceding experiments, no abforption of oxygen took place, becaufe no part of it was retained; and as thefe laft experiments alone come near to the natural exercife of this function, they authorife us to conclude, that fuch fuppofed abforption of oxygen conftitutes no neceffary part of healthy refpiration. In truth, in fome inftances where a mixture of oxygen and hydrogen gafes was refpired, the oxygen and carbonic acid in the expired air uniformly exceeded, by one *per cent.* the total oxygen infpired (Phil. Tranf. 1809, p. 425.); from which it may be inferred, that thefe variations in the proportions of the expired air proceed entirely from accidental caufes, and are totally independent of any abforbent function in the lungs. Further Inquiry, v. 2. ch. 4.

If we are correct in reprefenting that the air undergoes no diminution of volume in breathing, it will follow neceffarily that no part of it can be abforbed in the lungs. This notion of abforption is not only at variance with the refults of the moft accurate direct experiments, but it is alfo repugnant to our knowledge of the ftructure of the lungs. The finenefs of the abforbing veffels, the mucus perpetually fmearing the furface of the cells, the elaftic nature of air itfelf, fo that it neither penetrates moift paper, cloth, nor fkin—all demonftrate that no air gets into the blood by this route. If, indeed, air were taken up by the abforbents, it muft pafs to the right fide of the heart, and change the colour of the blood there, which does not happen.

But if, either by the function of abforption, or by the operation of chemical affinity, air did enter into the blood, we may furely with reafon demand fome proof of its prefence; yet, fays Haller, "Nulla unquam in vivo calido animali bulla aëris in fanguine vifa eft." (Primæ Lin. f. 306.) This opinion is confirmed by the direct experiments of Dr. Darwin; for having inclofed a portion of the jugular vein of a fheep between two ligatures, it was cut out, ftripped of its adhering cellular membrane, and then thrown into a glafs of water of temperature 100°, ftanding under the receiver of an air-pump. It at once funk to the bottom, and did not rife when the air was exhaufted; nor, when afterwards taken out, wiped dry, and laid on the floor of the receiver, did it exhibit any fwelling under the exhauftion of the veffel. The experiment was repeated with a fimilar refult on a portion of the vena cava of a pig. Phil. Tranf. v. lxiv. p. 345.

Neither do the effects refulting from the admixture of aëriform fluids with the blood, favour the notion of the entrance of air into that fluid. "Animal, cui aër in fanguinem inflatur," fays Haller, "perit certo et velociter; neque quidquam fatis certi eft in fanguinis venarum pulmonalium aucto rubore." (Loc. cit.) This affertion is confirmed likewife by direct experiment. When Dr. Girtanner injected oxygen gas into the jugular vein of a dog, he cried dreadfully, breathed quick, and died in three minutes; when nitrogen gas was thrown in, death happened in 20 feconds. (Memoirs on Irritability, pp. 221. 223.) Air, fays Bichat, thrown into the vafcular fyftem, quickly brings on agitation, convulfions, and death. (Récherches fur la Vie et la Mort, p. 179.) By forcing air through the windpipe into the lungs with a fyringe, and confining it there, he has made it to enter into the blood-veffels, which immediately brings on agitation and exertion in the animal; and if an artery in the leg or foot be now opened, the blood will fpring out frothy, and full of bubbles of air. If hydrogen gas has been ufed, the bubbles may be inflamed; and when this frothy blood has flowed 30 feconds, the actions of life ceafe, and cannot again be reftored, even although frefh air be fupplied. Ibid. 303. Inquiry, § 102, 103.

If, then, no proof exift of the paffage of air into the blood by the ordinary courfe of the abforbent veffels, the only other mode of effecting this purpofe that has been hitherto fuggefted, is the power of *chemical affinity*. What then are the chemical affinities fubfifting between venal blood and atmofpheric air? About the middle of the 17th century, Dr. Lower obferved, that the upper furface of venal blood, received into a veffel, acquired a fcarlet colour by expofure to the air; that if this furface was removed, the fubjacent one was foon changed to the fame colour; that if the cake of blood, after being allowed to fettle in the veffel, was inverted, its exterior and upper furface fpeedily alfo affumed a florid hue; and, laftly, that if venal blood was fhaken in a veffel, fo that the air thoroughly intermixed with it, it became entirely florid. (De Corde, p. 178.) Thefe opinions were afterwards held by Sig. Fracaffati and Dr. Slare, the latter of whom obferves, that the blood thrown up by a rupture of the capillary veffels of the lungs, is frothy and of a fcarlet colour; the firft of which effects he attributes to the intermixture of air, and the latter to its tinging power. (Lowthorpe's Abridg. Phil. Tranf. v. iii. p. 235.) Mr. Hewfon employed fimilar arguments to prove, that the florid colour, acquired by venal blood on expofure, was produced by the contact of the air; and, by injecting air into the jugular vein of a rabbit, he found that it there alfo rendered the blood florid. (Hewfon on the Blood, p. 9.) M. Cigna not only confirmed the foregoing facts, but proved alfo that the change of colour in this fluid did not take place when the blood was covered with oil or placed *in vacuo*; and Dr. Prieftley afcertained that not only by common air, but more efpecially by oxygen gas, this florid colour was produced on the black craffamentum of blood. On Air, v. iii. p. 66.

In effecting thefe remarkable alterations in the colour of the blood, the air itfelf, at the fame time, fuffers material changes. Dr. Prieftley found, that in twenty-four hours oxygen gas was fo far depraved by being in contact with venal blood, that one meafure of it and two of nitrous gas occupied the fpace of a meafure and a half, whereas, at the beginning of the experiment, they occupied the fpace of no more than half a meafure. (Loc. cit. p. 75.) Dr. Goodwyn

wyn confined venal blood under a jar of oxygen gas inverted in mercury, and repeatedly obferved that the change of colour was always very fudden, and, after feveral minutes, the mercury afcended two or three lines; from which he concluded that a fmall portion of the air had difappeared. (Effay, p. 61.) The precife change, however, which the air underwent, feems firft to have been obferved by Dr. Girtanner, who placed fix ounces of venal blood in a jar of oxygen gas inverted in mercury; the blood prefently affumed a florid colour; the air was fomewhat diminifhed in bulk, and contained a portion of carbonic acid, which was attracted by lime-water. (Beddoes' Obf. on Calculus, &c. p. 219.) Dr. Boftock obferves alfo, that a diminution of oxygen and production of carbonic acid take place when a piece of craffamentum is placed in a jar filled with oxygen gas. (On Refpiration, p. 227.) The fame production of carbonic acid occurs when blood is placed in contact with atmofpheric air. A quantity of this fluid was received into a cup, and confined in a jar of air inverted in water, a glafs of lime-water having been previoufly placed in the cup. The internal furface of the jar was foon bedewed with moifture, and a pellicle began to form on the lime-water, which, in a few hours, was increafed to a thick cruft of carbonate of lime. The craffamentum was then removed, and a frefh glafs of lime-water was placed in the ferum, which, in thirty-fix hours, had acquired a cruft like the former, and the water had rifen confiderably into the jar. In another experiment, where the ferum was placed for twenty-four hours in a jar of air inverted in mercury, the refidual air rendered lime-water milky, and the remainder had loft a part of its oxygen. A fimilar production of carbonic acid feems to have occurred, when, with a fmall diminution of the gas, a flight change of colour was produced on venal blood by placing it in contact with nitrous oxyd, in the experiments of Mr. Davy; for when a folution of ftrontian was admitted to the oxyd, it became flightly clouded, and, with the diminution of bulk that followed, minute portions of carbonic acid and nitrogen gas were produced. (Refearches, pp. 377. 380. 387.) Hence then we learn, that when venal blood is expofed to the contact of atmofpheric air, of oxygen gas, or of nitrous oxyd, it prefently affumes a florid colour, and, at the fame time, the volume of air is fomewhat diminifhed, and a portion of carbonic acid is produced.

Does then the carbonic acid, which is here met with, proceed ready formed from the blood, or is it in part formed by the decompofition of the air? No one has yet proved that any aëriform fluid, much lefs that carbonic acid, exifts naturally in the blood; and if this be true, no fuch aërial acid can be expected to iffue from it. The carbonic acid alfo, is not formed by blood when it is confined in nitrogen gas; neither does the colour of the blood, in that cafe, undergo any fenfible change; but this acid is formed by blood, either in oxygen gas, in nitrous oxyd, or in atmofpheric air, all of which are deteriorated thereby; whence it follows, that without the prefence of oxygen gas, the blood is unable to form carbonic acid, and that this acid, therefore, is, in part, formed out of that gas. If the oxygen gas that difappears do not contribute to form the carbonic acid that is produced, in what other manner can its lofs be accounted for? or from what other fource than the oxygen gas of the air, in contact with the blood, can that ingredient of the acid be derived? Thofe who fuppofe the carbonic acid to be furnifhed by the blood, independent of the air employed, muft likewife fuppofe that the nitrogen gas is furnifhed by it alfo; for the experiments of Mr. Davy teach us, that a portion of that gas, as well as of carbonic acid, is always prefent when nitrous oxyd is decompofed, which renders it probable that the fame thing likewife occurs when air is changed by venal blood. But in what manner the blood fhould be able to furnifh nitrogen gas, it is not eafy to conceive, fince no affinity exifts between that gas and venal blood. (Davy's Refearches, p. 375.) We infer, therefore, from thefe facts, that atmofpheric air is decompofed by being placed in contact with venal blood, its oxygenous portion being in part converted into carbonic acid, and a quantity of its nitrogen being, in confequence, left free.

But, fuppofing the air to be thus decompofed by the blood, it ftill remains a queftion, whether it has been firft attracted by that fluid, then decompofed, and afterwards in part expelled; or, whether the decompofition has been effected without fuch previous attraction and intermixture of air. The only evidence of this fuppofed attraction feems to be the fmall diminution of bulk, which the air in all cafes fuffers; but this cannot be confidered as a proof of the attraction of the air; for it is a neceffary confequence of that converfion of oxygen gas into carbonic acid, which has been fhewn to take place, when thefe fubftances are brought into contact. Even granting to the blood this power of attracting air, or its oxygenous portion, it is not eafy to conceive, why it fhould fo readily lofe it, and again give out this air in the form of carbonic acid. No change of quality in the blood, nor any variation of temperature, can have taken place fufficient to alter fo rapidly its affinity for thefe fubftances: and it cannot proceed from a want of affinity between the blood and the carbonic acid that is formed; for that acid fuffers a greater diminution, either than oxygen gas or atmofpheric air, by being placed in contact with blood. We incline, therefore, to the opinion, that neither the air nor its oxygen gas is attracted by, and diffufed through the blood, as happens with feveral gafes when placed in contact with certain fluids: but that the air is decompofed, and its oxygen gas changed into carbonic acid, without entering into the fubftance of that fluid.

But, for the formation of this acid, the blood muft fupply carbon, fince no other fubftance was prefent from which it could be derived: and it is well known alfo, that carbon enters largely into the compofition of that fluid; and our experiments prove, that it exifts as well in the ferous as in the more folid parts. By fome it may be objected, that becaufe carbonic acid is formed directly by the combuftion of charcoal, it cannot be produced at fo low a temperature as exifts in thefe experiments. To this we can reply only by an appeal to the general facts exhibited through the whole courfe of our enquiry, by which it appears, that both by the living functions of vegetables and animals, and by the decompofition of animal and vegetable matter, this acid is in like manner formed at temperatures equally low. Even thofe, who confider this acid to have proceeded ready formed from the blood, cannot attribute its production to the operation of heat; for in the animal body, the temperature of the blood feldom exceeds 100°—a degree of heat incompetent to form carbonic acid by any procefs analogous to combuftion. The combination of many bodies is, indeed, greatly accelerated by being expofed to very high temperatures; but this furely does not fet afide the fact of their fpontaneous union at temperatures much more low. From this review of the effects, which take place between the blood and air, we conclude, that the chemical phenomena, which arife when the fubftances are placed in contact, do not prove an attraction and diffusion of air through the blood; but shew only that a reciprocal action takes place, by which a new product is formed: no inference, therefore, in favour of an attraction of air by the blood in the lungs, can be drawn from the reciprocal action which they exert on each other out of the body. Inquiry, § 96—100.

It is, farther, an objection to this supposed operation of oxygen, that in the lungs the blood and air do not come into contact, and therefore although the combination of oxygen with that fluid might be conceived to happen, when they are placed together out of the body, yet the intervention of organised membranes may be supposed to prevent such an union in the living system. In the ordinary operations of chemistry, such an interposition of animal substance would be considered sufficient to vitiate the result of any similar experiment in which it was employed; but in the application of this science to the living body, neither membranes nor blood-vessels are conceived to oppose any obstacle to the exertion of chemical action, or, in the smallest degree, to affect its result. In support of this supposed operation of oxygen on the blood, some experiments of Dr. Priestley have been appealed to, as affording decisive evidence that this substance has the power of penetrating a compact membranous body, and may, consequently, penetrate the cells and blood-vessels of the lungs. The importance, which has been attached to these experiments, in all the late hypotheses which have been proposed to explain the function of respiration, renders it necessary for us to examine them with some minuteness, in order to discover the true relation which they bear to the present question.

Dr. Priestley, who, as we shall hereafter see, supposed that venal blood became red by imparting its phlogiston to the air, knew well that the blood in the lungs was separated from the air by a membranous substance, which, however, according to Dr. Hales, does not in thickness exceed the $\frac{1}{1000}$th part of an inch. To ascertain the effect of this circumstance, he put some black blood into a bladder moistened with a little serum, and then tying the bladder very close, he hung it in a free exposure to the air. The next day, all the lower surface of the blood, which had been separated from the air by the intervention of the bladder, had acquired a coating of a florid red colour, as thick, it appeared, as it would have acquired, if it had been immediately exposed to the open air; so that this membrane had been no impediment to the action of the air on the blood. This experiment was repeated, without previously moistening the bladder, and with the very same result. Obs. on Air, vol. iii. p. 369.

But although in these experiments the blood was rendered red by the agency of the air, yet we are not entitled to conclude, that this redness was produced by the combination of its oxygen, unless we can shew, not only that this substance comes into contact with the blood, but is likewise capable of changing it to a red colour. Dr. Priestley himself, who believed the blood to become red by the loss of phlogiston, could draw no such conclusion; and it is not a little remarkable that this philosopher, who had before so well observed the reciprocal effects produced in the air, when it thus changed the colour of the blood (loc. cit. p. 336.), should in these experiments have entirely overlooked them. It is still more remarkable, since these experiments have drawn so much attention, and seem now to be the chief or only remaining evidence urged in support of the hypothesis of oxygenation, that some attempt has not been made to inquire farther into the actual circumstances which attend them. It is this examination which we now propose to make, in the hope, that if it do not lead us to a knowledge of the true cause of this phenomenon, it may at least serve to shew to what it is not to be ascribed.

With this view, we procured a quantity of black blood, and putting it into a sheep's bladder, suspended it from the top of a jar containing about 100 cubic inches of atmospheric air. The jar was inverted in a saucer containing mercury, and within it a small cup of solution of potassa was likewise placed. The blood, in a short time, assumed a florid hue, and a dimness extended over the inside of the jar. By the next day, the mercury in the saucer had risen $\frac{3}{10}$ths of an inch into the jar, and it continued to rise several days; so that by the fifth day it had reached nearly to an inch in height. The jar was then raised, and diluted acid being poured upon the alkaline solution, disengaged from it a large quantity of carbonic acid gas. By this experiment, therefore, we are taught, that, when black blood assumes a red colour by being thus placed in a moistened bladder, and exposed to atmospheric air, the air itself, at the same time, undergoes a change; for its volume is diminished, and carbonic acid is produced.

To ascertain these facts with greater precision, we put another quantity of black blood into a small bladder, and suspended it, as before, from the top of a small jar inverted in mercury, and which contained 18.3 cubic inches of atmospheric air. Under this jar also a small cup of solution of potassa was placed. The blood, as before, was soon reddened, and the jar became dim. In two days, the mercury had risen nearly half an inch into the jar, and by the close of the fourth day, it stood seven-eighths of an inch high, where it remained for some time quite stationary. On analysing the residual air, it was found to suffer no change, either from agitation with lime-water, or by being exposed to the contact of phosphorus; so that, though all the oxygen had disappeared, no carbonic acid was present, but that gas was entirely attracted by the water of potassa employed.

The capacity of the jar, in the above experiment, has been stated to be equal to 18.3 cubic inches; and the bladder, with its contents, together with the cup and solution, we found to occupy a space equal to 5.2, which reduces the actual bulk of air, employed in the experiment, to 13.1 cubic inches. The mercury which in consequence of the attraction of the carbonic acid had risen seven-eighths of an inch into the jar, occupied a space equal to three cubic inches; so that of the 13.1 inches of air originally employed, three had disappeared, and $\frac{3}{13.1} = \frac{1}{4.37}$, or a portion of the air, was thus converted into carbonic acid, which comes very near to the proportion of oxygen gas which the atmosphere is known to contain. Hence we infer, that, in this experiment, all the oxygen gas that disappeared was converted into carbonic acid; and consequently we deny that any oxygen penetrated the bladder, in order to combine with the blood.

As thus it is denied that the blood, in these experiments, received any ponderable matter from the air, so likewise it will appear, from the facts which follow, that the air receives no such matter from the blood. We filled bladders with water, and suspended them in jars of atmospheric air, in the manner described above; and found that the oxygen gas of this air was converted into carbonic acid, in the same manner as when the bladders were filled with blood: and if the experiment was continued a sufficient length of time, the whole of the oxygen gas was, in like manner, made to disappear. The same effects followed from the introduction of of moiſtened empty bladders; and, indeed, it is the uſual effect produced in the air by every moiſtened animal ſubſtance. If, therefore, the moiſtened bladder be thus capable, by itſelf, of acting on the air, we are entitled to conclude that it exerts the ſame action when it is filled with blood; and as, on this ſuppoſition, the oxygen gas will unite with the carbon, furniſhed directly by the bladder, we have no ground whatever to ſuppoſe this carbon to come from the blood. Hence, therefore, when black blood is reddened by the air, through the coats of a moiſtened bladder, the air yields no oxygen to the blood, nor acquires from it any carbon; but the carbon of the bladder, by its combination with the oxygen of the air, paſſes into a ſtate of carbonic acid gas. Further Inquiry, § 581—587.

That this change in the colour of blood is always accompanied by a correſponding change in the air, may be farther inferred from other experiments of Dr. Prieſtley. He found that, when the black craſſamentum of blood was covered by ſerum or milk, it neverthelefs acquired a florid hue, on being expoſed to the air (Obſ. on Air, vol. iii. p. 370.); and Dr. Wells obſerved, that a covering of albumen, alſo, did not prevent the action of the air on the blood. (Phil. Tranſ. 1797.) Now we know that ſerum and albumen convert the oxygen gas of the air into carbonic acid; and we found by experiment, that the ſame effect was produced by milk, as probably would be the caſe with moſt of the animal fluids. Hence it is evident, that when the blood, in the experiments of Dr. Prieſtley, became florid, through ſeveral inches of ſerum, the oxygen gas muſt have been at once changed by it into carbonic acid, and could never, therefore, in the form of oxygen, be conveyed through this fluid to act on the blood.

On the other hand, Dr. Prieſtley found a thin ſtratum of water to prevent entirely this action of air on the blood. (Obſ. on Air, vol. iii. p. 370.) M. Cigna found the ſame thing to take place, when a pellicle of oil was interpoſed (ibid.); and Dr. Wells aſcribes a ſimilar effect to a ſolution of gum arabic. Theſe ſubſtances, however, act little, if at all, in changing the air; and no change of colour, therefore, takes place in the blood. That black blood ſhould have the power of attracting the oxygen of the air, through ſeveral inches of ſerum, and yet loſe this power when a thin ſtratum of water is interpoſed, ſeems ſomewhat ſurpriſing, if the intervening fluid be, in each caſe, conſidered to be equally paſſive; but proceeding on the fact, that the ſerum exerts an action on the air, which the water is incapable of effecting, a new circumſtance comes into view, and upon it the colouration of the blood may probably depend.

If, then, it appear, that the interpoſition of ſubſtances between the blood and the air neceſſarily prevents that contact, which is eſſential to the chemical union of oxygen with that fluid; if it alſo appear, that the colour of the blood is never, in ſuch caſes, changed, unleſs ſuch ſubſtances be interpoſed, as are themſelves capable of acting on the air; and if, laſtly, it be proved, that when the blood exhibits this change of colour, the air ſuffers a change, and that its oxygen, inſtead of combining with the blood, is really contained in the carbonic acid that is formed, we muſt conclude, that, whatever be the mode in which the air contributes to change the colour of the blood, it cannot be by imparting to it any portion of its ponderable matter. Conſequently, although theſe facts prove that oxygen gas poſſeſſes the power of changing the colour of the blood, as well through dead as through living animal membranes, yet they afford no evidence of the combination of oxygen with that fluid, but ſhew only the converſion of that gas into carbonic acid, preciſely in the ſame manner as this acid gas is formed, when the blood is reddened in the ordinary proceſs of reſpiration.

Even when the air and blood are brought into contact, they only exert a reciprocal action on each other, by which carbonic acid is formed, but no oxygen appears to combine with the blood. We have already given various proofs, that, when the blood is changed in colour by the agency of the air, the oxygen gas of the air diſappears, and carbonic acid is produced. Theſe facts are confirmed by the experiments of M. Berthollet, who confined recent blood in a veſſel of common air, and, at the end of twenty-four hours, the air, on analyſis, afforded nearly $\frac{4}{100}$ of carbonic acid. In two other experiments, ſimilar reſults were afforded; and in all theſe experiments, the acid gas produced was exactly equal to the volume of oxygen that diſappeared. (Mem. d'Arcueil, tom. ii. p. 462.) Unleſs, therefore, it be maintained, that the ſame oxygen can, at the ſame time, exiſt in two combinations, we muſt ſuppoſe, that, in theſe experiments, no oxygen combines with the blood; and from whatever cauſe, therefore, the red colour of the blood may proceed, we may ſafely conclude that it cannot ariſe from the combination of oxygen. Further Inquiry, § 592—595.

Mr. Ellis conſiders that the diminution in bulk, which the reſpired air undergoes, according to the reſults of moſt inveſtigations, may be accounted for by the condenſation which oxygen experiences in uniting with charcoal to form carbonic acid. Crawford eſtimated this diminution at $\frac{1}{7}$th, Lavoiſier at $\frac{1}{25}$th. But the experiments of Allen and Pepys (Phil. Tranſ. 1807), performed with a very perfect apparatus, and therefore apparently deſerving confidence, do not ſupport this notion of condenſation. When they tranſmitted repeatedly oxygen gas over ignited charcoal, ſo as to convert it into carbonic acid, the volume was the ſame at the end of the experiment as at the commencement. The reſearches of theſe chemiſts on reſpiration, publiſhed ſince the appearance of the "Inquiry," making it very probable that there is no loſs of bulk in the air reſpired, coincides with what they have proved concerning the conſtitution of carbonic acid.

Whether the azote of the inſpired air undergoes any change?—Mr. Murray has brought together all that is known on this point, and arranged it ſo clearly, that we avail ourſelves of his labours, without any further remark.

"It is laſtly to be determined, what is the influence of the nitrogen of the atmoſphere in reſpiration; and with regard to this, different concluſions have been formed. Lavoiſier, in his early experiments, conſidered the nitrogen of the atmoſpheric air as ſuffering no change in reſpiration. Mem. de l'Acad. des Sciences, 1777. Mémoires de la Société de Médecine, 1783.

Prieſtley, in the experiments already referred to, in which he breathed the ſame air repeatedly, obſerved an apparent conſumption of its nitrogen, as well as of its oxygen; but he afterwards inclined to the ſuppoſition, that the deficiency of nitrogen aroſe from the greater proportion of it in the lungs after the proceſs than before.

Mr. Davy inveſtigated this, and concluded that nitrogen is conſumed in reſpiration; a quantity diſappearing equal to about two-tenths of a cubic inch at each natural reſpiration, 13 cubic inches being the quantity of air taken into the lungs. As the number of natural inſpirations amounted in a minute to 26 or 27, it followed that, in this time, 5.2 cubic inches of nitrogen are conſumed; a reſult which was confirmed by continued reſpiration, as well as by the reſpiration of animals confined in a portion of air; though,

though, in the latter case, the quantity consumed appeared to be less. Chemical Researches, p. 434.

This absorption of nitrogen in respiration appeared to be confirmed by other experiments. It was observed by Dr. Henderson, in breathing a portion of air repeatedly from and into a gasometer. (Nicholson's Journal, vol. viii. p. 40.) And it seemed likewise to be established by the experiments of Pfaff. Nicholson's Journal, vol. xii. p. 249.

These experiments, however, are not free from fallacy, particularly those where the same quantity of air was repeatedly breathed; for, as Mr. Ellis has justly observed, (Inquiry on Vegetation, Respiration, &c. p. 114.) the respiration, as it proceeds, becomes more difficult and laborious, and is at length terminated by a feeble expiration, in consequence of which the due proportion of air is not thrown from the lungs. There appears, therefore, a diminution; and accordingly it is stated by Pfaff, that the diminution and the loss of nitrogen is always the greater, the longer the air is respired. There can be little doubt that the apparent diminution arises from this cause; and accordingly, in the experiments of Allen and Pepys, in which this source of error is avoided, there is no apparent consumption of nitrogen. The same result is stated to have been obtained in the last experiments of Lavoisier and Seguin, "there being neither any disengagement nor absorption of nitrogen gas during the respiration." (Mem. de l'Acad. des Sciences, 1789, p. 374.) From the experiments of Vauquelin, Spallanzani, and Ellis (Inquiry, &c. p. 87, 88.), it also appears that there is no sensible consumption of nitrogen, by the respiration of the lower orders of animals, while there is the usual consumption of oxygen, and formation of carbonic acid.

Messrs. Allen and Pepys, from some experiments (Phil. Trans. 1809), inferred, that there is even an evolution of nitrogen in respiration. They observed this, first, in the respiration of oxygen gas; in one experiment, where 3000 cubic inches of oxygen had passed through the lungs, 62 cubic inches of nitrogen being found in the first 260 cubic inches expired, though the gas originally contained only six cubic inches in this quantity; and in the next 562 cubic inches, 56 cubic inches were found, though this quantity, before it was respired, contained only 14; and a similar evolution of nitrogen was observed in the repeated respiration of the same quantity of oxygen, an equivalent quantity of oxygen disappearing. Much of this loss of nitrogen may, as they observe, be ascribed to the intermixture of the residual air in the lungs; but from comparing the capacity of the lungs with the quantity of nitrogen evolved, they found more of it to be evolved than could be derived from this source; and were therefore led to the conclusion, that where oxygen gas is respired, a portion of nitrogen is given off from the blood. This conclusion appeared to be confirmed by the results of experiments on a guinea pig, confined in a quantity of atmospheric air. In one experiment, at the end of an hour and twelve minutes, the increase of nitrogen in the air was more than equal to the cubic contents of the body of the animal. In the respiration of a mixture of oxygen and nitrogen gases, a similar evolution of nitrogen, and disappearance of an equivalent portion of oxygen, was observed; but not in the respiration of atmospheric air.

Three thousand four hundred and twenty cubic inches of air, consisting of 2.5 azote, and 97.5 oxygen in 100 parts, were breathed for 7′ 25″: the expired air measured 3362, therefore the deficiency was 58. The expired air was received in 13 successive portions; of which N° 1. contained, in 100 parts, 9 carbonic acid, 25 azote, 66 oxygen. N° 13. consisted of 12.5 carbonic acid, 5.5 azote, and 82 oxygen, in 100 parts. When all the thirteen were mixed, the composition was 12.0 carbonic acid, 6.5 azote, 81.5 oxygen. The whole quantity of carbonic acid formed in this experiment was 396.78 cubic inches. The quantity of azote taken into the lungs was 85.50; the quantity expired, 263.10: the increase is, therefore, 177.60. (Phil. Trans. 1808.) In another experiment of a similar nature, 2668 of gas were breathed backwards and forwards for 13 minutes: it contained 4 *per cent.* of azote. There was a deficiency of 124 cubic inches in the expired air, the largest ever observed by these gentlemen. In this experiment there was an increase of 105.08 of azote. If the azote emitted from the lungs in these experiments be supposed to have been contained in those organs before the experiments began, it will make their contents more considerable than we had before calculated. The following is a summary of four experiments on this subject:

	Barom.	Therm.	Oxygen gas, &c. inspired	Gas expired.	Deficiency.	Time.	Quantity respired in a Minute.	Azote evolved.	Inferred capacity of Lungs.
N° 1.	——	53°	3260	3193	67	9′ 20″	348	110	141
2.	30.3	70	3420	3362	58	7 25	461	177	225
3.	30.15	70	3130	3060	70	8 45	357	187	236
4.	29.4	51	2668	2544	124	13 0	205	105	133

The particulars of two analogous experiments on the guinea pig follow:

	Barom.	Therm.	Oxygen, &c. inspired.	Gas after the Exp.	Deficiency.	Carb. acid formed.	Carb. acid per Minute.	Time.	Oxygen missing.	Azote added.
N° 1.	29.05	57°	1060	1056	4	106.	1.48	$1^h\ 12^m$	54.07	50.12
2.	——	56	816	814	2	78.91	1.11	$1^h\ 11^s$	36.20	34.20

Philos. Trans. 1808 and 1809.

The conclusion that the nitrogen, found in these cases, is derived from the residual air of the lungs, is so probable, that it would at once be admitted, were it not that the quantity evolved is so large, as apparently to preclude its admission. Mr. Ellis, however, in some very ingenious observations on this question, has pointed out a source of fallacy to which there is every probability that the result is to be ascribed. It is, that the air in the lungs may be in a condensed state, or occupy less volume than it would do when it is expired; and hence, in the respiration of oxygen, a larger portion of nitrogen derived from the residual air in the lungs may be given out than could be inferred from their known capacity. The structure of the lungs is cellular, and the air is diffused in cells of an immense number, and at the same time of diameters extremely small. If these cells have any degree of contractile power, this may produce

duce condenſation of the air they contain. But independent of this, it is well known, as Mr. Ellis remarks, that a ſtrong attraction or adheſion is exerted between air and the ſurfaces of all bodies; the more, therefore, the ſurface is increaſed, the greater muſt be the effect from this attractive force. Hence, under the extenſive ſurface of the cells of the lungs, it muſt operate with great effect, and reduce conſiderably the volume of the air. The abſorption of aërial fluids by charcoal, Mr. Ellis adduces as illuſtrating this operation of adheſion; and in the lungs it is ſufficiently probable, that it may be aided by the affinity exerted by the humid ſurface to the aërial matter.

All the phenomena accord much better with this view than with the concluſion that nitrogen is evolved from the blood. Thus the "production of nitrogen is always greateſt in the firſt expiration, and its quantity progreſſively diminiſhes, until towards the cloſe of the experiment, it is reduced almoſt to nothing, circumſtances which ſeem plainly to ſhew that nitrogen is no longer obtained when all the reſidual air in the lungs is removed. If this nitrogen were furniſhed by the blood independent of the reſidual air, no reaſon occurs why it ſhould thus diminiſh, and ceaſe to appear, as this air is abſtracted; for the function of reſpiration goes on, and the blood, as far as depends on itſelf, cannot be conſidered leſs fit to ſupply nitrogen. The fact, alſo, that no ſuch exceſs of nitrogen is furniſhed in natural reſpiration, militates againſt the notion of its proceeding from the blood. No exceſs of nitrogen, too, is ever afforded in other caſes, unleſs its place be ſupplied by an equal or ſuperior bulk of ſome other gas. And this affords evidence, that in this ſuppoſed evolution of nitrogen from the blood, nothing more than a mechanical ſubſtitution of one gas for another takes place." (Farther Inquiries, &c. p. 306.) Murray's Syſtem of Chemiſtry, 3d edit. v. 4. p. 498, et ſeq.

Adopting, as we do entirely, the views of Mr. Ellis on the ſubject of reſpiration (to whoſe clear, logical, and very ſatisfactory works we refer our readers for more ample information), we conclude our review of the changes, which the atmoſphere undergoes in reſpiration, in the words of his "Further Inquiry," § 621.

"From the foregoing ſeries of facts, concerning the reſpiration of the higher claſſes of animals, we feel ourſelves entitled to repeat with increaſed confidence, that 'the whole of the oxygen gas which diſappears in reſpiration is employed to form the carbonic acid produced in that proceſs.' And that 'the nitrogen gas of the air neither ſuffers any change itſelf, nor produces any direct operation on the animal ſyſtem.' Or, in the words of Meſſrs. Allen and Pepys, 'When atmoſpheric air alone is reſpired, no other change takes place in it, than the ſubſtitution of a certain portion of carbonic acid gas for an equal volume of oxygen.' (Phil. Tranſ. 1809, p. 427.) Conſequently in man, as well as in the lower animals, the converſion of oxygen gas into carbonic acid conſtitutes the only eſſential change, which the air of our atmoſphere experiences in the lungs during its reſpiration."

Aqueous Vapour contained in the expired Air.—That the air expelled from the lungs contains a certain quantity of watery vapour, is rendered very obvious by its condenſation, when we breathe cold air. It is not very eaſy to aſcertain its quantity.

Dr. Hales performed many experiments for this purpoſe: he contrived to paſs the air which he expired through a flaſk filled with woodaſhes, which, in conſequence of the potaſh contained in them, have the property of ſtrongly attracting the moiſture. By obſerving the increaſe of weight which the acid had acquired in a given time, he eſtimates that the water emitted from the lungs in 24 hours, will amount to 9792 grains, above 20 ounces. (Statical Eſſays, v. 2. p. 322—4.) The nature of his proceſs, however, did not admit of much accuracy. Dr. Menzies attempted to ſolve this problem, by actually collecting in an allantoid fitted to the mouth, the water emitted from the lungs in a given time; his eſtimate is much leſs than that of Hales; he ſuppoſed that the quantity of water exhaled in 24 hours would amount to no more than 6 ounces, or 2880 grains. (Diſſertation on Reſpiration, p. 54.) Mr. Abernethy, by breathing into a glaſs veſſel of a peculiar conſtruction, collected in an hour 180 grains of water, containing, as he ſuppoſed, a quantity of mucous matter. According to his eſtimate, the quantity emitted in 24 hours, would amount to exactly 9 ounces, or 4320 grains, but as the ſubſtance which he obtained was not pure water, there muſt be ſome deduction made from it on this account. We are not informed what proportion the water bore to the mucus diſſolved in it. Surgical Eſſays, pt. 1. 141.

The difficulty of actually collecting and weighing the pulmonary exhalation, is probably the cauſe which induced Lavoiſier in his experiments upon reſpiration, to aſcertain its quantity by a calculation, founded upon the proportion between its conſtituent parts, compared with the compoſition of the other ſubſtances which are received into and diſcharged from the lungs. He firſt determined by direct experiment the quantity of oxygen conſumed, and of carbonic acid produced; the compoſition of carbonic acid is known, and by comparing the oxygen which had diſappeared with the quantity which would have been neceſſary to form the acid, he found that the oxygen conſumed was more than ſufficient to compoſe the carbonic acid which was actually produced. He ſuppoſed that this ſuperabundant quantity of oxygen was employed in the formation of water, by uniting in the lungs with a portion of hydrogen: he eſtimates the amount of the water by knowing what quantity of it a given weight of oxygen can produce.

In the firſt memoir (1789), the quantity of water emitted from the lungs of a man in 24 hours, is ſtated to be no more than 337.18 grains. In the 2d (1790), this quantity is raiſed to 11180.57 grains, or nearly 2lbs. troy: and in the laſt experiments recorded by La Place, the quantity is ſtill more conſiderable, *viz.* 13704 grains. The proportion between the water and the carbonic acid is very various in theſe different reſearches: in the firſt they are reſpectively 337.18 grains, and 17720.89 grains, or as 19 to 1000 nearly: in the ſecond, 11188.57 and 8450.24, or as 1323 to 1000; and in the third, 13704 and 7550.40, or as 1815 to 1000. Such diſcordant reſults can have no other effect than that of diminiſhing our confidence in the whole of them.

Mr. Murray breathed into a bladder containing acetate of potaſh, a very deliqueſcent ſalt, and calculated the quantity of vapour expired by the increaſe of weight in the bladder and its contents, after the expired air had cooled. In this way he inferred that three grains of watery vapour are expelled from the lungs in a minute. Syſt. of Chemiſtry, v. 4. p. 497.

There are two ways of explaining the production of the watery vapour expelled from the lungs: by evaporation of the mucous fluid covering the inner ſurface of the air-tubes and veſicles by the conſtant paſſage of the air to and from theſe parts, which are kept at a temperature of about 98°; or by exhalation from the pulmonary or bronchial blood-veſſels. The ſecretion of the mucous membrane of the lungs muſt undergo evaporation, under the circumſtances of its

its expofure to the atmofpheric current in refpiration, according to the ordinary operation of phyfical laws: this, therefore, feems the moft probable fource of the expired water.

Lavoifier conceived that the water is generated in the lungs; hydrogen being evolved from the venous blood, and uniting with a part of the oxygen of the infpired air. But this liberation of hydrogen is not fupported by a fingle proof, or fhadow of proof; and we have every reafon to believe that all the oxygen confumed in breathing is employed to form carbonic acid.

III. *Changes produced in the Blood by Refpiration.*—Soon after the doctrine of the circulation had been generally received, the diftinction between arterial and venous blood was pointed out, and it was underftood that this fluid is changed from the latter into the former ftate in the lungs. Various conjectures were reforted to, to explain the nature and manner of this change. Some confidered the alteration to be principally mechanical; conceiving that the blood, while in the pulmonary veffels, experiences a continual and violent agitation, by means of which, its particles, before loofely mixed, and confifting of feveral heterogeneous fubftances, are communicated and perfectly united together, fo that the whole mafs acquires an uniform confiftence. Baglivi fuppofed, that the blood was rarefied, and Helvetius, that it was condenfed in the lungs; Boerhaave thought that its particles acquired that peculiar organization, which he deemed effential to the exiftence of perfect blood. Other philofophers, as Harvey, Boyle, Hales, and Haller, were of opinion, that the blood emitted fome noxious or fuperfluous matter in its paffage through the lungs. Some again fuppofed, that the change from venous to arterial was caufed by fomething imparted from the air to the blood.

Thefe vague fpeculations were foon fuperfeded by the more certain information deduced from experiment and obfervation. We have already enumerated the proofs afforded by the refearches of Lower, Cigna, Prieftley, Lavoifier, Davy, and others, that the change of the blood from venous to arterial is effected by expofure to the oxygenous gas of the atmofphere in refpiration; and that a fimilar change, in colour at leaft, is effected by fuch expofure out of the body: the alteration being accompanied, in both inftances, with a change in the compofition of the air.

The proofs, that refpiration is the fource of the change in colour juft alluded to, that it is ftopped in living animals when breathing is interrupted, and goes on again when the refpiratory procefs is refumed, will be found in the article LUNGS.

But is there no other alteration in the properties of the blood confequent on refpiration, befides its change of colour? Undoubtedly there muft be fuch further alteration, for life is quickly ended, if this converfion of venous into arterial blood be ftopped; and we fhall prefently ftate our opinion, that carbon is exhaled from the pulmonary veffels; but chemiftry has not yet fhewn us any difference of compofition beween the two kinds of blood.

"When (fays Mr. Murray) we examine chemically the properties of arterial and venous blood, we find no other difference between them than that of colour. They contain the fame principles, and are fubject to the fame changes from chemical agents. The difference of colour, however, points out fome difference in compofition, though it may be too flight to be difcovered by analyfis; and when we examine the phenomena of refpiration, which are intimately connected with the change of venous to arterial blood, we find, that fuch a difference muft exift." Syftem of Chemiftry, vol. iv. p. 489.

Even the changes of colour of the blood are not well underftood. We know that this fluid is converted from the fcarlet to the black ftate, in the courfe of its paffage through the capillary veffels of the body. But it undergoes the fame change, when extravafated from a large artery, or when confined in an arterial tube between two ligatures. It never feems, however, to fuffer the oppofite change, except when in contact with oxygen gas, or with fome fubftance capable of furnifhing it.

That the paffage of the air through the lungs in refpiration is inftrumental in converting the chyle and lymph, poured from the thoracic duct into the venous fyftem, into blood; or, that it produces fibrine from the materials juft mentioned, has been fuppofed and afferted; but without any direct proof. We cannot, indeed, fee the chyle in the blood after it has gone through the lungs; but we know of nothing further than a mechanical admixture; and are completely ignorant of the circumftances accompanying and determining the generation of fibrine.

IV. *Theories of Refpiration.*—The principal explanations of the phenomena detailed in the preceding divifions of this article, as exhibited in the air and blood, confequently to refpiration, are detailed by Mr. Murray, in his Syftem of Chemiftry, vol. iv.; where they are followed by his own views of the fubject.

Dr. Prieftley, fays he, confidered thefe phenomena as owing to the difengagement of phlogifton from the blood in the lungs, and its combination with the air (Philof. Tranfact. 1776); a theory modified and rendered more comprehenfive by Crawford (Experiments and Obfervations on Animal Heat). Regarding hydrogen as the phlogiftic principle, and fuppofing it to exift in the blood in that ftate in which it is difengaged from vegetable fubftances by heat, the heavy inflammable air of the older chemifts, the carburetted hydrogen of the modern nomenclature, he fuppofed that this hydro-carbon, as it was named, is communicated to the blood in the extreme veffels, by which the converfion from the arterial to the venous ftate is occafioned; in the lungs, he concluded, it is given out, and in its nafcent ftate, or its tranfition to the elaftic form, it combines, he fuppofed, with the oxygen of the air, and forms the carbonic acid gas and watery vapour expired, while the blood, deprived of its hydro-carbon, returns to the arterial ftate. The fame explanation nearly was given by Lavoifier; at leaft he advanced the opinion, that the carbonic acid gas and watery vapour of the expired air are formed by the combination of carbon and hydrogen from the blood with oxygen in the lungs.

Lavoifier had alfo fuggefted, that the combination of oxygen with carbon might take place in the courfe of the circulation (Mem. de l'Acad. des Sciences, 1777, p. 191.), that the oxygen which difappears in refpiration may be abforbed by the blood, while carbonic acid may be given out fully formed. This hypothefis was afterwards endeavoured to be eftablifhed by Haffenfratz and Lagrange (Annales de Chimie, tom. ix. p. 261.) They obferve, that venous blood expofed to oxygen acquires a vivid red colour, which foon changes to a purple hue; and that arterial blood placed in vacuo, or in contact with any gas which does not contain oxygen, quickly affumes the dark purple colour. They conclude, therefore, that the florid red colour of the blood is the refult of the abforption of oxygen, while the dark venous colour arifes from the intimate combination of that oxygen with a portion of the carbon and hydrogen which the blood contains. According to this theory, oxygen is abforbed by the blood in the lungs, remains in the arterial blood for a time in a ftate of folution, or loofe combination,

bination, but it gradually paffes, in the extreme veffels, into more intimate combination with carbon, forming carbonic acid, in confequence of which the blood paffes to the venous ftate; and from this venous blood the carbonic acid is difengaged in the lungs, and a new portion of oxygen abforbed.

Thefe two hypothefes have divided the opinions of phyfiologifts. They are both, however, defective: their principles are not proved, and they involve fuppofitions incompatible with the laws which appear to regulate the chemical actions that proceed in the animal fyftem. No proof is given, in the fyftem of Crawford, of hydro-carbon being communicated to the blood in the extreme veffels; nor is it eafy to imagine any fource whence this principle in an infulated ftate can be derived; for, although it has been imagined by Crawford, that it may have its origin in the folid parts of the fyftem being abforbed, this is refuted by the confiderations, that this abforption is performed not by the veins, but by the lymphatics; that it is not fufficiently uniform, nor limited to carbon and hydrogen; that to whatever extent it may be carried, the blood muft, in a ftate of health, depofit as much as is removed; and that there is no evident caufe by which the carbon and hydrogen can be feparated from the other elements, and be brought into binary combination. And, in the theory of Haffenfratz, though it were granted, that a portion of oxygen is abforbed by arterial blood, there is no proof that this is combined merely with carbon, and that carbonic acid, the refult of this combination, is contained in venous blood. We have even proof that the latter fuppofition cannot be juft; for, when arterial blood is expofed to carbonic acid gas until its colour is darkened, it does not recover its florid hue from fubfequent expofure to oxygen (Prieftley, Experiments on Air, vol. iii. p. 363. 365.), and is therefore not venous blood.

Neither are the changes which thefe hypothefes fuppofe, analogous to the ufual chemical operations of the animal fyftem, or fufficiently connected with the purpofes which the blood ferves in its circulation. They both fuppofe, that the changes which the blood undergoes, depend not on alterations in its compofition, ftrictly fpeaking, but on the alternate communication and abftraction of a principle held by it in a ftate of folution, and which appears to ferve no purpofe in the animal economy, but is affumed merely to account for the phenomena of refpiration. But when the general facility of combination in the principles of animal matter, and the tendency which the actions of the veffels have to form them into ternary or quaternary compounds, are confidered, there is little probability in the fuppofition of the one hypothefis,—that oxygen fhould be abforbed by the blood in the lungs, without immediately altering its compofition; that, without being attracted by any of the other principles of the blood, or influenced by the other chemical changes going on in the fyftem, it fhould be merely combined with carbon, in the proportion neceffary to form carbonic acid; and that this carbonic acid, without affecting the ultimate compofition of the blood, fhould be carried the whole length of the venous circulation, and thrown out at the lungs; or in thofe of the other, that carbon and hydrogen fhould be brought into a ftate of binary combination in the extreme veffels, and fhould be held merely diffolved by the venous blood, until acted on by the oxygen of the air in refpiration.

Still lefs are thefe changes connected with the known changes which the blood fuffers; for no relation is traced between the proceffes of affimilation or of fecretion, and the fuppofed communication of hydro-carbon, or the combination of carbon and oxygen, in the extreme veffels. In the theory of refpiration, the converfion of arterial into venous blood ought to be confidered as connected with thefe proceffes; and this converfion, as well as that of venous into arterial blood, muft be regarded as arifing from changes in the ultimate compofition of the known proximate principles of the blood, and not from the alternate communication and abftraction of a principle which it holds diffolved in it, or in what is termed a ftate of loofe combination. According to this view of the fubject, Mr. Murray gives the following explanation of thefe phenomena.

The blood is the fource whence the animal products are formed. Its expenditure is fupplied by the chyle, a fluid lefs completely animalized than the blood itfelf. The peculiar character of animal matter, with regard to compofition, is a large proportion of nitrogen, and a diminifhed proportion of carbon. It may therefore be inferred, that in the extreme veffels, where the animal folids and fluids are formed, the general procefs will be the feparation from the blood of thofe elements of which animal matter is compofed; and that, of courfe, carbon, which enters more fparingly into its compofition, will exift in the remaining blood in an increafed proportion. This is accordingly the general nature of the converfion of arterial into venous blood. Nitrogen, hydrogen, and other elements, are fpent in the formation of new products, and the proximate principles of the blood, probably the craffamentum chiefly, remain with an increafed proportion of carbon. In this ftate it is expofed to the atmofpheric air in the lungs, the oxygen of which abftracts its excefs of carbon, and forms the carbonic acid expired, and this conftitutes the converfion of venous into arterial blood.

There is little reafon to fuppofe, that any combination of the oxygen of the air with the hydrogen of the blood takes place. The fuppofition that it does, and that this is the fource of the watery vapours expired, originated in the hypothefis of Crawford, which fuppofed hydro-carbon to be difengaged from venous blood. No fact has been ftated in its fupport; it is a combination which can apparently ferve no purpofe in the animal economy; for hydrogen exifts in as large a proportion, (and even in a larger,) in animal as in vegetable matter. And the degree of evaporation from a moift furface, fo extenfive as that of the internal furface of the lungs, at the temperature of 96°, is adequate to account for the whole of the watery vapour expired.

The converfion of arterial into venous blood, is thus confidered in connection with the other chemical changes going on in the fyftem, and is fubfervient to them. In the extreme veffels, the conftituent principles of the blood are expended in the nourifhment of the folid fibre; in the formation of the fecreted fluids; and in the fupport perhaps of the living powers. Of thefe principles, carbon is that contained in the fmalleft proportion in the folids and fluids; it is, therefore, that of which there is the leaft expenditure, and confequently it muft be prefent in a larger proportion in the blood, after it has undergone thefe changes. To preferve the due proportion, and prevent it from accumulating, it muft be difcharged by fome other procefs. Hence the neceffity of the application of oxygen to the blood in the lungs, and the origin of the carbonic acid which is uniformily difcharged. We thus, too, trace the procefs of animalization from the reception of the aliment to its completion. All animals live directly or indirectly on vegetable matter. The principal difference in the compofition of vegetable from that of animal fubftances, is in the former containing a larger proportion of carbon. Refpiration is the function by which this difference is eftablifhed. The aliment received into the ftomach, is foon formed into a fluid capable of affimilating with the blood. It is conveyed to the lungs, and loses part of its carbon, or is partially animalized. It is then distributed through the system, and, in the extreme vessels, along with carbon, parts with so much hydrogen, oxygen, nitrogen, and other elements, as to leave carbon predominant.

It might be supposed, that in any view, such as that which has been now given, there must be some difficulty in conceiving that oxygen gas should combine with carbon with so much facility, at a temperature much lower than that which is in general necessary for their union, and this, too, with the intervention of the coats of the vessels through which the blood circulates. On attending, however, to the objection, it will be found to have no real force. Although carbon, in its solid and insulated form, requires to be raised to a high temperature to cause it to combine with oxygen, yet when it makes part of a ternary or quaternary combination, in which state its cohesion no longer opposes the combination, it is abstracted, and combined with oxygen at any natural temperature. It is thus that many vegetable and animal substances, when humid, are altered by exposure to the air, and carbonic acid formed. Blood itself is acted upon in this manner. It suffers a change precisely similar to that which it undergoes in the lungs, and this more or less rapidly, and to a greater or less extent, according to the quantity of oxygen present, and the degree of agitation used. Arterial blood was exposed by Fontana to atmospheric air for three minutes, when no perceptible alteration was occasioned in the purity of the air: they were then agitated together for three minutes: the volume of air was diminished and its purity impaired. When oxygen gas was substituted for atmospheric air, the alteration was still more considerable, its purity being diminished when agitation was avoided; and when it was agitated, the diminution in purity and volume was still greater. In all these experiments, carbonic acid was also produced. (Opuscules Physiques, pp. 334, 335.) They therefore prove, that oxygen can attract carbon from arterial blood. With venous blood, the formation of carbonic acid is, according to Luzariaga, still greater. (Dissertatio Inauguralis, p. 53, 54.) If, therefore, oxygen can abstract carbon from the principles of the blood, under such circumstances, it is evident it must do so still more rapidly during respiration, where the circumstances are so much more favourable, where there is comparatively a high and uniform temperature kept up, where the blood is exposed on an extensive surface, and in a state of extreme division, and where that surface, as well as the air itself, are rapidly renewed.

Nor can it be supposed, that the thin membrane which forms the coats of the vessels through which the blood circulates can oppose an obstacle to this reciprocal action. Every humid substance is permeable through its whole substance to elastic fluids, and is penetrated by them. Animal membrane, in a much denser state than that which forms the coats of the extreme blood-vessels, is, when humid, pervious to gaseous fluids; and what is in point in the present case, through such membranes, when humid, oxygen can act on blood, and communicate to it the florid colour, the same as when blood is freely exposed to it. Thus, Priestley found by experiment, that if a quantity of black blood were inclosed in a moistened bladder, which was tied very close, on hanging it in a free exposure to the air, it acquired "a coating of a florid colour, as thick as it would have acquired if it had been exposed to the open air; so that this membrane had been no impediment to the action of the air on the blood." Mr. Hunter mentions a similar experiment: "I covered," says he, "the mouths of vessels filled with venous blood with gold-beaters' skin, touching the surface of the blood, and the blood constantly became of a florid red on the surface, and even for some depth." (Treatise on the Blood, p. 62.) Nor is there any reason to believe, as has been contended, that in the living solids this property is suspended, for it is one connected merely with mechanical structure, and the influence of humidity. The blood, therefore, may be considered, when circulating in vessels so fine, as exposed to the action of oxygen nearly as if no membrane were interposed: a part of that oxygen approximated to it will combine with a portion of its carbon, and the carbonic acid, when formed, will, from its elasticity, recede and be discharged. The whole action is purely chemical, and precisely the same as that which is exerted between air and blood out of the body, favoured only by the circumstances of exposure, temperature, and agitation, under which it takes place." P. 502.—510.

After adverting to the arguments, by which it is shewn that no gas can pass through the membranes of the bronchial cells and pulmonary vessels from without, nor any substance pass from within through these parts, to unite in the lungs by ordinary chemical affinity, consequently that the carbonic acid is not formed by the union of carbon and oxygen in the blood; and to the facts, in which carbonic acid is formed in the lower animals and even in man, by the skin, where we have no proof of any absorption of oxygen, or passage of it through the animal textures, Mr. Ellis declares his opinion, in which we entirely coincide, that the carbon supplied in human respiration is truly an animal excretion, performed by the exhalent vessels, which exist in such wonderful numbers in the lungs; consequently, that it depends primarily, like other excretions, on the due circulation and distribution of the blood, and is more or less affected by all its variations. The changes in its quantity have been found very considerable, according as the individual was at rest or in motion, fasting or with a full stomach, &c. in the experiments already noticed of Lavoisier and Seguin. We conceive, then, that the carbon, thus exhaled or excreted in the lungs, combines in the air-cells with the oxygen of the atmosphere to form the carbonic acid expired.

As the emission of carbonic acid in respiration is carried on through the whole period of living action, and is essential to the continuance of it, some ulterior source must be provided, from whence its supply may be duly maintained.

"To the organs of digestion, assimilation, and secretion alone, we are enabled to trace it; but the mode in which it is reduced to that state in which it is afterwards expelled by the surfaces of the lungs and skin, involves a knowledge of the nature and qualities of our food, of the various and successive changes which it is made to undergo in the system, and of its distribution by the blood to the different organs of secretion, according to the several uses which it is afterwards destined to answer: concerning all of which subjects, we have of late succeeded in getting rid of much error and absurdity, but have not in any instance attained to complete knowledge." Ellis's Inquiry, ch. 5.

V. *On the Respiration of the different Gases.*—No aëriform fluid, says Dr. Bostock, except the compound of oxygen and azote which exists in the atmosphere, is adapted to the permanent support of life. Of the other gases, there are some which, on account of their irritating nature, it is absolutely impossible to receive into the trachea; these properly constitute the nonrespirable gases. There are, however, others which it is possible to inspire, though their employment is followed sooner or later by the extinction of life. We shall detail some of the principal experiments that have been performed on this subject, as the nature of the change produced

duced upon the blood by common refpiration may be in fome meafure illuftrated, by obferving the effects which follow the ufe of the other gafeous bodies.

Soon after the difcovery of the power which the oxygenous part of the atmofphere poffeffes, of fupporting animal life, feveral trials were made of the effects which would refult from breathing it in an unmixed ftate. The accounts given by thofe who were the fubjects of thefe trials were various; Dr. Prieftley, who firft made the experiment, conceived that he felt an agreeable lightnefs in the cheft (Obf. on Air, v. ii. p. 162.); fome perfons fuppofed that it produced exhilarating effects upon the fyftem, while others imagined that the employment of this gas was followed by uneafinefs and pain about the region of the thorax. Thefe different fenfations muft be attributed, in a great degree, to the effects of imagination; in part, however, they may be afcribed to the gas which was employed in the earlier period of the pneumatic experiments having been often in an impure ftate, mixed with acid, acrid, or metallic particles. A difference in the effects produced by the refpiration of the gas, ought perhaps, in fome degree alfo, to be imputed to the manner in which it was received into the lungs, whether only in fmall quantities, or by deep and laborious infpirations, and whether it was employed in a condenfed or a rarefied ftate.

As Dr. Prieftley was the firft perfon who, himfelf, refpired oxygenous gas, fo he was likewife the firft who obferved the effects which it produced upon animals altogether immerfed in it. His experiments were performed upon mice; they decidedly proved the power which this gas poffeffes of fupporting animal life, but no other certain conclufions can be deduced from them. M. Lavoifier afterwards turned his attention to this fubject, and in the experiments upon guinea pigs, to which we have already referred, he noticed with more accuracy the effects refulting from the refpiration of oxygen. He examined the ftate of the internal organs of animals which had been for fome time confined in this gas, and he conceived that a degree of rednefs and turgefcence of the veffels was produced, and other effects which indicated that the fanguiferous fyftem had been in a ftate of increafed action. (Soc. Roy. de Médécine, 1782, 1783, p. 576.) There is, however, reafon to infer, that in this cafe, either the gas employed was in an impure ftate, or that there were fome circumftances attending the fituation of the animals, or the manner in which the experiment was conducted, which affected the refults, for the fame philofopher, in the fubfequent memoir of 1789, where there appears to have been the greateft attention to accuracy, and where the moft perfect apparatus was employed, forms entirely oppofite conclufions. In this paper, we are informed, that he confined guinea pigs in pure oxygen, and in mixtures of oxygen and azote, in different proportions, until the former conftituted only one-fifteenth part of the compound. In all thefe cafes, he found that the fame quantity of oxygen was confumed, a circumftance, he obferves, in which refpiration differs remarkably from combuftion, though, in many refpects, thefe operations are fimilar to each other. The effects produced upon the animals were precifely the fame, whether they were confined in pure oxygen, or in any of the mixtures of it, except that when the proportion of azote was very large, they exhibited marks of drowfinefs. The author exprefsly informs us, that neither the temperature nor the circulation were in any refpects affected by the infpiration of pure oxygen for the fpace of feveral days. (Acad. des Sciences, 1789, p. 573.) Thefe experiments muft be confidered as very valuable; there is no reafon to doubt their accuracy, and they may be relied on with more confidence, as the author feems to have had no peculiar theory in view when he performed them; indeed the refults are different from what we might previoufly have expected, and are unfavourable to the analogy which Lavoifier had always endeavoured to eftablifh between refpiration and combuftion.

We have an account by Dr. Higgins of the refpiration of pure oxygen by the human fubject; in one experiment, thirty-eight pints of this gas were refpired without interruption. No inconvenience was experienced, a fenfe of warmth was, however, produced in the cheft, and the pulfe was confiderably quickened, (Minutes of a Society, &c. p. 144—6.) Dr. Higgins, in a fecond experiment, breathed a quantity of oxygen under an additional preffure, and by very full infpirations. He conceived that by thefe means its confumption was much promoted (ibid. 152.); but more numerous and accurate experiments will be required before this inference can be fairly eftablifhed. Effay on Refpiration, p. 139—144.

In the year 1794, Dr. Beddoes publifhed his experiments upon this fubject. (On Factitious Air, pt. i. p. 13.) They were performed upon rabbits, and the attention was principally directed to an examination of the ftate of the internal organs of the animal, after it had been fubjected for fome time to the influence of pure oxygen. In detailing the refults, we fee fuch obvious marks of the influence of the author's pre-conceived notions, that our confidence in them is much diminifhed; and this unfavourable impreffion is ftrengthened by finding that they do not coincide with the reports of other very accurate obfervers. See Boftock on Refpiration, p. 144, et feq.

Mr. Davy has alfo recorded fome trials, which he made with oxygen gas; the refults of which, fo far as they regard the chemical changes of the air itfelf, we have noticed in a previous part of this article. Refearches, p. 444.

Meffrs. Allen and Pepys made fome experiments on the refpiration of oxygen. The pulfe was raifed about 15 beats in a minute, a gentle glow and perfpiration were produced over the whole body, and nothing elfe remarkable occurred. The refpiration of the gas was continued about ten minutes in thefe trials; and the effects foon fubfided. We have detailed the refults of their obfervations concerning the changes of the air, in that divifion of this article in which the quantity of carbonic acid, produced by breathing, is mentioned.

It thus appears that we have no direct proof that the refpiration of oxygen, for a fhort period, is injurious to the animal economy. Whether a much longer ufe of the gas would be hurtful, and what peculiar morbid action or condition of parts would be induced, we have no means of determining.

Among the remaining refpirable gafes, that which appears to be the leaft injurious to the living body is the oxyd of azote. This aëriform fluid was firft difcovered by Dr. Prieftley, and was by him fuppofed to be "in the higheft degree noxious to animals." (Obf. on Air, v. ii. p. 55.) The fociety of Dutch chemifts, who afterwards examined its properties with more accuracy, coincided with Dr. Prieftley, as to its effects upon animal life. (Journal de Phyfique, t. xliii. p. 329.) The experiment was, however, repeated by Mr. Davy, and he difcovered not only that this gas may be refpired for a fhort time without inconvenience, (four or five minutes,) but that the employment of it is fucceeded by a fingular excitement of the nervous fyftem, which differs from that produced by alcohol and

opium,

opium, in not producing a subsequent state of exhaustion. The description of its effects in the "Researches" is very interesting. Mr. Davy infers from his experiments, that this gas is absorbed in large quantities by the venous blood. This blood, when exposed to the gas out of the body, becomes of a brighter purple, and carbonic acid is formed. We have no doubt, therefore, that carbonic acid is formed when this gas is respired; the gas being decomposed, so that the carbon of the venous blood can unite with its oxygen. We have already spoken at length against the notion of any air being absorbed by the blood in breathing; and we may refer to Mr. Ellis's Inquiry, chap. iv., for satisfactory arguments against the supposed absorption of this gas in particular.

Hydrogenous gas has been frequently respired, and it is now pretty generally agreed, that it is altogether passive when received into the lungs, and that death succeeds the employment of it in consequence of the exclusion of oxygen, in the same manner as by suffocation, or drowning. M. Lavoisier distinctly ascertained this fact, in his experiments related in the memoir of 1789, and it has been since confirmed by Mr. Davy. (Researches, p. 466.) It must be remarked, however, that a contrary opinion respecting the effects produced by the respiration of hydrogen has been maintained by some eminent chemists, even by Dr. Priestley himself (Obs. on Air, v. i. p. 229.); but his experiments were made in the earlier period of the pneumatic chemistry, when the gases were frequently employed in an impure state, and the experiments of Mr. Davy clearly demonstrate that hydrogenous gas produces different effects upon the system, according to the substances from which it is procured.

The experiments that have been made upon the subject of azotic gas are few and imperfect; it has been generally supposed, that it exercises no noxious effects upon the blood, but, like hydrogen, destroys life simply by preventing the access of oxygen. Dr. Higgins indeed remarks, that an animal dies sooner when immersed in this gas, than from the simple interruption to respiration (Minutes of a Society, p. 133.); but we are not informed upon what data this opinion is founded. Mr. Davy likewise experienced the sense of suffocation more speedily from the use of azote, than from that of hydrogen, but it appears that the gas employed in the experiment contained a quantity of carbonic acid, to which we may, with great probability, ascribe its noxious effects; and the same philosopher, when speaking in general terms of the action of azote in respiration, seems to consider it as merely excluding oxygen. This opinion is adopted by Dr. Thomson, and was uniformly maintained by M. Lavoisier. It would certainly appear reasonable to conclude à priori, that a substance which enters so largely into the composition of the atmosphere, and which consequently composes so great a proportion of the contents of the lungs, could not exercise any noxious effects upon the animal system.

The only remaining gases which can be received into the lungs are the carbonated hydrogen or hydro-carbon, sulphurated hydrogen, and carbonic oxyd. They occasion death immediately, but produce some change in the blood. If hydro-carbon be inspired in an undiluted state, it is followed by instant death; and when employed in small quantity only, mixed with atmospheric air or with oxygen, if it be used for any length of time, it induces vertigo, dimness of sight, convulsions, loss of sensation, and, in short, every symptom of approaching dissolution. It evidently acts more rapidly and powerfully than those gases which merely exclude oxygen from the blood, and must consequently be considered as exercising a positively noxious influence upon the animal economy. For an account of the respiration of sulphuretted hydrogen, see the Journal de Physique, vol. lvi. p. 35.

All the remaining gases are found to be strictly non-respirable, *i. e.* incapable of being admitted into the trachea. It is obvious that this must be the case with the irritating acid or alkaline gases, and with the nitrous gas, which, during its passage into the lungs, must unavoidably be brought into contact with oxygen, and thus produce nitrous acid vapour. The only substance, respecting the respirability of which there could be any doubt, is the carbonic acid gas, which, though possessed of the decided characteristics of an acid, exhibits them in a much slighter degree than that in which they generally exist. The impossibility of taking it into the lungs, even by the most powerful voluntary efforts, when it composes a large proportion of the air, was, however, proved by the experiments of M. Pilatre de Rozier, executed with that intrepidity which formed so remarkable a trait in the character of this philosopher. Bostock's Essay, p. 149—153.

He went into a brewer's tub, while full of carbonic acid gas, evolved by fermentation. A gentle heat manifested itself in all parts of his body, and occasioned a sensible perspiration. A slight itching sensation constrained him frequently to shut his eyes. When he attempted to breathe, a violent feeling of suffocation prevented him. He sought for the steps to get out; but not finding them readily, the necessity of breathing increased, he became giddy, and felt a tingling sensation in his ears. As soon as his mouth reached the air, he breathed freely, but for some time he could not distinguish objects: his face was purple, his limbs weak, and he understood with difficulty what was said to him. But these symptoms soon left him. He repeated the experiment often, and always found, that as long as he continued without breathing, he could speak and move about without inconvenience; but whenever he attempted to breathe, the feeling of suffocation came on. Journal de Physique, vol. xxviii.

Blumenbach made an experiment on three dogs of nearly the same size, to shew in a comparative view how long three different aërial fluids could support life. He prepared a bladder with a pipe attached to it, and holding about 20 cubic inches. This, filled with oxygen, was tied in the trachea, and the animal died in 14 minutes. The second animal perished in six minutes, when the same bladder, filled with atmospheric air, was placed in the same way in the trachea. The bladder containing the air, at the end of the last experiment, was put into the trachea of the third animal, which died in four minutes. Instit. Physiolog. 1798, p. 114, note *q*; or more at length in his Medicinische Bibliothek, vol. i. p. 174, et seq.

VI. *Effects produced on the Air by the Respiration of Animals.*—The results of observation warrant us in asserting that no living being can subsist long without a supply of fresh air. That insects die, when their stigmata are covered with oil or honey, has been long known. "Oleo illito insecta omnia exanimantur," says Pliny. Mr. Derham found that wasps, bees, hornets, and grasshoppers, seemed dead in two minutes, when placed under the exhausted receiver; but revived in two or three hours, on being restored to the air, even although they had remained in vacuo 24 hours. (Physico-Theology, p. 8, 7th edit.) Snails survived several hours in the exhausted receiver, newts two or three days, and leeches five or six. (Hutton's Math. Dict. art. *Air-pump.*) Zoophytes, according to Davy, require air in the water which they inhabit, and act on it like fishes. (Beddoes's Contributions, p. 138.) When some pepper-water had remained in vacuo 24 hours, some of its animalcules were

were dead, and some alive. (Physico-Theol. p. 8.) Spallanzani never found any animalcules produced in vegetable infusions in vacuo. When infusions, containing animalcules, were placed under the exhausted receiver, they lived many days, but perished sooner than others of the same kind in the open air. (Tracts, p. 1, 2.) Hooke found that the eels of vinegar died in a very short time, when the fluid was put into a phial, and stopped close. (Microgr. p. 217.) Scheele inclosed leeches in a phial, with a little air: they lived only two days, although they would have lived as many years, if the water had communicated with the air. Mr. Ray remarked, that fishes cannot live in water without air: they will live in a vessel of water with a narrow mouth for months or years; but if the vessel be stopped, so as wholly to exclude the air, or interrupt its communication with the water, they will be suddenly suffocated. (Wisdom of God in the Creation, p. 81.) Dr. Priestley confined several small fishes in a vessel, containing three pints of rain water, that had been previously well boiled to deprive it of its air, and they lived only between three and four hours. (Obs. on Air, vol. v. p. 139.) Mr. Davy introduced a large thornback into a jar, containing three cubic inches of water, which had been deprived of its air by distillation through mercury: he was very quiet for four minutes and a half, but then began to move about, and, in seven minutes, had fallen on his back, but still continued to move his gills. In eleven minutes, he was motionless, and when taken out, after thirteen minutes, he did not recover. (Researches, p. 367.) Amphibious animals, likewise, cannot live without air, but its deprivation is not immediately fatal to them. Frogs and toads bear the pump for two or three hours, and a frog recovered on exposure to the air, after remaining in vacuo seemingly dead for eleven hours. Hence we see, that to all these animals, whether inhabiting the air or the water, a constant renewal of fresh air is required, while the actions of life continue. What then are the changes produced on atmospheric air, by these several classes of animal beings, whereby it is rendered so essential to the maintenance of vital action?

For the first and most accurate knowledge we possess concerning the changes which the air suffers by the respiration of insects, we are indebted to the labours of Scheele, who placed bees and flies in phials with air, and found the oxygen removed, and carbonic acid gas substituted in its place. (On Air and Fire, p. 148—155.) M. Vauquelin examined the subject more accurately. The experiments of this excellent chemist were made on the grasshopper (gryllus viridissimus), which is described as having 24 stigmata, or breathing pores, ranged parallel with, but exterior to, two white lines, extending longitudinally on the middle of the belly. In this insect they are of an oval form, but they vary in shape in different insects; and it is chiefly by their mediation, that the changes on the air are effected. A female grasshopper was placed in eight cubic inches of atmospheric air: it breathed from 50 to 55 times in a minute, and lived 36 hours. The air had not sensibly diminished in volume, but, when examined by the test of lime-water, carbonic acid was detected; and after this was removed, the remaining air still extinguished a taper. When many grasshoppers were put at the same time into a given bulk of air, and left till they died, the oxygen gas was nearly, but not entirely, consumed; and phosphorus melted in the residual air, when heat was applied, but burned very little. A male grasshopper lived 18 hours in six cubic inches of oxygen gas: its respiration was oppressive, and it breathed from 60 to 65 times in a minute. The volume of air was not sensibly diminished, but it lost $\frac{5}{100}$ths of its bulk by being washed in an alkaline solution. (Ann. de Chimie, tom. xii.) From these facts we learn, that insects, by their respiration, consume the oxygenous portion of the air; that carbonic acid is, at the same time, produced; and that, when all the oxygen gas has disappeared, the animal no longer survives.

M. Huber found, that bees very speedily die, when put into nitrogen gas; but that they survive in a close vessel of atmospheric air, until almost the last atom of its oxygen gas is consumed. (Mem. sur la Germination, &c.) We likewise confined, says Mr. Ellis, a number of flies in a flask, containing nine cubic inches of air, and then inverted it into a tall glass of mercury. By the third day, the flies were all dead, and the mercury had risen considerably into the neck of the flask. The residual air lost about $\frac{18}{100}$ths by agitation with lime-water, and the remainder did not suffer the smallest diminution by being placed in contact for two days with phosphorus. These results, therefore, agree with those obtained by Vauquelin, and prove farther, that, by the respiration of flies, the whole of the oxygen gas of the air disappears, and that a bulk of carbonic acid nearly equal thereto is formed. The small diminution of bulk, also, which the air suffered, is to be regarded as a necessary consequence attending the conversion of oxygen gas into carbonic acid, and which, as it accounts for the whole loss the air experienced, seems to authorize the conclusion, that while the oxygen gas had, in this case, completely disappeared, the nitrogenous portion of the air continued undiminished, and probably unaltered.

The researches of Spallanzani and Reaumur further shewed, that the ova of insects cannot be evolved without air; that the larvæ cannot exist without it, nor undergo their change to the pupa state; and that it is equally essential to the transformation of the latter into the perfect insect. Rapports de l'Air avec les êtres Organisés, tom. i. Memoires pour servir à l'Hist. des Insectes, tom. ii.

M. Vauquelin proceeded next to investigate the changes produced on the air by the respiration of the vermes class of animals. He confined a red slug in twelve cubic inches of atmospheric air, and it lived 48 hours. The air was not sensibly diminished in volume, but it extinguished candles, and copiously precipitated lime from water. Phosphorus was melted in this air, but did not suffer any combustion or change of colour. A snail (helix pomatia) was next put into twelve cubic inches of atmospheric air, and lived four days. The oxygen gas entirely disappeared; for the residual nitrogen gas contained not an atom of vital air, and, consequently, phosphorus did not burn in it at all: it contained, however, carbonic acid. Slugs and snails, therefore, require fresh air while in an active state, the oxygen gas of which, by the function of their respiratory organs, is made completely to disappear, and a quantity of carbonic acid is produced, while the nitrogenous portion of the air remains unaltered: and when these changes are effected, living action speedily comes to an end. So exactly do these animals separate the oxygenous from the nitrogenous portion of the atmosphere, that M. Vauquelin suggests the employment of them for eudiometrical purposes. Ann. de Chimie, loc. cit.

The numerous experiments of Spallanzani on worms, snails, slugs, &c. confirm the statements of Vauquelin in all essential points. (Memoirs on Respiration. Rapports de l'Air.) He also made experiments on muscles, and several marine testacea: they consumed the air of water in which they were confined, and the water then attracted more, so as to consume all the oxygen when a small quantity of air was confined in contact with it.

We

We are indebted to Meſſrs. Humboldt and Provençal for ſome experiments on the reſpiration of fiſhes, which poſſeſs great accuracy. Their attention was firſt directed to aſcertain the quantity and compoſition of the air that exiſts naturally in river-water. For this purpoſe, they filled glaſs balloons with given quantities of water, taken from the river Seine, and expelled the air from it by ſubmitting it to ebullition. The air that came over was received in veſſels filled with mercury, or with diſtilled water recently boiled, that no foreign air might mix with that obtained from the water in the balloon. From the reſults of ten experiments, conducted in this manner, they found, that the water of the Seine contained rather leſs than $\frac{1}{30}$th of its volume of air. This air they farther found to be compoſed of about $\frac{31}{100}$ths oxygen, with from 6 to 11 *per cent.* carbonic acid, and the remainder was nitrogen gas. Mem. d'Arcueil, tom. ii.

Having thus determined the quantity and kind of air contained in a given volume of river-water, theſe chemiſts proceeded to aſcertain the changes which it experienced by the reſpiration of fiſhes. With this view, they confined young fiſhes in bell-glaſſes of river-water, inverted over mercury; and ſuffered them to remain till their reſpiration became laborious. The animals were then withdrawn, and the water, in which they had reſpired, was transferred into the balloon, and its air expelled, by ſubmitting it to ebullition, in the manner before ſtated. Seven tenches were, in this manner, confined in 4000 cubic centimeters, equal to 250.5 cubic inches of river-water, where they remained eight hours and a half. A portion of this water, equal to 2582 cubic centimeters, or 161.5 cubic inches, was then transferred from the glaſs-bell into the balloon, and its air expelled by heat. The air, thus obtained, meaſured 453 parts, at temperature 50° Fahrenheit. Theſe 453 parts were then waſhed in lime-water, by which they were reduced to 300, ſo that 153 parts of carbonic acid were thus removed. The reſidue was afterwards analyſed by combuſtion with hydrogen, and by mixture with nitrous gas; and the means of three analyſes afforded 0.035 of oxygen; wherefore it is concluded, that the 453 parts of air, obtained from water which had been in contact with the reſpiratory organs of fiſhes, conſiſted of 10.5 oxygen, 289.5 nitrogen, and 153.0 carbonic acid gas. But by former experiments, it was found, that an equal volume of pure river-water afforded 524 parts of air, conſiſting of 155.9 oxygen, 347.1 nitrogen, and 21.0 carbonic acid; conſequently, ſay theſe chemiſts, theſe ſeven tenches have *abſorbed*, in eight hours, 145.4 of oxygen, and 57.6 of nitrogen gas; and they have produced in the ſame time 132 parts of carbonic acid. (Mem. d'Arcueil, t. ii. p. 376.) Mr. Ellis has pointed out ſome ſources of fallacy, from which theſe apparent reſults may have ariſen, and it is probable from analyſis, that in fiſhes, as in other animals, the change produced by reſpiration is the converſiou of oxygen into an equivalent portion of carbonic acid.

The changes which the air undergoes from the reſpiration of Reptiles are detailed in that article. Its alterations in the breathing of mammalia and birds are the ſame as in man.

"The preceding facts," ſays Mr. Ellis, "ſufficiently ſhew, that various animals, in all the foregoing claſſes, and in every ſtage and form of their exiſtence, require the preſence of oxygen gas to maintain the functions of life; that this gas, by the exerciſe of theſe functions, is converted into carbonic acid: and that the degree in which this converſion proceeds, depends much on the healthy condition of the animal, and the vigour of its circulating ſyſtem. Since, alſo, in every inſtance where the experiments have been made with the requiſite accuracy, the bulk of carbonic acid produced, nearly or exactly equalled that of the oxygen which diſappeared, we may conclude, from analogy, that ſuch is univerſally the extent to which this change in the air takes place in animal reſpiration; and ſince, farther, the nitrogen gas of the air appears to ſuffer no neceſſary change in the exerciſe of this function, we may alſo conclude, that, as far as regards the air, the ſubſtitution of an equal bulk of carbonic acid for the oxygen gas that is loſt, compriſes the only eſſential change which the atmoſphere experiences during the performance of this animal proceſs. We have before maintained that the oxygen of the air does not enter the animal ſyſtem, either by the living function of abſorption, or by the operation of chemical affinity; and have conſequently concluded, that the union of this ſubſtance with the animal carbon takes place exterior to the veſſels of the living animal." Further Inquiry, p. 271.

Animal Heat.—Taking the ſpecific caloric of water at 1.0000, Dr. Crawford found that of arterial blood to be 1.0300, and that of venous blood 0.8928; that of oxygen gas compared to water, as 4.7490 to 1.0000; of nitrogen, 0.7936; atmoſpheric air, 1.7900; and of carbonic acid gas, 1.6454. The power of oxygen gas to ſupply heat, ſays Mr. Berthollet, is well known, and there is no ſubſtance which ſuffers ſo much of it to eſcape in the changes of its conſtitution.

In the reſpiration of animals, as well as in the germination of ſeeds, and the vegetation of plants, the oxygen gas of the atmoſphere is converted into carbonic acid. Since the ſpecific caloric of the latter is little more than one-third of that which the oxygen gas itſelf previouſly contained, it neceſſarily follows, that a large quantity of caloric is liberated, whenever this converſion of gaſes takes place. Now, in the living proceſſes juſt alluded to, the preſence of caloric is very obvious: we refer for proofs on theſe ſubjects, to the articles Heat, *Animal*, Mammalia, Birds, Fishes, Insects, Reptiles, and Vermes, in which the facts connected with their vital temperature are detailed; alſo to the two "Inquiries" of Mr. Ellis.

Since, then, all animals poſſeſs a temperature exceeding that of the medium which they inhabit, and ſince this, in man and the ſuperior animals, varies but little under every viciſſitude of heat and cold, conſiſtent with the due performance of the animal functions, there muſt exiſt in all caſes appropriate means of ſuſtaining this function. But no living powers of the animal ſyſtem are ſufficient for this purpoſe, independent of the concurring aid of external agents. No ſuppoſed attrition between the contiguous ſoft parts of the animal; no friction between the veſſels and globules of the blood; no action of the ſolid parts upon one another; no circumſtances ariſing out of digeſtion or fermentation in the living body; no imagined combuſtion of phoſphorus in the blood; no liberation of the phlogiſtic or any other principle, through the ſyſtem, can be received as ſufficient to account for the uniform height and ſteadineſs of this temperature. As, therefore, the animal ſyſtem, by virtue of its own powers, is unable, within itſelf, to produce this high degree of heat, to what external agent ſhall we have recourſe, and to what organs ſhall we refer the production of that more or leſs elevated temperature which is obſervable in all animals.

Inſects, worms, and fiſhes, which have no reſpiratory ſtructure ſimilar to that of the lungs; and reptiles, the ſurface of whoſe lungs, in proportion to that of the body, is comparatively ſmall, and whoſe blood, at each circulation, is but partially expoſed to the influence of the air, poſſeſs a

 degree

degree of heat but little above that of the medium in which they live; while the mammalia have a temperature considerably higher; and birds, whofe lungs bear the largeft proportion to their bodies, are the warmeft of all animals. The obfervation of thefe facts led naturally to the opinion, that the temperature of animals was immediately connected with the functions of the refpiratory organs; and an abundance of facts, collected and arranged by Mr. Ellis, prove that the fmall excefs of temperature, which not only the inferior animals, but which vegetables alfo poffefs, is actually derived from the decompofition of the air by thefe feveral claffes of beings, fo long as living action continues. "No explanation, however," fays Mr. Ellis, "of the mode in which the air contributes to fuftain animal heat, was attempted, till after the great difcovery of latent heat by Dr. Black. That excellent philofopher having already proved that the change effected in the air by refpiration, confifted in the formation of carbonic acid, fimilar to what happens in many examples of combuftion, afcribed the production of animal heat to the decompofition of the air in the lungs, by which its latent heat was rendered fenfible, in the fame manner as it is given out in combuftion. The blood, in its paffage through the lungs, had, he conceived, its temperature by this means raifed; and thus was rendered capable of communicating heat to all parts of the body, in the courfe of its circulation through the fyftem. To this it was objected by Dr. Cullen, that, if true, the temperature of the body ought to be greateft in the lungs, and to diminifh gradually, as the diftance from the lungs increafes, which is not according to fact. This difficulty was removed by the ingenuity of Dr. Crawford, who, by a happy extenfion of Dr. Black's doctrine, maintained, that the heat, liberated by the decompofition of the air in the lungs, paffed into the blood, and exifted in that fluid in the form of latent, or, what is now termed, fpecific heat, in confequence of which its temperature was not raifed; and that this heat, by other chemical changes, was given out by the blood in a fenfible form during its circulation.

"In what manner, then, does the air, breathed by the fuperior animals, give out its heat, to fupport that high degree of temperature above the furrounding medium, which they all poffefs? We have feen reafon to conclude, that the infpired air is decompofed in the bronchial cells of the lungs, and that all its oxygenous portion which difappears, is converted into carbonic acid, by carbon emitted from the exhalent furface of thofe organs. During this gradual converfion of the oxygen gas, a quantity of fpecific caloric, much greater than what is neceffary to maintain the elafticity of the carbonic acid that is formed, is neceffarily fet free; and to this excefs of heat, thus conftantly liberated in the lungs, by the decompofition of the air, do we look as the fource of that fuperiority of temperature, above the furrounding medium, which man and other animals, under every viciffitude of climate, are enabled to exhibit and maintain.

"But if a quantity of caloric be thus conftantly difengaged in the lungs, it may be expected that the blood, in its tranfmiffion through thofe organs, fhould acquire a certain portion of it. To afcertain this point, Dr. Crawford, purfuing the difcoveries of Drs. Black and Irvine, mixed together certain quantities of water, at the temperature of 53°, with feparate portions of arterial and venal blood; and then meafuring the heat of the mixture, at different fucceffive periods, till coagulation took place, he found that the water containing arterial blood preferved a fuperiority of temperature over that mixed with venal blood; and, from the refults of feveral trials, he concluded, that the fpecific heat of the arterial blood of a dog, was to that of the venal, as 114 to 100, and that of a fheep as 115 to 100, or as $11\frac{1}{2}$ to 10. (On Animal Heat, p. 279.) Thefe refults derive confirmation from the experiments of Mr. Coleman, who, in order to difcover the relative fpecific heat of arterial and venal blood, while yet retained in the fyftem, ftrangled a cat, and immediately opened its cheft, while the blood in the left ventricle was ftill florid. He then introduced a thermometer, through an opening in the pericardium on each fide of the heart, and it ftood at 98°: in the left ventricle the temperature was only 97°, and in the right ventricle it was nearly 99°. In fifteen minutes, however, inftead of the right ventricle poffeffing two degrees of heat more than the left, it was found to have four degrees lefs. Mr. Aftley Cooper repeated this experiment in different ways, and found invariably, that although the venal blood was fuperior in temperature at firft, yet before coagulation was complete, the arterial became from three to fix degrees warmer. (On Sufpended Refpiration, p. 42, et feq.) Thefe facts afford clear and decifive proof, that the fpecific heat of the arterial blood exceeds that of the venal, and demonftrate, likewife, that this excefs is obtained during the paffage of that fluid through the lungs.

"Admitting the lungs, then, to be the organs in which, by a decompofition of the air, the blood, as it paffes through them, obtains its heat, it is next required to fhew the fufficiency of this decompofition, to fupply heat enough for the maintenance of that fuperiority of temperature, which the warmer blooded animals poffefs." (Inquiry, p. 234—236.) For an account of the mode in which this was explained by Dr. Crawford, fee Heat, *Animal*.

Although this explanation of the production of animal heat appears fimple and fatisfactory, and has been held adequate to account for the phenomena by fuch philofophers as Black, Crawford, Lavoifier, and La Place, the evidence on which it refts is not fo clear as to have commanded univerfal affent, or entirely fet afide objections. It has, indeed, been generally allowed, that refpiration, and the changes it produces in the air and animal fluids, are effential conditions of the evolution of the caloric in animals; but it has been thought, that there are other circumftances, hitherto perhaps not well underftood, which influence the phenomena.

In external appearance the blood is the fame in all the veffels of the fœtus; is this any proof that its temperature is owing to the converfion of oxygen gas into carbonic acid?

Is the uniformity of temperature in the higher animals, under varying ftates of refpiration and circulation, and the confumption of various quantities of oxygen, whether in the fame or different individuals, confiftent with the theory? and can local variations of temperature be explained from it?

Some recent inveftigations of Mr. Brodie are particularly calculated to increafe our doubts on the fubject. Having pithed or decapitated animals, he kept up artificial refpiration, and thus maintained their circulation. The blood continued to be changed in the lungs from venous to arterial, and from arterial to venous, in the general circulation.

The refpective colours of the two kinds of blood could not be diftinguifhed from thofe which they exhibit in living and healthy animals. Yet the temperature of an animal thus heated, funk fafter than that of another fimply killed and left to itfelf. The following table exhibits the refults of fuch a comparative experiment.

Time.	Rabbit with artificial Reſpiration.		Dead Rabbit.	
	Thermometer in the Rectum.	Thermometer in the Pericardium.	Thermometer in the Rectum.	Thermometer in the Pericardium.
Before the experiment	$100\frac{1}{2}$		$100\frac{1}{2}$	
30 minutes -	97		99	
45 - -	$95\frac{1}{2}$		98	
60 - -	94		$96\frac{1}{2}$	
75 - -	92		95	
90 - -	91		94	
100 - -	$90\frac{1}{2}$	$87\frac{1}{2}$	93	$90\frac{1}{2}$

The animal, in whom artificial breathing was kept up, inſtead of having its heat maintained by the converſion of arterial into venous blood, and *vice verſâ*, was thus actually cooled by the air conveyed into its cheſt.

Having thus aſcertained, that the ordinary changes are effected in the blood by its circulation and artificial reſpiration in a decapitated animal, Mr. Brodie proceeded to ſhew, that the oxygen of the air undergoes its uſual converſion into carbonic acid. He found, that a living rabbit formed 50—56 cubic inches of carbonic acid in an hour; a decapitated animal, in whom artificial reſpiration was kept up, emitted 40—48 cubic inches in the ſame time. The thermometer in the rectum of the latter had fallen from 97 to 90, while in another rabbit left to itſelf, but ſimilarly treated in all other reſpects, it had fallen only to 91. In a rabbit poiſoned with woorara, or the eſſential oil of bitter almonds, not decapitated, and in which artificial breathing was kept up, 51 cubic inches of carbonic acid were emitted in an hour. The thermometer in the rectum had ſunk to 91 in 30 minutes; while it ſtood in another animal treated exactly the ſame, excepting the artificial breathing, at 92.

Theſe experiments ſeem fully to warrant Mr. Brodie's concluſion, "that in an animal in which the brain has ceaſed to exerciſe its functions, although reſpiration continues to be performed, and the circulation of the blood is kept up to the natural ſtandard, although the uſual changes in the ſenſible qualities of the blood take place in the two capillary ſyſtems, and the ſame quantity of carbonic acid is formed as under ordinary circumſtances; no heat is generated, and (in conſequence of the cold air thrown into the lungs) the animal cools more rapidly, than one which is actually dead."

See the Croonian Lecture on ſome phyſiological reſearches, reſpecting the influence of the brain on the action of the heart, and on the generation of animal heat; Phil. Tranſ. 1811, p. 36.

And further experiments and obſervations on the influence of the brain in the generation of animal heat, Phil. Tranſ. 1812, p. 378.

On the ſubject of this article, the moſt valuable works, both for the collection of facts from various ſources, for original views and reſearches, acuteneſs of inveſtigation, and cloſe reaſoning, are thoſe of Mr. Ellis; entitled, "An Inquiry into the Changes induced on atmoſpheric Air by the Germination of Seeds, the Vegetation of Plants, and the Reſpiration of Animals," 1807. And, "Further Inquiries, &c." 1811. Dr. Boſtock's "Eſſay on Reſpiration," 1804, is a very valuable collection of the facts known on this ſubject up to that time. The preceding article is derived in greateſt part from theſe works. We may refer alſo to Thomſon's Syſtem of Chemiſtry, book 5. ch. 3. § 2; and Murray's Syſtem of Chemiſtry, book 9. ch. 2. § 1. To the valuable memoirs of Meſſrs. Allen and Pepys, "On the Changes produced in atmoſpheric Air and Oxygen Gas by Reſpiration," Phil. Tranſ. 1808; and "On Reſpiration," ibid. 1809. To thoſe of Lavoiſier in the Memoires de l'Academie des Sciences, 1777 and 1780; and in the Société Royale de Médécine, 1782—3. Of Lavoiſier and Seguin in the Mem. de l'Acad. 1789, 1790. See alſo Crawford, on Animal Heat; Goodwyn, on the Connection of Life with Reſpiration; Menzies, on Reſpiration; Coleman, on Suſpended Reſpiration; Davy's Reſearches; Spallanzani's Memoirs on Reſpiration, and his Rapports de l'Air avec les êtres Organiſés, t. 3. 8vo. Geneva. Prieſtley on Air. Seguin in Annales de Chimie, t. 5. and 21.

RESPITE, Respectus, in *Law*, &c. a delay, forbearance, or prolongation of time, granted any one for the payment of a debt or the like.

Menage derives the word *reſpite* from the Latin *reſpectus*; as *deſpite* from *deſpectus*. Du-Cange will rather have it come from *reſpirare, to breathe*; reſpite being, in effect, a breathing-while, granted a debtor, &c.

In the cuſtomary of Normandy, reſpite is a judicial delay or demur, given to procedures.

Respite, *Letters of*, or Credit. See Letters.

Respite *of Homage*, is a forbearance of the homage due from the vaſſal, or tenant, holding by homage, or by knight-ſervice, to his lord.

Anciently, thoſe who held by theſe tenures paid a ſmall ſum every fifth year into the exchequer, to be reſpited doing their homage or ſervice.

By ſtat. 12 Car. II. this reſpite of homage is taken away, as a charge ariſing from knight-ſervice; which is thereby likewiſe annulled.

Respite *of Execution*. See Reprieve.

Respite *of Jury*. See Jury.

RESPITED *on the Muſter-Roll, To be*, in *Military Language*, is to be ſuſpended from pay, &c.; during which period all advantages of promotion, pay, &c. are ſtopped. The money which is reſpited upon the muſter-roll is accounted for by the muſter-maſter general, and placed to the credit of the public by the paymaſter general.

RESPOND, in *Eccleſiaſtical Hiſtory*, was a ſhort anthem ſung after reading three or four verſes of a chapter: after which they proceeded with the chapter. Gibſon 263.

RESPONDEAS Ouster, in *Law*, is to anſwer over in an action to the merits of the caſe: or put in a more ſubſtantial plea.

RESPONDEAT Superior, a law phraſe. Where the ſheriffs are removable, as in London, for inſufficiency; *reſpondeat ſuperior*, that is, the mayor and commonalty are to anſwer for them.

If a coroner of a county is inſufficient, the county as his ſuperior ſhall anſwer for him. (Wood's Inſt. 83.) If a gaoler conftitutes another under him, and he permits an efcape, if he be not fufficient, *refpondeat fuperior;* and fuperior officers muft anfwer for their deputies in civil actions, if they are infufficient to anfwer damages.

For the infufficiency of a bailiff of a franchife *refpondeat fuperior,* that is, the lord of the franchife is to anfwer.

RESPONDENT, Respondens, in the fchools, a perfon who maintains a thefis in any art or fcience.

He is thus called, as being to anfwer all objections propofed by the opponent, or impugner, &c.

The refpondent's bufinefs is to fee whether the oppofition made by the contrary party be juft and legitimate; or whether fome of the laws and conditions of oppofition be not broken; which is called *ignoratio elenchi.* He is alfo to examine the moods and figures of the fyllogifms, to fee whether the premifes be juft, &c. and through the whole to anfwer rather by diftinguo's, than by direct negation.

Respondent, formed from the Latin *refpondere, to anfwer,* q. d. *pro alio fpondere, to promife for another,* in *Law,* a perfon who undertakes to anfwer for another; or binds himfelf as fecurity for the good behaviour of another.

The refpondent is to anfwer for the damages done by the perfon for whom he refponds. There are four ordonnances of the kings of France, by which the citizens are exprefsly forbid to take fervants without refpondents, bound in writing.

RESPONDENTIA, in *Commerce,* a term applied to money which is borrowed, not upon the veffel, as in bottomry, but upon the goods and merchandize contained in it, which muft neceffarily be fold or exchanged, in the courfe of a voyage; in which cafe the borrower, perfonally, is bound to anfwer the contract; and he is faid to take up money at refpondentia.

It is enacted, by ftat. 19 Geo. II. cap. 37, that all monies lent on bottomry, or refpondentia, on veffels bound to or from the Eaft Indies, fhall be exprefsly lent only upon the fhip, or upon the merchandize; that the lender fhall have the benefit of falvage; and that, if the borrower has not on board effects to the value of the fum borrowed, he fhall be refponfible to the lender for fo much of the principal as hath not been laid out, with legal intereft and all other charges, though the fhip and merchandize be totally loft.

Although refpondentia and bottomry are of themfelves a fpecies of infurance, yet the lender has an infurable intereft in his fecurities, and therefore may protect himfelf from the fea-rifk by infuring them. The lender can infure only the amount of the fum lent, and the borrower has an infurable intereft in the fhip or goods to the amount of the furplus value above the fum lent. If either were to infure more, it would be a gaming infurance, and void by the ftatute 19 Geo. II. c. 37, for all above the real intereft. But the ufage of trade may take a cafe out of this rule. Upon an infurance on goods, fpecie and effects in the India trade, the infured may recover for money laid out for the ufe of the fhip, and for which he charged refpondentia intereft, it being the ufage of trade to infure in this form. A policy on bottomry or refpondentia cannot be fubfcribed by the borrower of the money, becaufe it is only in confideration of the fea-rifk, from which he is exempt, that he agrees to pay the marine intereft. If he were to become an infurer, this would be no longer a loan upon bottomry, but a cloak for ufury. Refpondentia and bottomry fecurities, though they are the fubject of infurance, muft be particularly and fpecifically defcribed in the policy; for under the general denomination of goods, thefe fecurities cannot be infured. By 19 Geo. II. c. 32. if an under-writer become bankrupt before a lofs happen, the infured may claim; and after a lofs, prove his debt under the commiffion, and receive his dividend, as if the lofs had happened before the bankruptcy. See Bottomry.

RESPONSA Prudentum. See Civil and Response.

RESPONSALIS, in *Law,* he who appears for another in court at a day affigned.

Fleta makes this difference between *refponfalis atturnatus,* and *effoniator,* that the *effoniator* came only to allege the caufe of the party's abfence, be he demandant or tenant; whereas *refponfalis* came for the tenant not only to excufe his abfence, but to fignify what trial he means to undergo, the combat, or the country.

RESPONSARY Song, an anthem in which the chorifters fing by turns.

RESPONSE, Responsal, *Refponfatio,* an anfwer, reply, or repartee.

The word is chiefly ufed in fpeaking of the anfwers made to the prieft, by the people, in the litany, the pfalms, and other parts of the office.

It has its ufe, too, in fpeaking of the opinions or anfwers of the ancient jurifconfulti, when confulted on points of law.

The fifty books of the Digeft are compofed of *refponfa prudentum,* the refponfes of Papinian, Ulpian, Scævola, &c. collected by Juftinian; who afterwards gave them the force of laws. See Civil *Law.*

The refponfes of the emperors were more properly called *refcripts;* which fee.

RESPONSIONS, Responsiones, a term ufed in the *Military Orders,* for certain penfions or charges, which the knights, or the commandries they held, paid to the order.

Such a knight templar paid a refponfion of fifty pounds *per annum* to his order, on account of fuch a commandry.

In Rot. Parl. 9 Ric. II. the word is written *refponcies.*

RESPONSORIA, refponfes fung in chorus by the choir, in anfwer to the prieft in the cathedral fervice.

RESSAVA, in *Geography,* a town of European Turkey, in Servia; 46 miles S.E. of Belgrade.

RESSAULT, in *Architecture,* the effect of a body which either projects, or falls back, *i. e.* ftands either more out or in than another; fo as to be out of the line, or range, with it.

The term *reffault* is French, and but little ufed in Englifh; though the want of a word of equal import pleads for its naturalization.

RESSEL, or Roessel, in *Geography,* a town of Pruffia, in the province of Ermeland, with a caftle; 50 miles S. of Königfberg.

RESSELA, a term ufed by Paracelsus to fignify, as himfelf explains it, any thing that expels heat, in oppofition to *affa,* which with him fignifies any thing that promotes it.

RESSONS, in *Geography,* a town of France, in the department of the Oife, and chief place of a canton, in the diftrict of Compiègne; 10 miles W.S.W. of Noyons. The place contains 1039, and the canton 9637 inhabitants, on a territory of 170 kiliometres, in 23 communes.

RESSORT, or Resort, a term purely French, yet frequently ufed, by our late writers, to fignify the jurifdiction or authority of a court.

The word, in its popular meaning, fignifies *fpring,* or the force of elafticity. Hence it is alfo ufed for a jurifdiction, and the extent or diftrict thereof; as when we fay, fuch a thing belongs to his reffort; a judge out of his reffort has no authority. But its chief ufe among us is in fpeaking of a court or tribunal, where appeals are judged; or of a court or perfon who judges finally and ultimately, and whence there is no appeal.

The

The houſe of lords judge in the laſt reſſort, *en dernier reſſort.* Preſidials judge in the laſt reſſort of all criminals proſecuted by the provoſts of the marſhals. See Dernier *reſſort.*

Ressort, or *Reſort,* is alſo uſed in a writ of ayel, or couſenage, in the ſame ſenſe as *deſcent,* in a writ of right.

RESSOURCE, or Resource, a term purely French, yet uſed by Engliſh writers to denote a means or foundation of a man's recovering himſelf from his fall or ruin; or an after-game for the repairing of his damages.

Skinner derives the word from the French *reſoudre, to reſolve.* A reſource ſtrictly and literally expreſſes a means which preſents itſelf afreſh.

This merchant has credit and friends ſtill left; he has great reſources.

REST, Quies, in *Phyſics,* the continuance of a body in the ſame place; or its continual application or contiguity to the ſame parts of the ambient and contiguous bodies. See Space.

Reſt is either *abſolute* or *relative,* as place is. See Place.

Some define reſt the ſtate of a thing without motion; and hence again reſt becomes either abſolute or relative, as motion is. See Motion.

Sir Iſaac Newton defines true or *abſolute* reſt to be the continuance of a body in the ſame part of abſolute and immoveable ſpace; and *relative* reſt to be the continuance of a body in the ſame part of relative ſpace.

Thus, in a ſhip under ſail, relative reſt is the continuance of a body in the ſame region of the ſhip, or the ſame part of its cavity. True or abſolute reſt is its continuance in the ſame part of univerſal ſpace, in which the ſhip, with its cavity and contents, are all contained.

Hence, if the earth be really and abſolutely at reſt, the body relatively at reſt in the ſhip will really and abſolutely move, and that with the velocity with which the veſſel moves. But if the earth do likewiſe move, there will then ariſe a real and abſolute motion of the body at reſt; partly from the real motion of the earth in abſolute ſpace, and partly from the relative motion of the ſhip on the ſea. Laſtly, if the body be likewiſe relatively moved in the ſhip, its real motion will ariſe partly from the real motion of the earth in immoveable ſpace, and partly from the relative motion of the ſhip on the ſea, and of the body in the ſhip.

Thus, if that part of the earth, where the ſhip is, move eaſtward with a velocity of 10,010 parts, and the veſſel be carried by the wind weſtward ten parts, and, at the ſame time, a ſeaman aboard walk with the velocity of one part, the ſeaman will be moved really and abſolutely in immoveable ſpace eaſtward, with 10,001 parts of velocity; and relatively on the earth, with nine parts of velocity weſtwards.

It is an axiom in philoſophy, that matter is indifferent as to reſt or motion. Hence ſir Iſaac Newton lays it down as a law of Nature, that every body perſeveres in its ſtate, either of reſt or uniform motion, except ſo far as it is diſturbed by external cauſes.

The Carteſians will have firmneſs, hardneſs, or ſolidity of bodies to conſiſt in this, that their parts are at reſt with regard to each other; and this reſt they eſtabliſh as the great nexus, or principle of coheſion, by which the parts are connected together.

Fluidity, they add, conſiſts in a perpetual motion of the parts, &c. But the Newtonian philoſophy furniſhes us with much better ſolutions. See Solidity, Fluidity, and Cohesion.

Monſieur de Maupertuis aſſerts, that when bodies are in equilibrio, they muſt be ſo ſituated, that, if any ſmall motion be impreſſed on them, the quantity of action reſulting will be the leaſt poſſible. This he calls the law of reſt, and from this law he deduces the fundamental propoſition of ſtatics. See Mem. de l'Acad. de Berlin, tom. ii. p. 294.

Monſieur de Maupertuis deduces the laws of percuſſion from the ſame principle. See *Quantity of* Action.

Rest, *Repoſe,* or *Pauſe,* in *Poetry,* is uſed for the cæſura, which, in Alexandrine verſes, falls on the ſixth ſyllable; and, in verſes of ten or eleven ſyllables, on the fourth.

The reſt ſhould never fall on a monoſyllable, on which the voice may not dwell: it is called reſt, becauſe the ear and the pronunciation have both a repoſe, or reſpite.

Rest, in *Military Language,* a kind of fork to ſupport muſkets, when preſented in order to fire. Sometimes theſe reſts were armed with a contrivance called a ſwine's feather, which was a ſort of ſword-blade, or tuck, that iſſued from the ſtaff of the reſt, at the head: this, being placed before the muſqueteers when loading, ſerved, like the ſtakes placed before the archers, to keep off the cavalry. See Musket.

Reſts were of different lengths, according to the heights of the men who were to uſe them; they were ſhod with ſharp iron ferrils, for ſticking them into the ground, and were, on the march, when the muſket was ſhouldered, carried in the right hand, or hung upon it, by means of a ſtring or loop tied under the head.

Rest *Arms, To,* is to bring the firelock to the ſame poſition as in preſent arms.

To Rest *upon reverſed Arms.* At military funerals the arms are reverſed: on which occaſions, the ſoldiers belonging to the firing party, reſt upon the butt ends of their firelocks, while the funeral ſervice is performed, leaning with their cheeks ſo as to turn from the corpſe; and the word of command is "Reſt upon your arms reverſed."

Rest, in *Tilting Armour.* See Tilting *Armour.*

Rest, in *Muſic,* is a pauſe, or interval of time, during which there is an intermiſſion of the voice, or ſound.

Reſts are ſometimes uſed in melody, that is, in muſic of a ſingle part, to expreſs ſome ſimple paſſion, or even for variety ſake; but more frequently in harmony, or compoſitions of ſeveral parts, for the ſake of the pleaſure of hearing one part move on while another reſts, and this interchangeably.

Reſts are either for a whole bar, or more than a bar, or but for a part of a bar. When the reſt is for a part, it is expreſſed by certain ſigns, correſponding to the quantity of certain notes of time; as minim, crotchet, &c.; and is accordingly called *minim-reſt, crotchet-reſt,* &c.

The characters or figures of which, ſee under Characters *of Muſic,* where the notes and correſponding reſts are found together.

When any one of thoſe characters occurs, either on a line or ſpace, that part is always ſilent for the time of a minim, or crotchet, &c. Sometimes a reſt is for a crotchet and quaver together, or for other quantities of time for which there is no particular note; in which caſe the ſigns of ſilence are not reſts, but ſuch ſilence is expreſſed by placing together as many reſts, of different time, as make up the deſigned reſt. When the reſt is for a whole bar, the ſemibreve reſt is always uſed. If the reſt be for two meaſures, it is marked by a line drawn acroſs a whole ſpace. For three meaſures it is drawn acroſs a ſpace and a half, and, for four meaſures, acroſs two ſpaces. But, to prevent ambiguity, the number of bars is uſually written over the ſign.

Some of the more ancient writers in muſic make theſe reſts of different value in different ſpecies of time, *e. gr.* the character of a minim-reſt, in common time, ſay they, expreſſes the reſt of three crotchets in triple time; in that of the

the triples $\frac{6}{8}$, $\frac{6}{6}$, $\frac{12}{8}$, $\frac{12}{16}$, it always marks a half-meaſure, how different ſoever theſe may be among themſelves.

They add, that the reſt of a crotchet in common time is a reſt of three quavers in the triple $\frac{9}{8}$, and that the quaver-reſt of common time is equal to three ſemiquavers in the triple $\frac{9}{16}$. But this variety in the uſe of the ſame character is now laid aſide. Malcolm's Treat. of Muſic, p. 409, &c.

Franco, the inventor of muſical characters for time, commonly aſcribed to John de Muris, in the fourth chapter of his tract in the Bodleian library, entitled "Ars Cantus Menſurabilis," ſays, "as the ſounds in each mood are expreſſed by different notes or figures, and as diſcant itſelf is as much regulated by *ſilence* as by ſound, it will be neceſſary to treat not only of the ſigns or repreſentatives of ſounds, but of their equivalent reſts or pauſes."

But though Magiſter Franco may have invented the firſt time-table, conſiſting of full or black notes; John de Muris ſeems to have arranged the ſecond time-table, conſiſting of void or open notes, from the maxima to the minim. And in Morley's time, the notes were multiplied and accelerated to the ſemiquaver, with their equivalent reſts. See the *third* TIME-TABLE.

REST-*Harrow*, in *Botany*. See ONONIS.

RESTAUR, RESTOR, in *Ancient Cuſtoms*, the remedy or recourſe which aſſurers have againſt each other, according to the date of their aſſurances; or againſt the maſters, if the average ariſe through their default; as through ill loading, want of caulking, or want of having the veſſel tight.

The word is alſo uſed for the remedy, or recourſe, a perſon has againſt his guarantee, or other perſon, who is to indemnify him from any damage ſuſtained. Hence *reſtaurant* and *reſtauration*. In the lower Latin they alſo uſe the words *reſtor* and *reſtaur*.

RESTAURATION, RESTAURATIO, *Reſtoration*, the act of re-eſtabliſhing, or ſetting a thing in its former good eſtate.

Thus we ſay, the reſtauration of a minor to the poſſeſſion of his effects, alienated in the time of his minority. In the French laws it is an ancient formula, uſed for the reſtoring a perſon to his good name, after he has been wrongfully accuſed and condemned.

In England we ſay *the Reſtauration* or *Reſtoration*, by way of eminence, for the return of king Charles II. in 1660, after the civil wars.

The 29th of May is an anniverſary feſtival, appointed to be held in commemoration of the reſtoration of regal and epiſcopal government, by ſtat. 12 Car. II. c. 14.

We ſhall here obſerve, that the form of prayer for the 29th of May, as well as for the 30th of January, were of a different complexion in the reign of king Charles II. from the preſent, of which the reaſon is ſaid to be this: the parliament and other leading men, who were active in his reſtoration, and who had been concerned in oppoſing his father's meaſures, would not be called traitors; and required that a diſtinction ſhould be made between the commencement of the war and the concluſion of it; they would not ſuffer the firſt oppoſition made to the meaſures of that unhappy prince to be ſtyled rebellion, though they diſapproved of the abolition of regal government which enſued.

And accordingly the offices for theſe two ſolemnities were drawn up, without any reflection on the firſt authors or promoters of the oppoſition, and, in general, breathe more a ſpirit of piety than of party, of humiliation than of revenge; and, throughout, are modeſt, grave, decent, ſenſible, and devout. King James II. altered theſe forms, and king William did not venture to reduce them to their primitive ſtate; and ſo they have continued, with very little variation, to this day.

There is no order in either of theſe offices for a ſermon or homily on this day; and in the office of Charles II., there is no direction for a ſermon or homily on the 30th of January: but by the office of James II. it is required that on the ſaid 30th day of January ſhall be read the firſt and ſecond parts of the homily againſt diſobedience and wilful rebellion, or elſe the miniſter ſhall preach a ſermon of his own compoſing upon the ſame argument. The 29th of May is not a holiday in any of the law-offices, and conſequently no officer can take an extraordinary fee for buſineſs done on that day. 7 Term Rep. 163.

By 12 Car. II. c. 14. it is enacted, to the end that all perſons may be reminded of their duty on the 29th of May, and be the better prepared to diſcharge the ſame with that piety and devotion which become them, that every miniſter ſhall give notice to his pariſhioners publicly in the church at morning prayer, the Lord's day next before ſuch 29th day of May, for the due obſervation of the ſaid day, and ſhall then likewiſe publicly and diſtinctly read this preſent act to the people.

RESTAURATION, in *Architecture*, the act of repairing all the parts of a building gone to decay, either through the courſe of time, or other injuries; in ſuch manner, as that it is not only re-eſtabliſhed in its firſt form, but conſiderably augmented.

It is evident, from the plinths of the Corinthian columns of the Pantheon (which are almoſt wholly under ground), that the pavement of this temple is only a reſtauration made in the time of Septimius Severus. Daviler.

The temple of Concord, behind the Capitol at Rome, having been burnt long after it was built, and having angular baſes different from the reſt, ſeems to have been reſtored from the ruins of ſeveral ancient buildings.

RESTAURATION, in *Sculpture*, is the repairing of a mutilated ſtatue, &c. See REPAIRING.

Moſt of the antique ſtatues have undergone a reſtauration; as the Farneſe Hercules, the Faunus in the Villa Borgheſe at Rome, the Wreſtlers in the gallery of the great duke of Florence, the Venus of Arles, in the gallery at Verſailles. But theſe reſtaurations have all been made by the ableſt ſculptors. Daviler.

RESTIACEÆ, in *Botany*, a natural order of plants, firſt ſeparated from the *Junci* of Juſſieu by Mr. Brown, Prodr. Nov. Holl. v. 1. 243, and named from one of its chief genera; ſee RESTIO. The characters are theſe.

Perianth unconnected, deeply divided into from two to ſix ſegments, or rather of ſo many leaves; rarely wanting. *Corolla* none. *Stamens* definite, from one to ſix; when they are two or three, in a four or ſix-cleft perianth, they are oppoſite to its inner leaves. *Germen* of one or ſeveral cells, each cell containing one pendulous ſeed, except in *Xyris*, whoſe ſeeds are numerous. *Pericarp* either capſular, or amentaceous. *Seeds* inverted. *Albumen* ſhaped like the ſeed. *Embryo* lenticular, ſituated in the lower end of the ſeed, oppoſite to its ſcar, at the outſide of the albumen.

Plants herbaceous or ſomewhat ſhrubby, almoſt all exotic with reſpect to Britain, and even Europe. *Leaves* ſimple, narrow, in ſome caſes wanting. *Stems* naked, but often furniſhed with ſheathing ſcales, cloven at one ſide, imbricated, or equitant, at the other. *Flowers* for the moſt part aggregate, ſpiked or capitate, ſeparated by *bracteas*, the *ſtamens* and *ſtyles* generally in ſeparate individuals.

This order is diſtinguiſhed from the *Junci*, by having the embryo external, and contrary to the ſcar; from the *Commelineæ* of Brown, by the figure of that part, and its not being

being enclofed in the albumen. Thofe genera which have the habit of the *Cyperaceous* order, are well diftinguifhed from it by the fheaths of the ftem being fplit, not undivided. *Xyris*, though referred to the *Reftiaceæ*, and fcarcely more akin to any other tribe, ftill differs widely from the reft of this order; efpecially in the petal-like inner fegments, or leaves, of its perianth; the claws bearing the ftamens at their fummits; and the numerous feeds. See Obfervations on the generic character of Restio.

The New Holland genera of the prefent order are *Reftio*, *Lepyrodia*, *Lyginia*, *Anarthria*, *Loxocarya*, *Leptocarpus*, *Chætanthus*, *Hypolæna*, *Aphelia*, *Devauxia*, *Alepyrum*, *Eriocaulon* and *Xyris*.

RESTIARIA, a name given by Rumphius, in his Herbarium Amboinenfe, v. 3. 187, to two or three different fhrubs, on account of their fitnefs for ropes, or cordage; *reftiarius* being a fort of bafe Latin word for a rope-maker. The firft of thefe, *R. alba*, t. 119, is a very well-marked genus, for which the name might have been retained; but Linnæus, in his Supplementum, has called that genus *Commerfonia*, after the example of Forfter, in his Nova Genera t. 22. (See Commersonia.) Of the fecond, termed *R. nigra*, Rumphius gives no plate. We fhall fpeak of it prefently. The third he has called *Perticaria*, from *pertica*, a ftaff or pole; which name is alfo a fynonym of the other two. Nothing is known refpecting the flowers, or generic character, of this laft. Loureiro has adopted the name *Reftiaria*, for a plant which he fuppofes the fame with the *nigra* of Rumphius, but of which he knew the female flowers only. The following is his account of it. Loureir. Cochinch. 639. Clafs, *Diœcia;* Order unknown, as well as the Nat. Ord.

Gen. Ch. Male flowers unknown.

Female on a feparate plant. *Cal.* Perianth fuperior, oblong, capfular; limb in five deep, lanceolate, fpreading fegments. *Cor.* none. *Pift.* Germen inferior, oblong; ftyle none; ftigma concave. *Peric.* Capfule calycine, ovate-oblong, fomewhat tapering at each end, five-ribbed, hairy, with two cells and two valves. *Seeds* numerous, compreffed, roundifh, with a long, thin, membranous, linear wing at each fide.

Eff. Ch. Male . . . .

Female, Calyx five-cleft, capfular, fuperior. Corolla none. Stigma concave. Capfule with five ribs, two cells, two valves, and numerous winged feeds.

Obf. We do not profefs to underftand Loureiro's expreffions of *perianthium capfulare*, and *capfula calycina*, but give them as we find them, having no knowledge of the plant itfelf. De Theis fuggefts its affinity to *Gouania*.

1. R. *cordata*. Lour. (R. nigra; Rumph. Amb. v. 3. 188?)—Native of the woods of Cochinchina. A large *fhrub*, with a reclining *ftem*, and climbing *branches*, deftitute of tendrils or thorns. *Leaves* oppofite, heart-fhaped, rugofe, hairy, entire, large. *Flowers* in lax, axillary *panicles*, with long general as well as partial ftalks. The *bark* is tough and porous, fplitting into long ftrips, of which torches are made, and which ferve alfo for caulking of veffels. The generic name was adopted by Loureiro, becaufe of the fitnefs of the ftems and branches for cordage.

RESTINCLIERS, in *Geography*, a town of France, in the department of the Herault; nine miles N.E. of Montpelier.

RESTINCTION, Restinctio, in *Chemiftry*, the quenching of a metal or mineral in fome liquor, in order either to correct or to exalt it; by giving it fome new quality, power, &c.

RESTING Ground, in *Gardening*, the means of refreshing it, and of reftoring its fertility by the omiffion of culinary crops, and the cultivation of fuch as have this tendency, or by any other methods which may have the fame effect. It is a fort of management which is principally accomplifhed in two different ways; the former of which is that of fowing a certain portion of it, annually, with corn and fome fort of grafs feeds, fuffering it to continue under the latter of them for three or more years, as in arable field lands, in order that it may then be broken up again. This is a very beneficial method, but not much practifed, except by market-gardeners, who employ thefe two crops in feeding and foddering their cattle. When made ufe of in other ways, as in other gardens, great care fhould be taken that the grafs never runs up to feed, as is fometimes the cafe in market-gardens, but in all other particulars the practice may be entirely the fame. In this way of proceeding, by fowing and laying down a certain quantity of ground every year, the fame extent may be broken up, which will, of courfe, afford fo much frefh foil annually, upon which fuch garden crops as anfwer beft on newly broken up land, may be put in and raifed, as thofe of onions, carrots, turnips, and a great many other kinds.

The latter of the above modes of managing the bufinefs, is, however, better adapted to gardens in general, as being more fuited to the nature of their culture. It was, probably, firft fuggefted by the author of the "Scotch Forcing Gardener;" and is extremely well fuited to produce the fame effects and advantages as that which has been already noticed; and it may, indeed, in fome cafes, be combined with it, or ufed conjointly, with great benefit; as by fuch means much frefh furface foil will be yearly at the command of the gardener. The manner of performing it is this; after taking three culinary crops off from the firft furface, the ground is to be trenched over three fpits deep, by which the bottom and top parts are reverfed, and the middle part ftill remains in that fituation; then three fimilar crops are to be taken off from this furface, and the ground afterwards trenched two fpits deep, by which means the top becomes the middle, and the middle the top; three of the fame kind of crops being here alfo taken off from this furface, and then the ground trenched three fpits again, that part which was laft the middle, and now the top, becomes the bottom; and that which is now the bottom, and was the furface at firft, now becomes the furface again, after having had fix years' reft. By this alternate manner of proceeding, one time trenching three fpits deep, and the other two, the furface will conftantly be changed, and will reft fix years, while it is three years productive. On which account there will be continually new ground and foil in the garden for the growth of healthy culinary vegetables; and befides, much lefs manure will be wanted than where the foil is fhallow, and the fame furface conftantly under culinary crops.

Proper and careful modes of cropping, as well as other kinds of management, may likewife, in many cafes, contribute greatly to the fame intention.

Resting *Land*, in *Agriculture*, the means of keeping it without any fort of crop, or only under particular kinds, in the view of reftoring its fertility. This is done in the practice of naked fallowing, as well as that of cultivating green crops by way of a fallow, and by laying land down to the ftate of grafs, in order to its being afterwards broken up for grain crops. See Fallow and Fallowing, alfo Green *Crops*, and Laying *down to grafs*.

RESTIO, in *Botany*, from *reftis*, a cord, becaufe many of the genus ferve, at the Cape of Good Hope, where they abound, to make ropes, bafkets, &c. *Reftio* is properly a perfon who fells cord, or ropes. Elegia, fee that article, is is nearly related in habit, as well as characters, to the prefent genus, and was finally united to it by Linnæus, contrary to Thunberg's opinion.—Linn. Syft. Nat. ed. 12. v. 2. 735. Schreb. 676. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 368. Brown Prodr. Nov. Holl. v. 1. 244. Thunb. Diff. May 17. 1788. Rottb. Gram. 1. Juff. 44. Labill. Nov. Holl. v. 2. 77. Lamarck Illuftr. t. 804. (Chondropetalum; Rottb. Gram. 10. Calorophus; Labill. Nov. Holl. v. 2. 78.)—Clafs and order, *Dioecia Triandria*. Nat. Ord. *Calamariæ*, Linn. *Junci*, Juff. *Reftiaceæ*, Brown.

Gen. Ch. Male, *Cal.* Catkin ovate or oblong, many-flowered; its fcales coriaceous, imbricated, keeled. Perianth compreffed, of four or fix, nearly equal leaves; two of the outer ones boat-like, the third flat; the three innermoft lanceolate, thinner, one of them broader than the reft. *Cor.* none, except the three inner leaves of the calyx be fo confidered. *Stam.* Filaments three, fometimes but two; anthers oblong, fimple, peltate.

Female, on a feparate plant, *Cal.* and *Cor.* as in the male. *Pift.* Germen fuperior, triangular; ftyle one, deeply divided into two or three parts; ftigmas feathery. *Peric.* Capfule with two or three lobes, and as many cells, burfting at the prominent angles. *Seeds* folitary, fomewhat oval.

Obf. *Chondropetalum* of Rottboll differs from the reft of the fpecies, in having the inner fegments of the calyx longer, and of a cartilaginous texture. This difference, and the ftill more remarkable one in *Xyris*, between the outer and inner fegments of the calyx, might furely authorize us to call the three latter a corolla, in both thefe inftances.

Eff. Ch. Male, Catkin imbricated. Perianth of four or fix leaves, fhorter than the fcales of the catkin, deftitute of internal fcales. Corolla none. Anthers peltate.

Female, Catkin and Perianth like the male. Stigmas two or three. Capfule of two or three lobes, and as many cells, burfting at the angles. Seeds folitary.

The plants of this genus have a hard, rigid, fmooth, rufhy habit. The *root* is fcaly, creeping, and perennial. *Stems* rufhy, fimple or branched, leaflefs, fheathed with fcales fplit at one fide. *Catkins* either folitary, fpiked or panicled. Mr. Brown obferves, that the fcar of the *feed* is naked in the New Holland fpecies, but in thofe from the Cape of Good Hope it is bordered. Several things which Thunberg and Rottboll have referred to *Reftio*, are by Mr. Brown removed to other genera; fee Leptocarpus and Thamnochortus. This author defines 24 New Holland fpecies, in his Prodromus. How many are found at the Cape, we have no means of determining, becaufe of the uncertainties refpecting their generic characters, which we have not materials to remove. The following may ferve as examples.

Section 1. *Stem fimple.*

R. *tectorum.* Thatch Rope-grafs. Linn. Suppl. 425. Ait. n. 1. (Chondropetalum deuftum; Rottb. Gram. 10. t. 3. f. 2.)—Stem fimple. Leaves none. Catkins racemofe, moftly leaning one way, drooping, bracteated, roundifh, triangular. Gathered by Thunberg at the Cape, from whence Mr. Maffon fent living plants to Kew, in 1793. They are kept in the greenhoufe, bloffoming in May and June. The *root* is perennial, fmall and tapering, throwing out horizontal fcaly fhoots. *Stems* feveral, a foot and half high, erect, very ftraight, round, flender, fmooth, unbranched, with fhort taper-pointed fheaths at the joints. *Clufter* terminal, compound, about two inches long, variegated with black, or dark purple, and brown. The ftems are ufed for thatching, for which their hard rigid nature is well calculated; nor is this thatch difturbed by the very high winds that prevail in fouthern Africa. *Thunberg.*

R. *cernuus.* Pendulous-headed Rope-grafs. Linn. Suppl. 425. Thunb. Reft. n. 4. t. 1. f. 2.—Stem fimple. Leaves none. Catkins turbinate, pendulous, on capillary ftalks. Native of the Cape, on hills about the Table mountain. The *ftem* is flender, jointed and fmooth, two feet high, or more, with fcales at the joints, but no leaves. *Catkins* three, four, or five, at the top of each ftem, about the fize of a pea, brown, obtufe, tapering at the bafe, pendulous, each fupported by a capillary ftalk. *Scales* obtufe, with a fmall point.

R. *dichotomus.* Fork-leaved Rope-grafs. Linn. Syft. Nat. ed. 12. v. 2. 735. Rottb. Gram. 2. t. 1. f. 1. (Schœnus capenfis; Linn. Sp. Pl. 64?)—Stems fimple. Leaves repeatedly compound, with awl-fhaped leaflets. Panicle drooping. Catkins oblong. Scales taper-pointed. Common at the Cape. *Stems* feveral, a foot or more in height, bearing a few fheaths. *Leaves*, or, as fome call them, barren ftems, much fhorter than the flowering ftems, flender, twifted, branched, with a fheath at each joint; their ultimate fubdivifions awl-fhaped, channelled. *Panicles* at the top of each ftem, of 10 or 12 drooping oblong *catkins*, whofe fcales are of a fhining brown, and very finely pointed.

Section 2. *Stem branched.*

R. *verticillaris.* Horfe-tail Rope-grafs. Linn. Suppl. 425. Thunb. Reft. n. 22. t. 1. f. 7.—Branches whorled, jointed; with ovate fcales. Panicle compound, clofe.—Found about the banks of rivers at the Cape. *Stem* five or fix feet high, refembling an *Equifetum* in its copious, flender, whorled branches, from every joint; bearing numerous ovate, taper-pointed, fmall fcales. We confefs ourfelves unable to draw a line between thefe branches, and what we have termed leaves in the laft-defcribed fpecies, except that the latter are moftly, if not entirely, radical, and thefe grow from every joint of the ftem. The *catkins* are extremely fmall and numerous, in branched, repeatedly compound, denfe clufters.

R. *tetraphyllus.* Four-leaved Rope-grafs. Labill. Nov. Holl. v. 2. 77. t. 226, 227. Brown n. 24.—Stems femicylindrical, with blunt fheaths. Leaflets fetaceous. Panicle terminal, compound. Catkins nearly globofe. Scales pointed. Male flowers fix-cleft; female four-cleft.—Native of New South Wales and Van Diemen's ifland. *Stems* numerous, ftout, three feet high, with a few leafy branches in the upper part, whofe ultimate divifions are briftle-fhaped. *Catkins* ftalked, ovate in the female plant, nearly globofe in the male. The perianth of the female flowers has but four leaves, that of the male fix.

RESTITUTION, Restitutio, in *Phyfics*, the returning of elaftic bodies forcibly bent to their natural ftate, by fome called the *motion of reftitution.* See Elasticity.

Contraction being the proper and natural action of mufcular fibres, fome authors afcribe dilatation to a motion of reftitution; but the expreffion, as well as the idea, is very faulty.

Restitution, in the moral and legal fenfe, is the act of reftoring a perfon to his right, or of returning fomething unjuftly taken or detained from him.

Reftitution is reducible to commutative juftice; and till it be made, the cafuifts determine the party all the while guilty of theft.

The illegal incumbents of benefices are condemned to a reftitution of the fruits of the benefices. In the Romifh church, ufurers, &c. are obliged to a reftitution of their ill-gotten goods; otherwife the prieft has no authority to give them abfolution.

Restitution *in Blood.* See Corruption *of Blood*, Attainder, and Pardon.

Resti-

Restitution *of Conjugal Rights*. See Conjugal *Rights*.

Restitution *of Stolen Goods*, in *Law*, is allowed to the profecutor, on a conviction of larciny, by ftat. 21 Hen. VIII. c. 11. For, by the common law, there was no reftitution of goods upon an indictment, becaufe it is at the fuit of the king only; and therefore the party was forced to bring an appeal of robbery, in order to have his goods again. But it being confidered that the party, profecuting the offender by indictment, deferves as much encouragement as he who profecutes by appeal, this ftatute was made, which enacts, that if any perfon be convicted of larciny by the evidence of the party robbed, he fhall have full reftitution of his money, goods, and chattels, or the value of them out of the offender's goods, if he has any, by a writ to be granted by the juftices. And this writ of reftitution fhall reach the goods fo ftolen, notwithftanding the property of them is endeavoured to be altered by fale in market overt; or elfe, without fuch writ of reftitution, the party may peaceably retake his goods, wherever he happens to find them, unlefs a new property be fairly acquired therein; or, laftly, if the felon be convicted and pardoned, or be allowed his clergy, the party robbed may bring his action of trover againft him for his goods, and recover a fatisfaction in damages; but fuch action lies not before profecution, for fo felonies would be made up and healed. See Recaption.

Restitution *of Temporalities of Bifhops*. See Temporalities, and Restitutione *Temporalium*.

Restitution *in Integrum*, is ufed for what is otherwife called *refciffion*.

Religious obtain reftitution againft their vows, *i. e.* they are freed from their obligation, when they proteft againft them within five years of their profeffion.

In the hiftory of Germany for the feventeenth century, the firft day of January, 1624, is called the *term of reftitution;* becaufe by the peace of Munfter, then concluded, the Lutheran and Calvinift princes were obliged to reftitute, or reftore what they had taken from the Roman Catholic churches in their territories till that day.

By the peace of Weftphalia in 1648, the reftitution-edict was abrogated, and both the contending parties confirmed in the perpetual and uninterrupted poffeffion of whatever they had occupied in the beginning of the year 1624. And all the articles agreed upon by this peace were confirmed and ratified, in the year 1650, at Nuremberg.

Restitution *of Medals*, or *Reftituted Medals*, is a phrafe ufed by antiquaries, for fuch medals as were ftruck by the emperors, to renew or retrieve the memory of their predeceffors.

Hence it is, that in feveral medals we find the letters rest. Claudius was the firft who began this practice, by ftriking afrefh feveral medals of Auguftus. Nero did the fame; and Titus, after the example of his father, ftruck reftitutions of moft of his predeceffors. Some, however, have maintained that the reftituted medals of Claudius and Nero are modern and fpurious, and that the practice began under Titus.

Gallienus ftruck a general reftitution of moft of the preceding emperors in two medals, the one bearing an altar, the other an eagle, without the *reft*. F. Joubert choofes rather to call them *converfations* than reftitutions, as being done quite anew. Thefe were defigned to preferve the remembrance of the confecration of thofe emperors in honour of whom they were ftruck; and they have all the fame legend on the reverfe, *viz.* consecratio.

RESTITUTIONE *extracti ab ecclefia*, in *Law*, a writ anciently granted for the reftoring a man to the church, or fanctuary, from which he had been forced way.

Restitutione *Temporalium*, a writ which lies where a man is elected and confirmed bifhop of a diocefe, for the recovery of the temporalities, or barony, of the faid bifhopric.

It is directed from the king to the efcheator, or rather fheriff of the county.

RESTIVE, or Resty, a term applied to a horfe, &c. that ftops, or runs back, inftead of advancing forwards.

In the manege, a reftive horfe is a rebellious, refractory, ill-broken horfe, which only goes where it will, and when it will. The word is formed from the Latin *reftivus*, which fignifies the fame thing. (See Ramingue.) A horfe of this fort, who has been too much conftrained and tyrannized over, fhould be treated with the fame lenity as a young colt. The fpurs are improper to be ufed to either; inftead of which a fwitch fhould be ufed, in order to drive him forward, as he will be thus lefs alarmed; becaufe the fpurs furprife a horfe, abate his courage, and are more likely to make him reftive than oblige him to go forward, if he refufes to do fo. There is likewife another method to punifh a reftive horfe, which is to make him go backward the moment he begins to refift. Thefe corrections generally fucceed; but the general rule is to pufh and carry your horfe forward, whenever he refufes to advance, and continues in the fame place, and defends himfelf either by turning or flinging his croupe on one fide or the other; and, for this purpofe, nothing is fo efficacious as to pufh him forward vigoroufly. Berenger's Horfemanfhip, vol. ii. p. 29, &c. See Ride.

RESTOR. See Restaur.

RESTORATION. See Restauration.

Restoration, in *Theology*, a term applied by thofe who maintain the doctrine of the final happinefs of all mankind, to the recovery of tranfgreffors from a ftate of guilt and mifery to pardon and felicity, in confequence of the penal difcipline which they are doomed to endure in a future world. See this doctrine difcuffed under the article Hell.

Restoration *Cove*, in *Geography*, a bay on the weft coaft of North America, in Burke's canal, fo called by Vancouver, from the 29th of May, the day of its difcovery. Among the fkins brought to fale at this bay were thofe of the animal which produces the wool, of which the garments worn by fome of the Indians are made. Their length, exclufively of the head and tail, was 50 inches; and their breadth, exclufively of the legs, was 36 inches. All the fkins that were brought to captain Vancouver were white, or rather of a cream colour. The pelt was thick, and of a fine texture; but from their ftate of mutilation, the fpecies of animals to which they belonged could not be afcertained. The women, who appeared to be of the greateft importance, were adorned by an horizontal incifion about three-tenths of an inch below the upper part of the under lip, extending from one corner of the mouth to the other; and in this flit was fixed a piece of wood, confined clofely to the gums of the lower jaw, and projecting by its external furface horizontally. Thefe wooden ornaments were of an oval form, and refembled a fmall oval platter or difh, concave on both fides: the fmalleft of them was about $2\frac{1}{2}$ inches, and the largeft $3\frac{1}{10}$ inches long, and $1\frac{1}{2}$ inch broad; the others decreafed in breadth in proportion to their length. The clothing of the natives here confifted either of the fkins of the fea-otter, or of garments made of the pine-bark, into which was neatly wrought fome of the fur of the fea-otter, and their fides and bottoms were decorated with various colours. In this they ufe only woollen yarn, very fine, well fpun, and dyed for that purpofe, particularly with a very

lively

lively and beautiful yellow. N. lat. 52° 1′. E. long. 232° 20′.

Restoration *Island*, a small island in the South Pacific ocean, near the east coast of New Holland, discovered by captain Bligh in 1789. S. lat. 12° 39′.

Restoration *Point*, a cape on the west coast of Vashon's island. N. lat. 47° 30′. E. long. 237° 46′.

RESTORATIVE, in *Medicine*, such substances both in the way of food, drink, and medicines, which are calculated to restore the vigour of the constitution, after the cessation of acute diseases, after violent hæmorrhages, fatigue, watching, or want of food. These of course comprehend the most nutritious parts of animal substances, jellies, broths, &c.; and the vegetable starches, arrow-root, sago, &c. with milk, rice, and other light nourishment. The restorative medicines will be selected from the bitter and aromatic vegetables, and some of the metallic salts, especially those of iron; their principal use being to give tone and vigour to the digestive organs, and thus enable them to extract and digest the nutriment, which the food affords.

RESTOUN, in *Geography*, a town of Syria, anciently called "Arethusa;" 12 miles S.E. of Hamah.

RESTOW, a town of Austrian Poland, in Galicia; 72 miles W. of Lemberg.

RESTRAINING Statute. See Remedial.

Restraining *Statute of Leases*. See Leases *by Statute*.

RESTRAINT is when an action is hindered, or stopped, contrary to volition, or the preference of the mind.

RESTRICTION, the act of modifying, limiting, or restraining a thing to narrower bounds.

General laws always bear some restriction. In contracts it is usual to have *restrictive clauses*, which bind the covenants down to certain bounds.

Restriction, *Mental*. See Reservation.

Restriction, among *Logicians*, is understood of the limiting a term, so as to make it signify less than it usually does.

In which sense the name philosopher is restrained to Aristotle; Great, to Alexander; City, to Rome, &c.

RESTRICTIVE Proposition. See Proposition.

Restrictive *Suture*. See Suture.

RESTRINGENT, in *Medicine*. See Astringent.

RESTY. See Restive and Ride.

RESULT, what is gathered from a conference, an inquiry, meditation, discourse, or the like; or the conclusion and effect thereof.

The usual result of disputes, Mr. Bayle observes, is, that each person remains more attached to his own opinion.

RESULTING Use, in *Law*. See Use.

RESUMMONS, Resummonitio, a second summons or calling a man to answer an action, where the first summons is defeated, or suspended, by an accident; as the death of a party, &c.

RESUMPTION, Resumptio, in a law-sense, signifies the taking again into the king's hands such lands or tenements as before, upon false suggestions, or other error, he had delivered to the heir, or granted, by letters patent, to any man.

Resumption, in the *Schools*, a summary repetition, or running over, of an argument, or of the substance of it, in order to refute it.

Resumption is also used by *Logicians* for the reduction of some figurative or quaint proposition, to a more intelligible and significant one.

RESUMPTIVE, in *Pharmacy*, an epithet given to a kind of unguent, used to recruit and restore arid languishing constitutions, and to dispose the dry bodies to receive nourishment. It is called in Latin *unguentum resumptivum*.

RESUPINATUM Folium, in *Botany*, a reversed leaf, has its proper under side turned uppermost, as in *Pharus latifolius*, and *Alstroemeria pelegrina*. See Leaf.

RESUPINATUS Flos, a reversed flower, is so circumstanced, that what, according to analogy, ought to be its upper side, is really the under. Of this *Lavandula*, Lavender, is an example, the longer lip of its corolla being uppermost, while the other, with the stamens and style, are downwards.

RESURRECTION, Resurrectio, *Resuscitation*, the act of returning to a new or second life, after having been dead.

The great argument for the truth of Christianity, and that urged with the most force and conviction for the same, is drawn from the resurrection of our Saviour. The circumstances of it are such as almost admit of a demonstration; which has accordingly been attempted on the strict principles of geometricians. See Ditton on the Resurrection.

The records of the fact of our Lord's resurrection are contained in the four gospels of St. Matthew, St. Mark, St. Luke, and St. John; and though the accounts given by these historians have been charged with some discrepancies and contradictions, the difficulties occasioned by them admit of a satisfactory solution. Among those who have made attempts for this purpose, Mr. Gilbert West (ubi infra) is entitled to our particular notice. With this view, he states the several incidents of this wonderful event, according to the order in which they seem to have arisen. He premises with observing, that our Saviour Christ was crucified on a Friday (the preparation, or the day before the Jewish Sabbath); gave up the ghost about three o'clock in the afternoon of the same day; and was buried that evening, before the commencement of the Sabbath, which, among the Jews, was always reckoned to begin from the first appearance of the stars on Friday evening, and to end at the appearance of them again on the day we call Saturday. He adds, that, some time, and most probably towards the close of the Sabbath, after the religious duties of the day had terminated, the chief priests obtained of Pilate, the Roman governor, a guard to watch the sepulchre, till the *third* day was past; pretending to apprehend that his disciples might come by night, and steal away the body, and then give out that he was risen, as he had predicted while he was yet alive. Accordingly a guard was set, the sepulchre made sure, and, to prevent the soldiers themselves from conniving with the disciples, a seal was put upon the stone which closed up the entrance of the sepulchre.

Some have objected to the evangelical statement of the time that elapsed between our Lord's death and resurrection; and they say, that the resurrection happened a day sooner than the prediction imported. But in the "Trial of the Witnesses," it is alleged, that the objection is founded upon a mistake of a mode of speaking, common to the Jews and other people; who, when they name any number of days and years, include the first and the last of the days or years to make up the sum. Christ, alluding to his own resurrection, says, "In three days I will raise it up." The angels report his prediction thus: "The Son of man shall be crucified, and the third day rise again." Elsewhere it is said, "after three days;" and again, that he was to be in the bowels of the earth "three days and three nights." These expressions are equivalent to each other; for we always reckon the night into the day, when we reckon by so many days. If you agree to do a thing ten days hence, you stipulate

ſtipulate for forbearance for the nights as well as days; and, therefore, in reckoning, two days, and two days and two nights, are the ſame thing. That the expreſſion, "after three days," means incluſive days, is proved by Grotius in Matth. xxvii. 63, and others. The prediction, therefore, was that he would riſe on the third day. Now, he was crucified, as we have already ſtated, on Friday, and buried; he lay in the grave the whole of Saturday, and roſe early on Sunday morning. But as the objectors ſay, he ought not to have riſen till Monday: let us try what the uſe of common language requires to be underſtood, in a like caſe. Suppoſe you were told that your friend ſickened on Friday, was let blood on Saturday, and the third day he died: what day would you think he died on? If you have any doubt about it, put the queſtion to the firſt plain man you meet, and he will reſolve it. The Jews could have no doubt in this caſe; for ſo they practiſed in one of the higheſt points of their law. Every male child was to be circumciſed on the eighth day. How did they reckon the days? The day of the birth was one, and the day of the circumciſion another; and though a child was born towards the very end of the firſt day, he was capable of circumciſion on any time of the eighth day. And, therefore, it is not new nor ſtrange, that the third day, in our caſe, ſhould be reckoned into the number, though Chriſt roſe at the very beginning of it. It is more ſtrange to reckon whole years in this manner; and yet this is the conſtant method obſerved in Ptolemy's canon, the moſt valuable piece of ancient chronology, next to the Bible, now extant. If a king lived over the firſt day of a year, and died the week after, the whole year is reckoned to his reign.

The order of the incidents our author conceives to have been as follows. Very early on the *firſt* day of the week (the day *immediately following* the ſabbath, and the *third* from the death of Chriſt), Mary Magdalene and the other Mary, in purſuance of the deſign of embalming the Lord's body, which they had concerted with the other women who attended him from Galilee to Jeruſalem, ſet out, in order to take a view of the ſepulchre, juſt as the day began to break; and about the time of their ſetting out "there was a great earthquake," &c. (Matth. xxviii. 2—4.) During the amazement and terror that occurred, Chriſt came out of the ſepulchre; and the keepers recovered from their trance and fled, when an angel, who till this time ſat upon the ſtone, quitted his ſtation on the *outſide*, and entered *into* the ſepulchre; and probably diſpoſed the linen clothes and napkin in that order in which they were afterwards found, and obſerved by John and Peter. Mary Magdalene, in the mean while, and the other Mary, were ſtill on their way to the ſepulchre, where, together with Salome (whom they had either called upon, or met as they were going), they arrived at the riſing of the ſun. And as they drew near, "they ſaid among themſelves, Who ſhall roll us away the ſtone from the door of the ſepulchre? for it was very great:" and they themſelves (the two Maries at leaſt) had ſeen it placed there two days before, and ſeen with what difficulty it was done. But whilſt they were deliberating (for it does not appear that they knew any thing of the guard), "lifting up their eyes," being yet at ſome diſtance, they perceived it *was* already *rolled* away. Alarmed at ſo extraordinary and ſo unexpected a circumſtance, Mary Magdalene, concluding that, as the ſtone could not have been moved without a great number of hands, it muſt have been rolled away with ſome deſign; and that this deſign could have been no other but to remove the Lord's body; and being convinced by appearances that this was the caſe, ran immediately to inform Peter and John of what ſhe had ſeen, and what ſhe ſuſpected; leaving Mary and Salome there, ſo that, if Joanna and the *other* women ſhould come in the mean time, they might acquaint them with their ſurpriſe at finding the ſtone removed, and the body gone, and of Mary Magdalene's running to inform the two above-mentioned apoſtles of it. While ſhe was going on this errand, Mary and Salome went on and entered into the ſepulchre; and there ſaw an angel "ſitting on the right ſide," &c. (Mark, xvi. 5—8.) After the departure of Mary and Salome came John and Peter, who, having been informed by Mary Magdalene, that the body of the Lord was taken away out of the ſepulchre, and that ſhe knew not where they had laid him, "ran both together to the ſepulchre," &c. (John, xx. 4—17.) After the appearance of Chriſt to Mary Magdalene, to whom, as St. Mark ſays expreſsly, he appeared firſt, the other Mary, and Salome, who had fled from the ſepulchre with ſuch terror and amazement, that "they ſaid not any thing to any man," (Mark, xvi. 8.), that is, as the expreſſion may be underſtood, had not told the meſſage of the angel to ſome (probably John and Peter, who were running with Mary Magdalene to the ſepulchre, about the time that theſe women were flying from it, and whom in their fright they might not immediately recollect), whom they met, and to whom they were directed to deliver it, were met on their way by Jeſus Chriſt himſelf, who ſaid to them, "All hail!" &c. (Matth. xxviii. 9, 10.) Theſe ſeveral women, and the two apoſtles, being now gone from the ſepulchre, "Joanna, with the other Galilean women, and others with them," &c. (Luke, xxiv. 1—9, 11.), Peter, who, upon the report of Mary Magdalene, had been *at* the ſepulchre, had *entered into* it, and, with a curioſity that beſpoke an expectation of ſomething extraordinary, and a deſire of being ſatisfied, had obſerved that the *linen clothes* in which Chriſt was buried, and the *napkin that was about his head*, were not only *left* in the ſepulchre, but carefully *wrapped up*, and laid in *ſeveral places*, and who, from theſe circumſtances, might begin to ſuſpect, what his companion St. John from the ſame circumſtances ſeems to have believed:—Peter we ſay, hearing from Joanna, that ſhe had ſeen a viſion of angels at the ſepulchre, who had aſſured her that Chriſt was riſen, ſtarting up, ran thither immediately; and knowing that the angels, if they were *within* the ſepulchre, might be diſcovered without his *going in*, he did *not*, as before, *enter in*, but *ſtooping down*, looked ſo far in as to *ſee* the *linen clothes*; and "departed, wondering in himſelf at that which was come to paſs." (Luke, xxiv. 12.) And either *with* Peter, or *about that time*, *went* ſome *other* diſciples, who were preſent when Joanna, and the other women, made their report; "and found it even ſo as the women had ſaid."—"The ſame day, two" of the diſciples "went to a village called Emmaus," &c. (Luke, xxiv. 13—35.) Such, according to Mr. Weſt, is the order in which the ſeveral incidents above related appear to have ariſen: and he concludes, that by this order, in which all the different events naturally and eaſily follow, and, as it were, riſe out of one another, the narration of the evangeliſts is cleared from all confuſion and inconſiſtencies; and, moreover, the proof of the reſurrection is better eſtabliſhed by thus *ſeparating* the women into two or more diviſions, than upon the contrary ſuppoſition, which brings them *all together* to the ſepulchre; for, in the laſt caſe, inſtead of *three different* appearances of angels to the women, and *two* of Jeſus Chriſt, we ſhould have but *one* of each; whereas, in the former, there is a train of witneſſes, a ſucceſſion of miraculous events, mutually ſtrengthening and illuſtrating each other, and equally and jointly concurring to prove one and the ſame fact:—a fact, which, as it was in its own nature more aſtoniſhing, and in its conſequences of the

the utmoſt importance to mankind, required the fulleſt and moſt unexceptionable evidence. Never, ſays our author, was a fact more fully proved; and in ſtating this proof, with a brevity correſponding to our limits, and yet, we truſt, with a clearneſs anſwerable to the importance of the ſubject, we ſhall avail ourſelves of the luminous arrangement which our author has made of the principal arguments that eſtabliſh the intereſting fact of our Lord's reſurrection, and that rendered it credible to the apoſtles and firſt diſciples; and by means of their teſtimony to perſons of countries and ages remote from thoſe in which it occurred. In its reference to the conviction of the apoſtles and firſt diſciples, the *firſt* object of conſideration comprehends the characters and diſpoſitions of the perſons who were themſelves to be convinced, and who were to be witneſſes of the reſurrection to the world in general; the *ſecond* includes the manner, *i. e.* the method and order in which the ſeveral proofs were laid before them; and the *third* is the matter of the evidence. The knowledge of the character and diſpoſition of the apoſtles and diſciples, for whoſe conviction the proofs of the reſurrection were primarily deſigned, is neceſſary to evince their aptitude and their ſufficiency for this purpoſe, and will ſerve to ſhew us, that the manner in which they were adduced, and the matter, or facts, of which they conſiſted, were ſelected with conſummate wiſdom. The apoſtles and firſt diſciples were, for the moſt part, perſons of low birth and mean occupations, unaccuſtomed to abſtract reaſoning and deep inquiry, and ſtrongly poſſeſſed with the national prejudices of the Jewiſh religion, as it was then taught by the Scribes and Phariſees. Although it appears from many paſſages in the goſpel hiſtory, that they were convinced by the numerous miracles which Jeſus of Nazareth performed, and by the accompliſhment of many prophecies in the hiſtory of his life, of his being the promiſed and expected Meſſiah; yet they were deluded by the notion prevalent among their brethren, the Jews, that the Meſſiah would be a temporal prince, a redeemer and ruler of Iſrael, who ſhould never die. Our Saviour, in many of his diſcourſes, laboured to undeceive them; but their prepoſſeſſions and errors were ſo deeply rooted, that all his efforts for this purpoſe proved ineffectual. He had, indeed, moſt circumſtantially foretold his own ſufferings, death, and reſurrection: but it ſufficiently appears, that they did not underſtand theſe predictions, until ſome time after their accompliſhment. As, in their opinion, immortality and temporal dominion were the characteriſtics of the Meſſiah, the ſufferings and death of Jeſus muſt have convinced them, before his reſurrection, that he was not the Meſſiah, or that perſon in whom they had truſted as the Redeemer and king of Iſrael. When he actually died according to his prediction, and his enemies ſeemed to have obtained a complete triumph over him, their minds muſt have been agitated by prejudice, doubt, perplexity, deſpair, and terror. The evidence, therefore, that was adapted to recover them from this ſtate, muſt, in the *manner* of its being preſented to them, as well as in its own nature, be of a peculiar kind: otherwiſe it could not have ſerved the purpoſe of converting them from being incredulous and ready to deſert their Maſter, into believers, teachers, and martyrs of the goſpel. The firſt alarm they received was from Mary Magdalene, who, early in the morning, on the third day from the burial of our Saviour, came running to inform Peter and John, that the ſtone was rolled from the mouth of the ſepulchre, and that the body of the Lord was removed. Theſe two apoſtles haſtened to the ſepulchre, and having entered it, found the fact that had been announced to them actually verified. Thus were their minds prepared for the extraordinary events that afterwards occurred. The life of Jeſus, they knew, had been a life of miracles; and his death had been attended with prodigies and wonders; and yet none of them, John excepted, believed that he was riſen from the dead; *for as yet* (as that apoſtle aſſures us) *they knew not the ſcriptures, that he muſt riſe again from the dead;* that is, they did not underſtand from the prophets, that the Meſſiah was to riſe again from the dead; being, on the contrary, perſuaded, that theſe very prophets had foretold the Meſſiah ſhould *not* die, but *abide for ever.* The next report they received was from Joanna, and her companions, who acquainted them that angels had appeared to them, and had told them that Jeſus was riſen, reminding them, at the ſame time, that Chriſt himſelf had, not only from the ſpirit of prophecy with which it was known that he was endowed, but from the prophets alſo, predicted his own ſufferings and death, and riſing again from the dead on the third day. But then they did not underſtand what was meant by his "riſing from the dead." In order to explain to them the meaning of the reſurrection, they were probably acquainted, in the next place, by Mary Magdalene, that ſhe had ſeen, not angels only, but Chriſt himſelf. Neverthelefs ſome doubts and difficulties ſtill remained. He had been ſeen only by Mary Magdalene. To relieve them in this ſtate of heſitation and perplexity, nothing could be better calculated than the account given by the other Mary and Salome, who had alſo been at the ſepulchre, and had there ſeen an angel, who not only aſſured them that "Chriſt was riſen," but had ordered them to tell his diſciples, "that they ſhould meet him in Galilee," agreeably to what he himſelf had ſaid to them in his lifetime. The only ſcruple that now remained in the minds of the apoſtles, aroſe from their not having ſeen him themſelves; and till they did, they ſeemed reſolved to ſuſpend their belief of his being riſen from the dead, and treated all thoſe viſions of the women as ſo many idle tales. They were left for ſome time to ruminate over the wonderful events that had rapidly occurred, to examine the ſcriptures, and to recollect the predictions and diſcourſes of their Maſter, to which they were referred both by the angels and himſelf. In order to aſſiſt them in their inquiries, and lead them to the true ſenſe of the ſcriptures, the only rational means of conquering their prejudice, Chriſt himſelf appeared to two of his diſciples, on their way to Emmaus, whom he found diſcourſing and reaſoning as they went upon thoſe very topics. The deſign of Chriſt in his converſation with theſe diſciples, and particularly in his expoſition of the prophets, was to ſhew, that, by the proper exerciſe of their underſtandings, they might, from thoſe very ſcriptures, whoſe authority they allowed, have been convinced that the Meſſiah "ought to have ſuffered," as they had ſeen him ſuffer, "and to riſe from the dead on the third day." That is, Chriſt choſe rather to convince them by *reaſon*, than by *ſenſe;* or, at leaſt, to prepare their minds, that their aſſent afterwards to the teſtimony of their ſenſes, ſhould be with the concurrence of their reaſon. Having duly prepared them for receiving the teſtimony of their ſenſes, he diſcovered himſelf to them by an act of devotion, "in breaking of bread;" a form of devotion which he had inſtituted in remembrance of his death. Accordingly they were convinced, and "returned that ſame hour to Jeruſalem," where they found the apoſtles aſſembled together, and debating apparently upon the ſeveral reports they had heard that day, and particularly upon what Peter had told them, to whom, ſome time on that day, Chriſt had appeared. The apoſtles having now had every kind of evidence laid before them that was requiſite to convince them of the reality of the reſurrection of Chriſt, and being alſo enabled by the gift of that Spirit, which inſpired the prophets, to underſtand the true meaning of thoſe ſacred oracles

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to which their Master constantly referred them for the marks and characters of the Messiah, which *he* affirmed to be found in himself; they were left again to themselves, that they might consider and examine at leisure the several proofs of the resurrection, which they had heard and seen, and particularly those arising from the accomplishment of the predictions contained in the holy scriptures. Accordingly he forebore visiting them for eight days, after which he condescended to submit himself to a farther examination, in order to remove the unreasonable scruples of St. Thomas, one of the apostles. After this there seems to have been no scruple left in the minds of any of the apostles, to whom, however, Christ was still pleased to continue his visits; "being seen of them," as St. Luke testifies (Acts, i. 3.) "forty days after his passion, and speaking of the things pertaining to the kingdom of God."

It is observable, that all the appearances of Christ already mentioned, seem to have been intended only for the *conviction* of his apostles; and those that follow, which were probably much more numerous than the evangelical history records, rather for their *confirmation* and *instruction* in the faith and doctrines of the gospel. The sacred writers have been very particular in their accounts of the former, whilst they have mentioned but very few of the latter; and the reason of their different proceeding is very obvious. The apostles are to be considered both as *witnesses* of the miracles, and the sufferings, the death, and the resurrection of Jesus Christ, and as *teachers* and *preachers* of his doctrine. In the character of *witnesses*, a circumstantial account of the means and opportunities they had of knowing certainly the several facts attested by them, must necessarily give great force and credit to their evidence: whereas in that of *preachers*, it is sufficient if their auditors were satisfied, in general, that the doctrines taught by them were derived from the instructions, and authorised by the commission given them by their Master, "to teach all nations;" and of this, the various gifts of the Holy Spirit, poured out, not upon the apostles *only*, but *by* them upon *all* believers, were full and unquestionable proofs.

From a review of the method and order in which the several proofs of the resurrection were laid before the apostles, it is manifest that Christ required of them a reasonable and well-grounded faith, and that he also pursued the most proper and effectual means for the attainment of that end. With this view, instead of bearing down their reason, and dazzling their understanding by a full manifestation of himself at once, we see him letting in the light upon them by little and little, and preparing their minds by the gradual dawning of truth, that they might be able to bear the full lustre of the Sun of righteousness rising from the grave; to consider and examine, and know that it was he himself, and to assure the world it was impossible they could be deceived. By referring them to the scriptures, and submitting himself to the scrutiny and judgment of their senses, he not only waved all authority, but required them in a strong and particular manner to exercise their reason in examining the evidence brought before them; for which purpose he also improved their faculties by the infusion of his holy spirit. Never, says Mr. West, was evidence more fairly offered to consideration: never was inquiry put into a more rational method, as indeed there never were any facts that could better abide the test.

These facts, of which the *matter* of the evidence of the resurrection consisted, may be comprised under three heads, viz. the appearances of the angels, the appearances of Christ to the women, and the appearances of Christ to the disciples and apostles. Our limits will only allow us briefly to recite them. Those of the *first* class, at the sepulchre on the morning of the resurrection, are such as were observed by the Roman soldiers, who kept the sepulchre, by the other Mary and Salome, by Mary Magdalene and by Joanna, and her companions. Mr. West has satisfactorily proved, by a train of reasoning which we have not room to pursue, that these appearances of the angels were neither the effects of illusion, the phantoms of a distempered visionary mind, nor the operations of artifice and imposture. The *second* class comprehends the appearances of Christ, which were two; the first to Mary Magdalene; the second, to the other Mary and Salome. Some persons have very absurdly inferred from our Lord's prohibition to Mary, expressed in these words, "Touch me not, for I am not yet ascended to my Father," that our Saviour was not clothed with a real or material body: whereas the evident meaning of the words is "detain me not, for I am not yet ascending to my Father," and therefore they imply, that she should have another opportunity, before his departure from the world, of expressing her regard and maintaining intercourse with him. The *third* class of appearances includes those of Christ to his disciples, for the 40 days after his passion, which undoubtedly were numerous, though only few are recorded. An objection has been founded on one of these appearances, in recording which St. John says, "that Jesus came (the doors being shut) and stood in the midst," against the reality of the body of Christ; but it is needless to reply to so groundless a suggestion, as that the body of Christ passed through the solid door; when it is possible that he might enter, unperceived by them, through an open door.

The third time of our Saviour's appearance to any number of his disciples together after his resurrection was at the sea of Tiberias, called also the sea of Galilee (John, xxi. 14.); and subsequent to this was his appearance on a mountain in Galilee, mentioned by St. Matthew. One reason that has been assigned for his shewing himself in Galilee, after his resurrection, seems to have been, that, where he was personally known to so many people, having resided there above 30 years, he might have the greater number of competent witnesses to his resurrection. It is probable that the greatest number of his appearances for the 40 days after his passion were in Galilee, where he would have a favourable opportunity of discoursing to his disciples of "things pertaining to the kingdom of God," (Acts, i. 3.); and of preparing his apostles especially for testifying to the reality of his resurrection, and for executing the commission with which they were entrusted. Here they would be more secure, as well as more retired, than at Jerusalem.

It might be further urged that the resurrection of Christ was a necessary fulfilment of ancient prophecies pertaining to the Messiah, and also of our Lord's predictions: and that it was a no less necessary appendage to his office as a teacher and saviour than his death. Without the resurrection, the great scheme of divine mercy for the benefit of mankind would have been incomplete; by that, it was perfected, and the triumph over death added to that over sin; the Messiah thus accomplishing all that the scriptures foretold of his glory and power. This event authenticates and confirms the promise of future existence, and is indeed the pledge and earnest of immortality.

But it has been objected, that all the proofs of our Lord's resurrection which have been above adduced were not exhibited to all the Jews. (Acts, x. 41.) That Christ made choice of a select number of disciples, and particularly of twelve, (who were called apostles,) to be witnesses of the great actions of his life, and especially of his resurrection, and preachers of his gospel to all the world, is a well-known and indisputable

able fact. He not only, on many occasions, both *before* and *after* his crucifixion, discoursed to them in particular of things "pertaining to the kingdom of God," and poured upon them all the various gifts of the Holy Spirit, but gave them every kind of evidence of his "being risen" from the dead, which the most scrupulous and sceptical could imagine or require; "shewing himself alive to them by many infallible proofs," such as eating and drinking with them, "for 40 days after his passion." And, indeed, it is highly expedient that those, upon whose testimony and credit the truth of any fact is to be established, should have the fullest and most unexceptionable evidence of it, that can be had; because their having had all possible means of information must necessarily add great weight and authority to their depositions. That their perfect knowledge of the things which they were to testify was necessary for those who were ordained to be apostles, is further evident from the words of St. Peter, Acts, i. 15—26. It was the peculiar and distinguishing character of the apostles to be witnesses of the resurrection, and it was their office to testify to the reality of this fact: but all the infallible proofs of our Lord's resurrection were not vouchsafed by him to his disciples, merely from a particular favour and regard to *them*, that *they* might believe and be saved; but with a further view, that *others* also, by their testimony, founded on the most complete and exact information, might likewise believe and be saved. If Christ had intended nothing more than to induce his disciples to *believe* his resurrection, he might have left them to the *testimony* of the Roman soldiers; to that of the *women;* to the *writings* of *Moses* and the *prophets;* to his own *predictions;* to the *state* of the sepulchre, and that wonderful circumstance of his body's being *no where* to be found; and they would have been without excuse, if they had still continued unbelieving. But though the apostles had, upon *this* evidence, believed their master to be risen from the dead; yet, without those other *infallible* proofs mentioned by St. Luke, they would certainly have not been so *well* qualified for being witnesses of the resurrection to all the world: the heathens would not have admitted the *testimony* of Moses and the prophets, of whose writings they knew nothing, and of whose divine authority they had no proof. And as to the depositions of the *women;* besides their being strangers to *their* characters, they might, from Christ's appearing to *them*, with some colour have demanded, why he did not appear likewise to those whom he commissioned to *preach* his gospel, and to be *witnesses* of his resurrection. But when, on the contrary, the apostles could tell them, that they *themselves* had *seen* Christ, had *handled* him, *eat* and *drank* with him, and *conversed* with him for *forty* days *after* that he *was risen* from the dead, they could not but allow them to have had the *fullest* evidence of the resurrection, supposing what they told them to be *true;* and of this the purity of their doctrines, the holiness of their lives, their courage and constancy in defying and undergoing all kinds of hardships, dangers, pain, and death, in advancing a cause, which every worldly interest obliged them to desert, joined to the attestation of the Holy Spirit, "working with them, and confirming the word with signs following," were such assurances as no other man could give of his veracity. It has been said, however, that our Lord did not shew himself, after he was risen, to the Jews, to the chief priests and elders, to the Scribes and Pharisees, and mistakenly interpreting a passage in Matt. xii. 39, 40, Christ has been charged with a violation of his promise to this purpose. Of his rising again from the grave on the third day, the Jews had the testimony of the prophets, of the predictions of Christ himself, the evidence of the Roman soldiers, of his body's being no where to be found, of the women and disciples, and apostles, to whom he had appeared; and who, before the Sanhedrim, bore witness to his resurrection, and having just before wrought a miracle upon a lame man (Acts, iv. 10.) declared, that they had done it in the name of "Jesus of Nazareth, whom," say they, "ye crucified, whom God raised from the dead." This surely was evidence sufficient to convince any reasonable and unprejudiced person, and, consequently, to acquit our Lord of his promise of giving that "evil generation" satisfactory proofs of his being risen from the dead. To the evidence vouchsafed by Christ, neither out of favour to those "who had forsaken all and followed him;" nor to those whom he had chosen to be "witnesses of him to all the world," they certainly could have no just pretensions; who, instead of being his disciples, had rejected his doctrine, and put him to death as an impostor and blasphemer; and instead of shewing any disposition to embrace and propagate his gospel, opposed it with all their power, and, by threats and punishments, forbade his apostles to preach any more in his name. It deserves consideration in this place, that the apostles were not chosen merely to be witnesses of the fact of our Lord's resurrection, but they were appointed to their office, and commissioned to publish it to the world, because, having often seen Christ after his resurrection, they were duly qualified for the service assigned them, and were able to testify the truth of it from their own knowledge. Although our Saviour did not think proper to appear to the people at large; that is, to the multitude of the Jews, who were the declared enemies of his person and religion, and particularly to the chief priests and magistrates, who had been the instruments of his crucifixion; he *shewed himself openly*, without reserve and disguise, to those who had been accustomed to associate with him; and to no fewer than to five hundred such persons at one time; and of the number of these were the twelve apostles, who were specially appointed to preach his doctrine, and to declare the fact of his resurrection, as a distinguishing evidence of its truth and importance. Their office commenced during the period of his public ministry; and one necessary qualification for the future exercise of it was their being able to attest his resurrection. Others might have borne a similar testimony. They were prepared and disposed to do it. But the apostles were particularly selected and ordained for this purpose.

It is a very natural inquiry, why the Jews in general, and the priests and rulers in particular, should not have had an opportunity of seeing Christ after his resurrection, and conversing with him, and ascertaining the reality of the fact? As this was the evidence of his divine mission and character, to which he had often appealed; should not those who persisted in their incredulity, notwithstanding the proofs of supernatural powers, which he had exhibited in the course of his life and ministry, have enjoyed the benefit of it? And if it had been sufficient to overcome their obstinate prejudices, would not their testimony have contributed, more effectually than any other concurring circumstance, to the conviction of mankind in general, and to the credit and influence of Christianity? This kind of reasoning, we allow, seems, on a slight and superficial consideration of it, to be very plausible; and it has been strongly urged and very pertinaciously maintained by sceptics and infidels.

Let us examine the principles upon which it is founded; and we shall perceive that it is more plausible than just, and that it will not warrant the conclusion that has been drawn from it. It supposes, that the Jewish priests and magistrates had a right to expect personal evidence of our Saviour's resurrection; that some useful and important end would have been anſwered by its being afforded them; and that no injury to the character and religion of Chriſt could have reſulted from their being thus indulged and gratified. If neither of theſe ſuppoſitions can be reaſonably admitted; if, upon farther inveſtigation, they ſhould appear to be fallacious and unfounded; it cannot be alleged againſt the evidence of our Saviour's reſurrection, that it was defective and partial, becauſe it was not communicated to the Jewiſh prieſts and rulers.

The plea of right cannot be urged in their favour by any, who duly conſider, what their diſpoſition and conduct had been during our Saviour's life and miniſtry. Men who had diſcovered no inclination to examine the nature of his doctrine and the deſign of his miſſion; who had ſlighted and reſiſted the means of information and conviction, which his preaching and miracles had afforded them; and who had purſued him with malignity and violence to the croſs and grave;—ſuch men could ſurely have no juſt claims on his farther attention: they could have no reaſon to expect, that he would condeſcend to uſe any new efforts for removing their prejudices, when every paſt endeavour had not only proved fruitleſs, but had ſerved to exaſperate their reſentment, and to provoke a perſecution which terminated in his death. Their oppoſition to him had been ſuch both in its nature and degree, as to render them altogether unworthy of any forbearance and indulgence. Much leſs diſcernment than he poſſeſſed would have been ſufficient for perceiving, that no evidence was likely to avail with perſons of their temper and character. They had juſtly forfeited every token of his regard. They had merited the moſt ſignal puniſhment. It would have been not only a vain, but an impious and daring preſumption in them to expect any other evidence of his reſtoration to life beſides that, which they might derive from the teſtimony of perſons leſs guilty and more deſerving than themſelves. Beſides, our Saviour's particular commiſſion to the Jews expired with his death; and he had previouſly informed them that they ſhould not ſee him till they were better diſpoſed to receive him. Every perſonal claim muſt, in this caſe, be ſet aſide.

The plea of right being diſmiſſed as unfounded, the next queſtion that occurs is, whether any important and valuable purpoſe to themſelves or others, would have been anſwered by our Saviour's appearance to them, after his reſurrection? Have we any reaſon to imagine, that they would have been convinced of the truth of his miſſion and doctrine by ſuch an appearance? The ſame prejudices and intereſts that prevented the effect of the miracles which he had performed, and of which they had been witneſſes, would have reſiſted the conviction, which his reſurrection tended to produce. The ſame antipathy to the doctrine he taught and the religion he meant to eſtabliſh, would have prevailed againſt the evidence of this fact; and it is probable, that they would have only aggravated their guilt and condemnation by obſtinately perſiſting in their unbelief.

But though they were convinced of the reality of our Saviour's reſurrection, would they avow their conviction? Would they publicly teſtify the truth of that fact? By an undiſguiſed and open declaration of it, would they lead others to believe and acknowledge it? This, indeed, would have been a very ſignal triumph of truth over prejudice and malice. But it would have been a triumph over their own prejudice and malice, of ſo extraordinary a kind, that it was very unlikely to happen. Pride and intereſt would have been very reluctant in acknowledging that they had perſecuted and murdered a divine Meſſenger; in renouncing the worldly rank and influence which they poſſeſſed; and in ſubmitting to be taught and governed by the authority of Jeſus of Nazareth, whom they had deſpiſed, calumniated, and crucified. If they were conſtrained to aſſent to the truth of our Saviour's reſurrection, it was not very probable that they would confeſs to the world, that he, whom they had perſecuted during his life, and doomed to a premature and ignominious death, was the promiſed Meſſiah and Saviour. It was not very probable, that in ſo doing they would publiſh their own diſgrace, and that they would proclaim to the world, that they were perſecutors and murderers. It would have required a degree of virtuous fortitude, of which we diſcover no traces in the Jewiſh Sanhedrim, to bear public teſtimony to the reſurrection of a perſon whom they had ſo lately condemned and crucified as a malefactor. Without ſuch a teſtimony, of what avail would have been the conviction of their own minds to the general credit of the Chriſtian cauſe? Afraid or aſhamed of avowing it, and thus of forfeiting the reputation and influence annexed to their character and office, and of incurring popular cenſure and reproach; no benefit could have accrued from it either to their contemporaries or to future generations. They were, therefore, very unfit to be witneſſes of a fact, which it was their intereſt to conceal, and which they were not likely to acknowledge, if they had believed it to be true.

Beſides, their teſtimony, if truth had extorted it from them, and if they had poſſeſſed honeſty and reſolution ſufficient to avow it, would have been liable to ſuſpicion. It was the teſtimony of men whoſe minds muſt have been oppreſſed and terrified by a conſciouſneſs of their guilt; and it might have been ſaid, that they were haunted by ghoſts and ſpectres, and that their imagination converted a phantom into the real perſon of him whom they had expoſed to public deriſion, and ſentenced to an ignominious death. Their teſtimony would have gained little credit with men of their own rank and ſtation, and of principles and characters ſimilar to their own. It would have died with themſelves; and produced no effect beyond the circle of their own acquaintance and the age in which they lived.

It ought to be conſidered farther, that the character and religion of Chriſt might have been very materially injured by his appearance to the Jewiſh prieſts and rulers, after his reſurrection. They had no right to expect this kind of evidence. No good purpoſe could be anſwered by it. We now obſerve, that it might have been very detrimental in its effects. If they had remained unconvinced, which might moſt probably have been the caſe, the fact would have been queſtioned. The multitude would have become obſtinate and irreclaimable in their incredulity; and they would have pleaded the authority of their ſuperiors in ſtation and office, as an apology for neglecting inquiry and rejecting the means of conviction. If they had been convinced, without honeſty and reſolution to declare the truth, the fact would ſtill have been conſidered as doubtful, or at leaſt of no great importance. But if with their conviction they connected the public avowal of its truth, our Saviour would have incurred the charge of an impoſtor, and his religion of fraud. Loud would have been the clamour of a combination between him and the rulers of the ſtate. Suſpicion would have attached itſelf to the evidence of men, who had the care of his ſepulchre, who appointed the guard, and ſealed the ſtone that ſecured it, and who could eaſily have propagated a report, which would have gained credit with the ſervile multitude. Chriſtianity would have been repreſented, by perſons who are prone to aſcribe all religion to ſtate policy, as a contrivance of the prieſts and magiſ-rates of Judea, to anſwer ſome purpoſe of worldly emolument or ambition. Its progreſs and prevalence would have been attributed to the ſecular influence of its advocates; and it would have been deprived of that moſt diſtinguiſhing and ſatisfactory evidence which it now poſſeſſes, that it derived its origin from God, and owed its ſucceſs to the ſignal interpoſition of divine power.

Allowing that the apoſtles and firſt diſciples had ſufficient evidence of our Lord's reſurrection, we are next to inquire, in the diſcuſſion of this intereſting ſubject, how the fact may be aſcertained to the ſatisfaction of thoſe who live in ages and nations far remote from thoſe in which it occurred. Such perſons muſt recur for conviction, firſt and principally to the *teſtimony* of the original witneſſes, choſen to announce the fact to the world, tranſmitted from one country and one age to another in writings, either penned by themſelves, or authorized by their inſpection and approbation. Theſe writings are contained in the *Goſpels*, the *Acts*, the *Epiſtles*, and the *Revelation;* and for proofs of their authenticity and credibility, we refer to theſe titles, and alſo to BIBLE, CANON, and TESTAMENT; and for an account of their authors, to MATTHEW, MARK, LUKE, JOHN, PAUL, PETER, &c. How far we may ſafely, and without danger of miſtake, rely on the teſtimony of the witneſſes of our Saviour's reſurrection, thus tranſmitted to us, will appear, if we conſider, that they were men, not only capable of knowing the truth, and duly informed concerning it, but, on account of their general character, unlikely to report and propagate a falſehood. They had been raiſed from private and obſcure ſtations to the office they ſuſtained. They were deſtitute of thoſe natural talents and external advantages which ſuggeſt and favour a plan of impoſture and deceit. Artleſs and undeſigning, and unconnected with perſons of extended views and worldly influence, they were unfit inſtruments for concerting and executing a deliberate and complicated ſcheme of deluſion. The principles they had embraced, and the profeſſion they had aſſumed, ſince their converſion to Chriſtianity, were altogether incompatible with a combination to promote the prevalence of a known falſehood. Integrity and a regard to truth, under the awe of the God of truth and juſtice, and in the proſpect of righteous judgment and retribution, were the avowed principles of their conduct; and they muſt have been impoſtors, chargeable with the moſt atrocious guilt and the moſt conſummate folly, if they had propoſed, by the wickedneſs of deceit, to promote the cauſe of truth and virtue. But the falſehood of aſſerting, that Chriſt was riſen, was ſuch as would never have engaged their concurrence and ſupport. It was an event of which they had no expectation. Their prejudices and falſe hopes had led them to ſurrender their cauſe, as altogether defeated, when their Maſter ſubmitted to death. They had either forgotten or miſunderſtood his predictions; and when ſome of them firſt received the report of his reſurrection, they were departing from Jeruſalem with dejected and deſpairing ſpirits; and they needed very peculiar evidence of the fact, before they were diſpoſed to admit the reality of it. If Chriſt had not actually riſen from the dead, theſe men would have returned to their former attachments and occupations. All their prepoſſeſſions in favour of the perpetuity of the law of Moſes would have revived. Diſappointed in their erroneous expectations, they would have been the leſs inclined to propagate an impoſture.

More eſpecially when we conſider, that all their intereſts, as well as their prejudices, militated againſt their public declaration of a fact, which had never exiſted. Can we ſuppoſe, that they would have incurred the reſentment of the whole body of the Jews; and that they would have hazarded their lives in the ſupport of a cauſe, the founder of which had deceived and betrayed them? On the contrary, we diſcern in the temper and conduct of the witneſſes of our Lord's reſurrection undeniable evidence of their conviction of its truth, and of their ſincerity in avowing and publiſhing it. Nothing leſs than the evidence of truth can account for the change which they manifeſted both in their ſentiments and conduct. Men, who a little while before were timid and deſpairing, become bold and fearleſs; declare the fact on the ſcene, where they report it to have happened, and in the preſence of thoſe, who, after having ſucceeded in procuring the crucifixion of Chriſt, employed all the means in their power for preventing any deluſion with regard to his reſurrection; and who expoſe themſelves to perſecution and death in aſſerting and proclaiming it. With new views, with reſpect to the nature and extent of the Chriſtian diſpenſation; with a knowledge and zeal, with a ſteadineſs and conſtancy, which indicate a conſciouſneſs of truth and an extraordinary illumination; they publiſh the fact, and propagate the doctrines and duties which it was deſigned to eſtabliſh and enforce.

Beſides, "the apoſtles wrought miracles in confirmation of the truth of their teſtimony." The God of truth concurred with them, and atteſted their credibility; and thus obviated every doubt and difficulty, which prejudice and malignity might have ſuggeſted. Every miracle they performed was a new atteſtation to the fact which they reported, and the extraordinary powers they poſſeſſed, and which they derived from the Sovereign of nature, qualified them for being proper witneſſes of it to the world. He, who appointed them to this office, aided them in the execution of it. Their ſucceſs, inſufficient as they were of themſelves to combat the prejudices and powers of the world, afforded an increaſing and permanent evidence of the fact, on which their commiſſion was founded. To us their teſtimony has deſcended with every ſanction and with every circumſtance of credibility, that can juſtify our aſſent, and our attachment to the doctrine they taught, and to the practice of the duties they inculcated.

In the prevalence and duration of Chriſtianity, and in the proſpect of its continued ſubſiſtence and increaſing ſpread and triumph, we diſcern traces of its divine original: we ſee exiſting proof of the reſurrection of its founder; and we perceive reaſons and motives for holding faſt the profeſſion of our faith in it without wavering. Our religion is founded on evidence, that cannot be reaſonably queſtioned: the objections to which it is liable, furniſh, on due examination, arguments in its favour. It needs only an impartial ſcrutiny and trial, in order to approve itſelf *the wiſdom and the power of God.*

From the exiſtence of the Chriſtian religion, which we may conſider as a diſtinct argument in proof of our Saviour's reſurrection, may be deduced the ſame kind of evidence of this fact, as is exhibited to us of the deluge by the many petrifactions of ſhells and bones of fiſhes, and other animals of diſtant regions, &c. found often in the bottoms of the deepeſt mines, and the bowels of the higheſt mountains; for, as it is impoſſible to account for thoſe various petrifactions being lodged in ſo many parts of the earth, ſome many leagues diſtant from the ſea, others very much above the level of it, without admitting ſuch a ſubverſion and confuſion of this globe, as could not have been occaſioned by a leſs violent cauſe than the "breaking up of the fountains of the great deep, and the waters flowing above the tops of the higheſt hills;" ſo will it be extremely difficult to account for the propagation and preſent exiſtence of Chriſtianity in ſo many regions

regions of the world, without ſuppoſing that "Chriſt roſe from the dead," aſcended into heaven, and enabled his diſciples, by the miraculous gifts of his holy ſpirit, to ſurmount ſuch obſtacles, as no mere human abilities could poſſibly overcome. See CHRISTIAN *Religion.* "Obſervations on the Hiſtory and Evidences of the Reſurrection of Jeſus Chriſt," by Gilbert Weſt, eſq. "Obſervations on the Converſion of St. Paul," by the right hon. George lord Lyttelton. "The Trial of the Witneſſes of the Reſurrection of Jeſus." Rees's Sermons, vol. i. Serm. 4.

The reſurrection of Chriſt is a moſt important fact, not only as it certifies his divine miſſion, the character he aſſumed, and the truth of the doctrine he taught, but as it aſſures us of the reality of a future ſtate of righteous retribution. This event exhibits a triumph over death, which proves not merely the poſſibility, but the certainty, of a general reſurrection of mankind. It is the pledge and earneſt of that reſtoration to life, which Jeſus Chriſt, as a divine teacher, both predicted and promiſed. Many curious queſtions have been propoſed on the mode of the future exiſtence of mankind; as well as on the place of abode of the good and wicked (ſee HEAVEN and HELL); and alſo on the time when this intereſting event ſhall happen. (See SLEEP *of the Soul.*) With regard to the mode of our future being, it is generally allowed, both by thoſe who believe and thoſe who deny the eſſential diſtinction between matter and ſpirit, that we ſhall exiſt hereafter in a corporeal form; but the difference between our preſent bodies and thoſe in which we ſhall exiſt after the general reſurrection is a ſubject, which, however it may have engaged the attention and employed the pens of metaphyſicians and polemical theologians, is more curious than uſeful; and provided that we ſhall exiſt hereafter, we need not be anxious about the deciſion of this queſtion. It is important merely as it relates to the doctrine of a future exiſtence in general, the truth of which, whatever may be the conjectures of the learned, it does not invalidate.

Many Chriſtians believe the reſurrection of the ſame identical body, the very ſame fleſh and bones, at the day of judgment. The two principal philoſophical objections againſt it are theſe:

1. That the ſame piece of matter, or ſubſtance, may happen to be a part of two or more bodies. Thus a fiſh feeding on a man, and another man afterwards feeding on the fiſh, part of the body of the firſt man becomes firſt incorporated with the fiſh, and afterwards in the fiſh, with the laſt man. Again, inſtances have been known of one man's feeding immediately on another; and, among the cannibals of the Weſt Indies, the practice has been frequent.

Now, where the ſubſtance of one is thus converted into the ſubſtance of another, each cannot riſe with his whole body; and to which ſhall the common part be allotted?

To this objection ſome anſwer, that, as all matter is not fit or diſpoſed to be aſſimilated to the body, and incorporated with it, human fleſh may very probably be of this kind; and, therefore, what is thus eaten, may be again excreted, and carried off. But Mr. Leibnitz's anſwer ſeems the more ſolid. All that is eſſential to the body, he urges, is the original ſtamen which exiſted in the ſemen of the father; nay, and on the footing of the modern theory of generation, which exiſted in the ſemen of the firſt man. This we may conceive as the moſt minute ſpeck or point imaginable; and therefore, not to be ſeparated, or torn aſunder, and any part of it united with the ſtamen of any other man. All this bulk we ſee in the body, is only an accretion to this original ſtamen; an addition of foreign matter, of new juices, to the primary, ſolid ſtamen: there is, therefore, no reciprocation of the proper matter of the human body.

The ſecond objection is this: the human body, we know, by the late diſcoveries in the animal economy, is continually changing; a man has not entirely the ſame body to-day as he had yeſterday; and it is even computed, that in leſs than ſeven years' time, his whole body undergoes a change, and not a particle of the ſame body remains. Which of thoſe many bodies, then, which the ſame perſon has in the courſe of his life, is it that ſhall riſe? or does all the matter that has ever belonged to him riſe again? or does only ſome particular ſyſtem thereof? The body, *e. gr.* he had at twenty, at thirty, or at ſixty years old? If only this or that body ariſe, how ſhall it be rewarded or puniſhed for what was done in the other? with what juſtice does one perſon ſuffer, &c. for another?

To this it may be anſwered on Mr. Locke's principles, that perſonal identity, or the ſameneſs of a rational being, conſiſts in ſelf-conſciouſneſs; in the power of conſidering itſelf the ſame thing in different times and places. By this every one is to himſelf what he calls *ſelf;* without conſidering whether that ſelf be continued in the ſame or divers ſubſtances. So far reaches the identity of that perſon. It is the ſame ſelf now it was then; and it was by the ſame ſelf which now reflects on an action, that action was performed.

Now, it is this perſonal identity that is the object of rewards and puniſhments, which we have obſerved may exiſt in different ſucceſſions of matter; ſo that to render the rewards and puniſhments juſt and permanent, nothing needs but that we riſe again with ſuch a body as that we retain the conſciouſneſs of our paſt actions.

RESUSCITATION. See RESURRECTION, and REVIVIFICATION.

RESUSCITATION *of Plants*, in *Chemiſtry*, the art of reproducing a plant from its aſhes. See PALINGENESIA.

Many have pretended to this art, and have ſhewn reſuſcitated plants in vials; but all theſe ſeem only particular inſtances of artificial chemical vegetations, of which many others may be given. The external appearances of theſe reſemble plants, and the ignorant may eaſily take them for ſuch; but when cloſely conſidered, there is a great difference to be found. See *Artificial* VEGETATION.

RETAIL, in *Commerce*, &c. the buying of goods in the great, or by wholeſale, and ſelling them out again in ſmall parcels.—"Qui rem integram ementes, per minutiores eam partes diſtrahebant."

RETAIN, *To*, ſpoken of mares, ſignifies *to hold*, *i. e.* to conceive after covering.

RETAINER, in *Law*, a ſervant not menial or domeſtic, that is, not continually dwelling in the houſe of his lord and maſter, but only wearing his livery, and attending on ſpecial occaſions.

This livery was anciently given by a great man, and frequently for the maintenance of quarrels; whence it was juſtly prohibited by ſeveral ſtatutes; as under Richard II. on pain of impriſonment, and grievous forfeiture to the king.

It was further prohibited by other ſtatutes of the ſucceeding kings, by which the delinquents were ſubject to make ranſom at the king's pleaſure; and knights and eſquires hereof duly attainted were to loſe their ſaid liveries, and forfeit their fees for ever.

Edward IV. added a ſpecial penalty of five pounds *per* month on every man that gave ſuch livery, and as much on every perſon ſo retained, either by writing, word, or

oath.

oath. But moſt of theſe ſtatutes are repealed by a ſtatute 3 Car. I.

RETAINER *of Debts*, a remedy which the law gives to an executor or adminiſtrator for the debt, by allowing him to retain ſo much as will pay himſelf, before any other creditors whoſe debts are of equal degree. (See DEBT.) The debts of co-executors ſhall be diſcharged in proportion. An executor of his own wrong ſhall not, in any caſe, be permitted to retain.

RETAINING-FEE, is the firſt fee given in any cauſe to a ſerjeant or counſellor at law, by which to make him ſure, that he ſhall not be on the contrary ſide.

RETALIATION, RETALIATIO, the act of returning like for like. See TALIONIS *Lex*.

When a nation cannot obtain juſtice, either for a loſs or an injury, it has a right to do itſelf juſtice. But before it declares war, there are various methods practiſed among nations for obtaining ſatisfaction. Among theſe is that called the law of retaliation, according to which we make another ſuffer exactly ſo much evil as he has done. Many have extolled this law, as being derived from the moſt ſtrict juſtice; and can we be ſurpriſed at their having propoſed it to princes, when they have even dared to give it for a rule to the Deity himſelf! The ancients called it the law of Rhadamanthus. Although a nation may puniſh another which has done it an injury, if it refuſes to give juſt ſatisfaction; yet it has not a right to extend the penalty beyond what is required by its own ſafety. Retaliations, unjuſt between private perſons, would be much more ſo between nations, becauſe here the puniſhment would, with difficulty, fall on thoſe who have done the injury. What right would you have to cut off the noſe and ears of the ambaſſador of a barbarian, who had treated yours in the ſame manner? As to thoſe repriſals in time of war, which partake of the nature of retaliation, they are juſtified on other principles. (See REPRISALS.) All that is true in this idea of retaliation is, that every thing be equal; the pain ought to bear ſome proportion to the evil required to be puniſhed; the end and even the foundation of puniſhment requiring thus much.

RETARDATION, RETARDATIO, in *Phyſics*, the act of retarding; that is, of delaying the motion or progreſs of a body, or of diminiſhing its velocity.

The retardation of moving bodies ariſes from two great cauſes, the *reſiſtance of the medium*, and the *force of gravity*.

The RETARDATION *from the Reſiſtance* is frequently confounded with the reſiſtance itſelf; becauſe, with reſpect to the ſame moving body, they are in the ſame proportion. See RESISTANCE.

With reſpect to different bodies, however, the ſame reſiſtance often generates different retardations. For if bodies of equal bulk, but different denſities, be moved through the ſame fluid with equal velocity, the fluid will act equally on each; ſo that they will have equal reſiſtances, but different retardations; and the retardations will be to each other as the velocities which might be generated by the ſame forces in the bodies propoſed; that is, they are inverſely as the quantities of matter in the bodies, or inverſely as the denſities.

Suppoſe, then, bodies of equal denſity, but of unequal bulk, to move equally faſt through the ſame fluid, their reſiſtance increaſes according to their ſuperficies; that is, as the ſquares of their diameters. But the quantities of matter are increaſed in proportion to the cubes of the diameters: the reſiſtances are the quantities of motion; the retardations are the celerities ariſing from them; and dividing the quantities of motion by the quantities of matter, you will have the celerities; therefore the retardations are directly as the ſquares of the diameters, and inverſely as the cubes of the diameters; that is, inverſely as the diameters themſelves.

If the bodies be equal, move equally ſwift, and are of the ſame denſity, but move through different fluids, their retardatious are as the denſities of thoſe fluids.

And when bodies equally denſe, and of equal bulk, are carried through the ſame fluid with different velocities, the retardations are as the ſquares of the velocities.

The RETARDATION *from Gravity* is peculiar to bodies projected upwards. A body thrown upwards is retarded after the ſame manner as a falling body is accelerated; only, in the one caſe, the force of gravity conſpires with the motion acquired; and in the other, it acts contrary to it.

As the force of gravity is uniform, the retardation from that cauſe will be equal in equal times.

Hence, as it is the ſame force which generates motion in the falling, and diminiſhes it in the riſing body, a body riſes till it has loſt all its motion; which it does in the ſame time in which a body falling would have acquired a velocity equal to that with which the body was thrown up.

Thus, alſo, a body thrown up will riſe to the ſame height, from which falling, it would acquire the velocity with which it is thrown up; therefore the heights, which bodies thrown up with different velocities can riſe to, are to each other as the ſquares of the velocities.

Hence, the retardations of motions may be compared together: for they are, firſt, as the ſquares of the velocities; ſecondly, as the denſities of the fluids through which the bodies are moved; thirdly, inverſely, as the diameters of thoſe bodies; laſtly, inverſely, as the denſities of the bodies themſelves.

The numbers in the ratio compounded of thoſe ratios, expreſs the proportion of the retardations; multiplying the ſquare of the velocity by the denſity of the fluid, and dividing the product by the product of the diameter of the body multiplied into its denſity; and working thus for ſeveral motions, the quotients of the diviſions will have the ſame compound ratio to one another.

RETARDATION *of Motion, Laws of*. 1. If the motion of a body be uniformly retarded, that is, if its celerity be diminiſhed equally in equal times, the ſpace it paſſes over is one half of that it would paſs over in the ſame time by an uniform motion.

2. The ſpaces deſcribed in equal times by an uniformly retarded motion, decreaſe according to the uneven numbers 9, 7, 5, 3, &c. See ACCELERATION and MOTION.

RETCH, or RETCHES, a name given by our farmers to an iron, or a pair of irons, which in the common plough ſerve to faſten the ſheet to the beam. The retches are faſtened to the ſheet with nails, and to the beam with pins.

RETCHANI, in *Geography*, a town of Ruſſia, in the government of Pikov; 16 miles S. of Tropetz.

RETCHING, or REACHING, the effort or endeavour to vomit. See NAUSEA.

RETCHNA, in *Geography*, a circar or province of Hindooſtan, ſituated between the rivers Rauvee and Chunaub; in which are the cities of Lahore, Ameenadab, Sealcot, and ſeveral other towns.

RETE MALPIGHII, in *Anatomy*, the network compoſing the cellular ſtructure of the lungs.

RETE *Mirabile*, the plexus of veſſels formed by the internal carotid arteries of animals, before they branch out to the brain. See MAMMALIA.

RETE *Mucoſum*, the ſoft delicate layer of the integuments interpoſed between the cuticle and the true ſkin, in which

which the colour of the ſkin reſides. This part is much thicker in the dark coloured than in the light races of man, and is black in the Negro. See INTEGUMENTS.

RETE *Teſtis*, a part of the excretory apparatus of the teſticle. See the deſcription of that gland in the article GENERATION.

RETE *Peny*, in *Ancient Records*, a cuſtomary due of one penny for every perſon to the pariſh prieſt.

RETEH, or ARRATAMA, in *Geography*, a diſtrict of Africa, in the country of Sugulmeſſa.

RETEINER, or RETAINER. See RETAINER.

RETENEGI, in the *Materia Medica*, a name uſed by Avicenna, and others, to expreſs the common reſin of the pine, or fir-tree, and ſometimes common black pitch. The lexicographers have given us *ſtorax* as the explanation of retenegi, but this is not warranted by any paſſage in the authors who uſe the word. It is certain, indeed, that the generality of authors have confounded the ſeveral ſorts of reſin and pitch-making trees together, and among them the pine, fir, cedar, and turpentine trees, are called by the ſame name, but the ſtorax-tree is never included among the number. Theſe were only confounded together, becauſe of the ſimilitude of the things they produced; but the ſtorax was too different from all theſe, and too precious a gum not to be diſtinguiſhed.

RETENTA, a word uſed by the medical writers to expreſs things retained in the body, or which are not to be retained in a ſtate of good health.

RETENTIO, RETINENTIA, in our law-books, is ſometimes uſed to ſignify retinue.

RETENTION, RETENTIO, a faculty of the human mind, by which, in order to a farther progreſs in knowledge, it keeps or retains thoſe ſimple ideas, which it before received by ſenſation or reflection.

This is done two ways. Firſt, by keeping the idea which is brought into the mind for ſome time actually in view. This is called *contemplation*.

Secondly, by reviving thoſe ideas in our minds, which have diſappeared, and have been, as it were, laid out of ſight. This is *memory*, which is, as it were, the repoſitory of our ideas.

RETENTION is alſo uſed, in *Medicine*, &c. for the ſtate of contraction in the ſolids, or vaſcular parts of the body, which makes them hold faſt their proper contents.

In this ſenſe, retention ſtands oppoſed to evacuation and excretion.

Retention and excretion make two of the non-naturals.

RETENTION is alſo frequently conſidered as a diſorder, and defined the act of retaining the excrements, humours, &c. ſo as they cannot be voided out of the body. See INFANT.

It is the retention of peccant humours which cauſes ſuch a diſeaſe.

RETENTION *of Urine*. See URINE, *Retention of*.

RETFORD, EAST, in *Geography*, a market and borough-town in North Clay diviſion of the wapentake of Baſſetlaw, county of Nottingham, England, is ſituated on the eaſtern bank of the river Idle, at the diſtance of 29 miles N.N.E. from Nottingham, and 145 miles N. by W. from London. Retford conſiſts of two diſtinct parts, or diſtricts, reſpectively named, from their poſition to the river, Eaſt and Weſt Retford; the former of which is ſtrictly the market-town, and the latter a ſeparate pariſh, or ſuburb. Edward II. granted to the burgeſſes the right of chooſing bailiffs for the government of the town; and Henry III. granted them a fair. By a charter from Henry VI., the bailiff was empowered to hold a court of record, and to execute the office of eſcheator and clerk of the market. Theſe immunities have ſince been confirmed, and others added by James I.; under whoſe charter, Retford is now governed by two bailiffs, a ſteward, twelve aldermen, two chamberlains, a town-clerk, and two ſerjeants at mace. The bailiffs and ſteward for the time being are juſtices of the peace, and of the quorum, within the borough. Retford ſends two members to the national ſenate, and theſe are choſen by about 150 voters, compoſed of the bailiffs, aldermen, and freemen. Like moſt other ſmall boroughs, it has occaſionally been the ſcene of warm election conteſts. This place firſt exerciſed the right of repreſentation in the early part of the reign of Edward II.; but it ſeems to have allowed this privilege to remain dormant from the ninth year of that king till the thirteenth year of queen Elizabeth, when the ſame was reſumed, and has continued to be regularly exerciſed ever ſince. Formerly the county aſſizes were held here; but of late years all criminal trials have taken place at Nottingham, the county town.

Retford market-day is Saturday, weekly; and there are, beſides, two annual fairs for horſes and black cattle, held on the 23d of March and the 2d of October. At the commencement of the laſt century, a conſiderable malting buſineſs was carried on here; but Workſop has occaſioned its decline. At preſent, Retford is ſupported principally by its hat and ſail-cloth manufactories. Major Cartwright ſome years ago eſtabliſhed a worſted mill in the immediate vicinity; but the project, having proved unſucceſsful, has been abandoned. An agricultural ſociety was eſtabliſhed here in 1799, under the auſpices of the duke of Portland, viſcount Newark, colonel Eyre, and others.

The public buildings in Retford are the town-hall, Sloſwick hoſpital, a free-ſchool endowed by Edward VI., an alms-houſe for twelve poor women, and the pariſh church. The laſt, called the corporation church, is a ſmall, but neat, edifice, in the Engliſh ſtyle of architecture, though much modernized, particularly in the interior. The living is a vicarage, in the patronage of the duke of Devonſhire.

On the weſtern bank of the Idle, and connected with the borough by a handſome modern bridge, is the village of Weſt Retford, which, however, is altogether diſtinct from Eaſt Retford, both as to civil and eccleſiaſtical juriſdiction. Here is an hoſpital, which was founded in 1666 by John Dorrel, M.D., for ſixteen poor perſons, who are allowed annually 10*l*. each, beſides clothing, coals, &c. Much injury was done to this village by a heavy flood, which occurred in 1795; but it is neverthelеſs a very thriving place, as well as Eaſt Retford, and derives conſiderable advantage from its proximity to the Cheſterfield canal. Weſt Retford Hall, a ſeat of the Emerſon family, is the moſt conſpicuous ornamental object in the immediate neighbourhood. St. John's well, a mineral ſpring about a mile from Retford, has been long famed for its medicinal qualities. South-eaſt of Retford is Grove-Hall, the ſeat of Anthony Hardolph Eyre, eſq., M.P. for the county. The houſe is ſeated on an eminence in a finely wooded park. Thoroton's Hiſtory of Nottinghamſhire, folio, 1663. republiſhed with large additions by John Throſby, 3 vols. 4to. vol. iii. Beauties of England and Wales, vol. xii. by Mr. Laird.

RETHEL, a town of France, and principal place of a diſtrict, in the department of the Ardennes; before the revolution, the capital of a ſmall country, called the "Retelois." The place contains 4862, and the canton 12,473 inhabitants, on a territory comprehending 200 kiliometres, in 23 communes. N. lat. 49° 30'. E. long. 4° 27'.

RETHEM, a town of Weſtphalia, in the principality of of Luneburg Zell, on the Aller; 32 miles W. of Zelle. N. lat. 52° 51′. E. long. 9° 18′.

RETHONDES, a town of France, in the department of the Oise; 5 miles N.E. of Compeigne.

RETHWISCHE, a town of the duchy of Holstein; 25 miles N.E. of Hamburg.

RETI, in *Hindoo Mythology*, a personification of Affection, and the fabled consort of Kama, the god of love. She is represented in pictures as a beautiful woman, on horseback sometimes, and in the act of throwing a lance. Allusions to this goddess, proverbial for beauty, occur very frequently in Hindoo writings. Under the article RADHA, that lovely goddess describes the glances of her eye as "keener than the arrows darted by the husband of Reti." She sometimes is styled "mother of Kama." That appellation occurs in the article RUKEKA of this work. Kama is often called "he who lovest the goddess Reti." On the occasion of the combustion of the god of love, as noticed under KAMA, the lamentations of the afflicted Reti are very touchingly related by the celebrated Kalidasa, author of Sakuntala. A whole book of his poem, entitled "Kumara-sambhava, or the Birth of Kumera," is occupied with her tender sorrows. This book sir W. Jones's teacher, a learned Vaidya (see VAIDYA), was restrained from reading; considering the ceremonies of a marriage, that of Kama and Reti, at which Brahma himself officiated as father of the bridegroom, as too holy to be known by any but Brahmans. An instance somewhat similar, of a book being too holy to be read by individuals of an inferior class, is given under RAMAYANA. Farther particulars connected with the interesting goddess, the subject of this article, will be found under KAMA, KRISHNA, and PRADYAMNA.

RETIARII, in *Antiquity*, a kind of gladiators, thus denominated from a net which they made use of against their antagonists, who were called *secutores*, and sometimes *myrmillones*. See GLADIATOR.

The word is formed from the Latin, *rete, net;* or perhaps from *retejaculum;* for they call their net *jaculum*, and sometimes in one word *retejaculum*.

This net they carried under their buckler, and, when opportunity served, cast it over the head of their antagonist, and, in this condition, killed him with a trident, or three-grained spear, which they bore in the other hand.

Lipsius and others observe, that they fought in tunics, and were furnished with sponges to wipe off the sweat, blood, &c. and to stop their wounds.

RETICENCY, RETICENTIA, a figure in *Rhetoric*, by which we make oblique mention of a thing, in pretending to pass it over unmentioned.

Thus: *to say nothing of the nobility of his ancestors: I forbear to speak of his courage, and pass over the severity of his morals*. See APOSIOPESIS and PRETERITION.

RETICULA, RETICULE, in *Astronomy*, a contrivance for the exact measuring of the quantity of eclipses, introduced several years ago by the Royal Academy of Paris. See ECLIPSE.

The reticule is a little frame, consisting of thirteen fine silken threads, equidistant from each other, and parallel; placed in the focus of object-glasses of telescopes; that is, in the place where the image of the luminary is painted in its full extent. Of consequence, therefore, the diameter of the sun and moon is by this seen divided into twelve equal parts or digits; so that, to find the quantity of the eclipse, there is nothing to do but to number the luminous and the dark parts.

As a square reticule is only proper for the diameter, not for the circumference of the luminary, it is sometimes made circular, by drawing six concentric equidistant circles. This represents the phases of the eclipse perfectly.

But it is evident, that the reticule, whether square or circular, ought to be perfectly equal to the diameter or circumference of the sun or star, such as it appears in the focus of the glass, otherwise the division cannot be just. Now this is no easy matter to effect, because the apparent diameter of the sun and moon differ in each eclipse; nay, that of the moon differs from itself in the progress of the same eclipse.

Another imperfection in the reticule is, that its bigness is determined by that of the image in the focus; and of consequence it will only fit one certain magnitude.

But M. de la Hire has found a remedy for all these inconveniencies, and contrived that the same reticule shall serve for all telescopes, and all magnitudes of the luminary in the same eclipse. The principle on which his invention stands is, that two object-glasses applied against each other, having a common focus, and there forming an image of a certain magnitude, this image will increase in proportion as the distance between the two glasses is increased as far as a certain limit.

If, then, a reticule be taken of such a magnitude, as just to comprehend the greatest diameter the sun or moon can ever have in the common focus of two object-glasses applied to each other, there needs nothing but to remove them from each other, as the star comes to have a less diameter, to have the image still exactly comprehended in the same reticule.

Another improvement is, that whereas the silken threads are subject to swerve from the parallelism, &c. by the different temperature of the air; a reticule may be made of a thin looking-glass, by drawing lines or circles on it with the fine point of a diamond; which shall be safe from any alteration of the air. See MICROMETER.

RETICULAR BODY, *corpus reticulare*, in *Anatomy*, a body of vessels lying immediately under the cuticle or scarf-skin. See INTEGUMENTS.

RETICULAR *Plexus*, *plexus reticularis*, sometimes denotes the choroides, which is thus called, because its fibres are interwoven like a net.

RETICULARIA, in *Botany*, a genus of *Fungi*, named by Bulliard, from the reticulated appearance of its structure when ripe. It is the LYCOGALA of Micheli, Persoon, and others; see that article.

RETICULARIS MEMBRANA, in *Anatomy*, a name sometimes given to the cellular substance. Dr. Hunter speaks of the cellular substance, which contains no fat, under this name, giving the appellation of adipous cellular substance to the other.

RETICULUM, in *Comparative Anatomy*, one of the divisions of the stomach in ruminating animals, so called from the reticulated arrangement of the folds of its internal membrane. See MAMMALIA.

RETIERS, in *Geography*, a town of France, in the department of the Ille and Vilaine, and chief place of a canton, in the district of Vitré; six miles W.S.W. of La Guerche. The place contains 2384, and the canton 14,638 inhabitants, on a territory of 237½ kiliometres, in 10 communes.

RETIMO, a town of the island of Candia, built on the ruins of the ancient Rithymna. The environs of this town afford prospects that are very picturesque:—gardens planted with orange-trees, among which rise some date-trees; fields covered with olive-trees and kitchen-garden plants; rising grounds, on which the vine, the fig-tree, the mulberry-tree, and the almond-tree grow together; and farther

farther on, wooded mountains:—to the weft, the citadel, the harbour, and the fea. In a word, every thing concurs to render Retimo the moft agreeable town in the ifland. It would alfo have become, perhaps, the richeft, and the moft populous, if the harbour, fmall as it is, had been kept in order. At prefent it is only practicable for the barks of the country; fhips remain in the road, but rarely anchor here; and thus Retimo, which, from its pofition, the abundance of oil which is collected in its vicinity, and the other productions of its territory, might be an important place of trade, has, as well as Candia, feen a part of its population pafs to Canea. Its prefent population, fays Olivier, confifts of from 5 to 6000 inhabitants, half Greeks, half Turks: the Jews here are not fo numerous as at Candia.

This town, weakly defended, was plundered and ravaged by the Turks, as far back as the year 1572, while Selim II. was caufing the fiege of Famagufta, in Cyprus, to be pufhed on with vigour; but it was not till the reign of Ibrahim, in 1645, that the Venetians were driven from it for ever; 40 miles W. of Candia. N. lat. 35° 20′. E. long. 24° 21′.

The province of Retimo is one of the beft cultivated and moft productive of the ifland; it furnifhes a great deal of oil, a little barley and wheat, and a tolerably large quantity of wine. The rifing grounds and hills which fkirt the fhores of Armiro are almoft all covered with vines. On the neareft mountains which lie to the fouth, is a foreft of common and native oaks, maples, and carob-trees, into which the inhabitants of Retimo come to cut the wood, of which they ftand in need. To the fouth of Retimo are the two provinces of Aïon-Vaffali and Amuri, the only ones that are comprifed in this pachalic; they furnifh wheat, barley, oil, and fome fruits. The former, fituated to the N.W. of the other, furnifhes, befides, excellent cheefe, which is confounded in trade with that of Sphachia. The Greeks are more numerous than the Turks in the provinces of Aïon-Vaffali and Amuri. Olivier and Sonnini.

RETINA, in *Anatomy*, a membrane of the eye, formed by the expanfion of the optic nerve, and conftituting the immediate organ of vifion. See EYE.

RETINA, in *Optics*. The retina is ufually fuppofed to be the great organ of vifion, which is effected by means of the rays of light reflected from each point of the objects refracted in their paffage through the aqueous, vitreous, and cryftalline humours, and thus thrown on the retina, where they paint the image of the object; and where they make an impreffion, which is continued thence, by the fine capillaries of the optic nerves, to the fenfory. See EYE and VISION.

Indeed, whether the retina, or the choroides, be the principal organ of vifion, and that on which the images of objects are reprefented, has been much controverted between feveral members of the Royal Academy; particularly Meffrs. Mariotte, Pecquet, Perrault, Mery, and de la Hire. Mariotte firft referred vifion to the choroides, and was feconded by Mery; the reft afferted the caufe of the retina.

The retina was always judged to have all the characters of the principal organ. It is fituated in the focus of the refraction of the humours of the eye; and of confequence receives the vertices of the cones of rays, proceeding from the feveral points of objects. It is very thin, and confequently very fenfible. It has its origin from the optic nerve, and is itfelf wholly nervous; and it is the common opinion, that the nerves are the vehicles of all fenfations. Laftly, it communicates with the fubftance of the brain, where all fenfations terminate.

As to the choroides, its ufe was fuppofed to be to ftop the rays, which the extreme tenuity of the retina fhould let pafs; and to do the fame office with refpect to the retina, which the quickfilver does to a looking-glafs; efpecially in thofe animals in which it is black.

But from an experiment of a cat plunged into water, M. Mery conceived a different opinion. (See PUPIL.) He obferved the retina to difappear abfolutely on that occafion, as well as all the other humours of the eye; while the choroides ftill appeared diftinctly, and even with all the lively colours which it has in that animal. Hence, he concluded, that the retina was as tranfparent as the humours, but the choroides opaque; confequently the retina was not a proper inftrument to terminate and ftop the cones of rays, or to receive the images of objects; but that the light muft pafs through it, and could only be ftopped on the choroides; which therefore would become the principal organ of vifion. The black colour of the choroides in man is extremely favourable to this opinion; the principal organ fhould feem to require, that the action of the light fhould terminate on it as it arrives; which it is certain it here does in the black, that abforbs all the rays, and reflects none; and it fhould alfo feem neceffary, that the action of the light fhould be ftronger on the organ of fight than any where elfe: now it is certain that the light, being received and abforbed in a black body, muft excite a greater vibration there than any where elfe; and hence it is that black bodies are kindled by a burning-glafs much fooner than white ones.

The fituation of the choroides behind the retina is another circumftance on its fide; M. Mery having obferved the fame pofition of the principal organ behind a mediate organ in the other fenfes, which makes an happy analogy. Thus the cuticle extended over the fkin is the mean organ of feeling; but the cutis underneath is the principal organ. The like is obferved in the ear, nofe, &c.

The retina, therefore, fhould feem a kind of mediate or fecondary organ, ferving to break the too ftrong impreffion of the light on the choroides, or to preferve it; which is the ufe afcribed to the cuticle. Add to all this, that the retina is infenfible, as having its origin from the medullary fubftance of the brain, which is fo too; and the choroides, on the contrary, is very fenfible, as arifing from the pia mater, which is certainly fenfible in a great degree.

This laft argument being doubted of, M. Mery was engaged to prove it; which he did before the Royal Academy, where he fhewed that the optic nerve is not compofed, like the other nerves, of fibres; that it is only a train of the medulla inclofed in a canal, out of which it is eafily feparable.

This ftructure of the optic nerve, hitherto unknown, fhews that the retina can be no membrane; it is only a dilatation of the medulla, inclofed under two membranes; and a pith or medulla feems no proper fubftance to be the feat of fenfation. It can fcarcely ferve for any thing but to filtrate the fpirits neceffary for the action of vifion. The vibration, by which the fenfation itfelf is effected, muft be made on a part more folid, more firm, and more fufceptible of a brifk impreffion.

For other arguments in favour of the choroides being the feat of vifion, fee CHOROIDES.

RETINA, *Paralytic*, and *Difeafed*. See GUTTA SERENA.

RETINACULUM, the name of a chirurgical inftrument ufed in caftration, and in the operation for a hernia, to prevent the inteftines from falling into the fcrotum.

RETINARIA, in *Botany*, was fo called by Gærtner, from *rete*, a net, or rather more immediately perhaps from the

the anatomical word *retina*, applied to the nervous network of the eye. This genus was founded, by the above author, on a fruit given him by profeffor Hermann, and faid to belong to a climbing fhrub of the Mauritius. So nearly do Gærtner's plate and defcription approach to the fruit of *Gouania domingenfis*, that we have no doubt of their belonging to fome fpecies of the fame genus; probably to one that we have defcribed in our article GOUANIA, though, poffeffing none but the *domingenfis* in fruit, we cannot exactly appropriate Gærtner's fynonym. He feems not to have been acquainted with the fruit of a *Gouania*.

RETINASPHALTUM, in *Mineralogy*, a name given to an inflammable kind of refinous fubftance, accompanying Bovey coal. It has a pale brown ochre-yellow colour, is very brittle, and breaks with a vitreous fracture. Its fpecific gravity is 1.135. When held in the hand for fome time, it emits a flightly refinous fmell, but when burned it has a fragrant odour; at laft the fmell is bituminous. On the firft application of heat it melts and fmokes, and then burns with a bright flame. When the melted mafs is cooled, it is black and brittle, and breaks with a glaffy fracture. It is not acted on by water, but is partly diffolved by alcohol, potafh, and nitric acid; the diffolved portions having the properties of a refin; the undiffolved of afphaltum. It was analyfed by Mr. Hatchett, and is compofed of

55 Refin,
41 Afphaltum,
3 Earths.

A fimilar fubftance occurs in the wood coal at Cologne, and was alfo recently difcovered in making the excavation for the Tunnel at Highgate. It may be doubted, however, whether thefe fubftances are more entitled to be ranked among minerals than the other vegetable matters found in alluvial ground.

RETINUE, RETINENTIA, the attendants or followers of a prince, or perfon of quality, chiefly in a journey.

In *Law*, thofe perfons are properly faid to be of a nobleman's retinue, who belong to him in quality either of fervants or retainers.

RETIRADE, in *Fortification*, a kind of retrenchment made in the body of a baftion, or other work, which is to be difputed inch by inch, after the firft defences are difmantled. It ufually confifts of two faces, which make a re-entering angle. When a breach is made in a baftion, the enemy may alfo make a retirade, or a new fortification behind it.

RETIRED FLANK. See FLANK.

RETIRED *Lift*, a lift on the marine eftablifhment, on which fuperannuated officers are placed.

In the Eaft India fervice, the company have refolved that a military officer, after 20 years' actual fervice in India, who comes to Europe upon leave, may be allowed to retire on the pay of his rank, provided he fignifies his intention of fo doing, within 20 months after his arrival. Officers on leave who are defirous of retiring, and who declare their intention to that effect, within 12 months from their arrival, will be permitted to retire on the pay of the rank to which they may be intitled at that period. An officer having completed 22 years' refidence in India will be allowed to retire on the full pay of his rank, directly on his leaving India.

RETMANDORF, or RADOVELZA, in *Geography*, a town of the duchy of Carniola, on the Save; 52 miles W. of Cilley. N. lat. 46° 22'. E. long. 14° 5'.

RETONVILLER, a town of France, in the department of the Somme; four miles N.E. of Roye.

RETORBIO, a town of Italy, in the Pavefe; 14 miles S. of Pavia.

RETORNO *Falfo Brevium*, in *Law*. See FALSO.

RETORNO *Habendo*, &c. See RETURNO *habendo*, and REPLEVIN.

RETORT, RETORTA, in *Chemiftry*, a kind of crooked matrafs, or a round bellied veffel, made of earth, glafs, or metal, with a flender crooked beak or neck, to which the recipient is to be faftened.

From this form this veffel has been probably called a *retort*. The moft capacious part is called the belly; its upper part the arch or roof of the retort; and the bent part, which makes with the belly an angle of about fixty degrees, is the neck; and the paffage from the belly to the neck fhould be free and wide, and gradually diminifhing to the extremity of the neck or mouth of the retort. Retorts differ in form and materials; their bellies are generally round; fome of them are oblong, and fhaped like a cucurbit, and thefe are called *Englifh* retorts. They are preferable for the diftillation of matters which are fubject to fwell, and to pafs into the receiver before they be decompofed.

A retort, which has a little hole pierced in its roof, is called a *tubulated* retort. This hole muft be capable of being exactly clofed with a ftopper of proper materials. Retorts of this kind are employed in diftillations, where fome matter muft be introduced into the retort after the receiver is joined to it, as in the diftillation of fmoking marine acid, and in the operations for procuring the feveral kinds of clyffus.

When the retort is of glafs, it is ufually covered with a lute of loam, &c. an inch thick, to enable it to bear the fire the better; and it is ufed for all operations which require a lefs heat than is fufficient for its fufion. Earthen retorts are neceffary when great heat is requifite, as in the preparation of phofphorus.

The retort feems to draw fpirits and oil from woods, gums, minerals, earths, and other matters which require a ftrong fire.

The retort is a kind of compendium or improvement on the cucurbit and bolt-head; anfwering all the purpofes of both, without the affiftance of a capital or head, which the other require.

The quantity of air arifing from fome fubftances is apt to burft glaffes in diftilling; Dr. Browne Langrifh has, therefore, given us a new contrivance of applying receivers to retorts, by which fuch accidents may be prevented. To his firft receiver he adapts a fecond, inferted into an opening at the top of the firft, in order to give more room to the rarefied and new generated air. To an opening at the bottom of each of thefe receivers, he fixes a bottle, tied on clofe by means of a bladder, fo that they may be removed at any time, and another inftantly placed in their room; by which means very little of the fteam will efcape. He alfo ties on a bladder to an opening, or upper neck of the fecond recipient; and this bladder being much thinner and weaker than any of the glaffes, will always give way firft, and prevent their burfting. And even when there is the greateft danger of this accident, the fmalleft pin-hole made through the top of the bladder, as foon as the fumes begin to rife, will be fufficient to let out the air as faft as it is generated. See Philof. Tranfact. N° 475. fect. 3. where we have a figure of the whole apparatus. For a farther account of the retort, and the ufes to which it is applied; fee DISTILLATION and LABORATORY.

RETORTION, in *Political Economy*. When a fovereign is not fatisfied with the manner in which his fubjects are treated by the laws and cuftoms of another nation, he is at liberty to declare, that he will treat the fubjects of that nation in the fame manner as his are treated. This is what is is called the "law of retortion;" in which there is nothing that is not conformable to juſt and ſound politics; for no one can complain of being treated as he treats others. This law of retortion may alſo take place with regard to certain regulations, of which we have no right to complain, and which we are even obliged to approve, though it is proper to guard againſt their effects, by imitating them. Such are the orders relating to the exportation of certain commodities or merchandize. It is alſo frequently not convenient to make uſe of retortion; in this reſpect we ought to follow the dictates of prudence.

RETOW, in *Geography*, a town of Samogitia; 12 miles W. of Medniki.

RETRACTATION, Retractatio, the act of unſaying what a perſon had ſaid or written.

Galileo made a public retractation of his doctrine of the world, De Mundo, after its being cenſured and condemned by the pope. See Copernicus and Galileo.

Among St. Auguſtine's works is a book of "retractations;" where, however, the word is to be underſtood in a new ſenſe; not as if he recanted or unſaid any thing he taught, but only treated of the ſame matter, or handled the ſame ſubject, a ſecond time. This ſenſe the word will very well bear; being a compound of *re, again,* and *tracto, I handle, treat of.*

RETRACTION, Retractio, formed from *retrahere, to draw back,* in *Anatomy,* the contraction or ſhortening of a part. A retraction of the nerves takes away the uſe of the limbs.

RETRACTS, among *Horſemen,* pricks in a horſe's feet, ariſing from the fault of the farrier in driving nails that are weak, or in driving them ill-pointed, or amiſs.

Theſe, unleſs timely prevented, feſter, and prove very dangerous. When the farrier, in ſhoeing, perceives the horſe to ſhrink at every blow on the nail, it is a ſign of a retract, and the nail is to be pulled out again; which is done without any harm.

When the horſe halts immediately after he is ſhod, it is concluded ſome of the nails preſs the veins, or touch him in the quick.

To find where the grievance lies, they knock the nails round with a hammer, till the horſe's ſhrinking upon hitting a particular nail diſcovers the place.

Some farriers give this as a rule, that throwing water on the hoof, the place where he is hurt will be dry ſooner than any of the reſt. The places where the horſes are moſt uſually pricked, are, the heel in the fore-foot, and the toe in the hind-foot.

RETRAHENS, in *Anatomy,* a muſcle of the external ear. See Ear.

RETRAXIT, in *Law,* is where the plaintiff comes into court in perſon, alone, or with the defendant; and declares he will proceed no farther in his action.

A retraxit is peremptory, and a perpetual bar, and may be pleaded as ſuch to the plaintiff in the ſame action for ever. See Nonsuit.

RETREAT, in *Ornamental Gardening,* any ſort of erection, place, or convenience, formed in gardens or pleaſure grounds for the purpoſe of recreation and amuſement. Theſe are of very different kinds, according to the nature of the particular grounds or gardens, their circumſtances, and ſituations; as covered, open, or in other forms, as the taſte of the proprietor or deſigner may direct. They may be made either in the different quarters, centre parts, angles, or other places of theſe ſituations, or formed in the range of hot-houſes, as is the caſe in ſome inſtances. The particular forms, deſigns, and means of conſtruction of them, are ſo various, but, for the moſt part, ſo well known, that it is unneceſſary to give any deſcription of them in this place. Thoſe of the more ornamental kind ſhould, however, in general, be contrived ſomewhat in conformity to the ſtyle of the ground, garden, place, and proprietor; being furniſhed from deſigns of great diverſity and number, as well as of various degrees of elegance, from that of the ſimple bower of honeyſuckle, hop, or vine, twined upon bent poles, to the Grecian porch or temple of the fineſt ſort of maſonry. Great caution is, however, required in the introduction of theſe ſorts of ornamental erections into gardens of the culinary kind. And in them, as with every thing elſe which relates to them, uſe, Mr. Loudon ſuppoſes, ſhould be the prevailing idea; and that, as *uſe* and *beauty* go hand in hand, the moſt vulgar objects may be dignified by the judicious introduction of elegance. A garden of the kitchen kind, though unmixed with productions purely ornamental, is ſtill, it is thought, a pleaſing ſcene, becauſe full of *utility* and *animation,* and conſtantly varying from the practice of cultivation, as well as from the ſeaſons. It is conſequently very generally reſorted to at moſt times of the year, but eſpecially in the early ſpring months. Of courſe, in a climate ſo very variable as this, wherever the walks are frequently made uſe of at ſuch a ſeaſon, there ſhould, it is ſaid, be covered retreats or places for retiring to, which ſhould correſpond with the whole of which they are conſpicuous parts or portions. In this way they may conſtantly be made to harmonize with the different objects around them.

Retreat, in *War,* the retiring or moving back again of an army, or part of it.

We ſay, to ſound a retreat, to ſecure a retreat, &c.

What they call a retreat in the armies, is really a flight; only a flight made by deſign, and with conduct.

The ſkill and ability of the general is known by his retreats more than his engagements. The retreat of the ten thouſand Greeks under the command of Xenophon, has been admired in all antiquity.

The three moſt celebrated retreats of modern times have been general Moreau's retreat in 1796, that of Prague, and that of general Macdonald in Italy.

Retreat, *Chequered, Rétraite en échiquier,* Fr. is ſo called from the ſeveral component parts of a line or battalion, which alternately retreat and face in the preſence of an enemy, exhibiting the figures of the chequered ſquares upon a cheſs-board. In the "General Rules and Regulations," (part 4.) it is judiciouſly obſerved, that all manœuvres of a corps retiring, are infinitely more difficult to be performed with order, than thoſe in advancing. They muſt be more or leſs accompliſhed by chequered movements; one body by its numbers or poſition, facing and protecting the retreat of another; and if the enemy preſſes hard, the whole muſt probably front in time and await him; as the ground narrows or favours, different parts of the corps muſt double; mouths of defiles and advantageous poſts muſt be poſſeſſed; by degrees the different bodies muſt diminiſh their fronts, and throw themſelves into column of march when it can be done with ſafety.

The chequered retreat by the alternate battalions or half battalions of a line going to the rear, while the others remain halted, cover them, and in their turn retire in the ſame manner, is the quickeſt mode of refuſing a part of a corps to the enemy, and at the ſame time protecting its movement, as long as it continues to be made nearly parallel to the firſt poſition.

In the chequered retreat the following rules muſt be obſerved: The battalions of the diviſion neareſt to the enemy, will form flanks as ſoon as there is nothing in their front to cover them; but the other diviſions will not have any flanks except to the outward battalion of each. The battalions always paſs by their proper intervals, and it is a rule in retiring, that the left of each ſhall always paſs the right of the neighbouring one. Whatever advantages the ground offers, thoſe advantages muſt be ſeized, without too critical an obſervance of intervals, or minute adherence to the determined diſtance of each retreat. The diviſion next the enemy muſt paſs in front, through the intervals of the diviſion immediately behind, and any battalion, that finds it neceſſary, muſt incline for that purpoſe. The retiring diviſion muſt ſtep out, and take up no more time than what is abſolutely required to avoid confuſion. The diviſion neareſt the enemy fires by platoons ſtanding; the flanks of its battalions only fire when the enemy attempts to puſh through the intervals. When that diviſion retires, it fires on, ſkirmiſhes by men detached from its light company, if preſent, or from platoons formed of rear rank men of one or two of the companies, and placed behind the flanks of the battalions. But ſhould any of its battalions be obliged to halt and to fire, a ſhorter ſtep muſt then be taken by the line; and ſhould the enemy threaten to enter at any of its intervals, beſides the fire of its flanks, ſuch platoons of the line behind it, as can with ſafety, muſt give it ſupport.

Retreat is a beat of the drum in the evening, at the firing of a piece called the evening-gun, at which the drum-major, with all the drums of the battalion, except ſuch as are upon duty, beat round the regiment; the drums of the quarter-guards, of the general-guards, and all other ſmall-guards, do likewiſe beat; the trumpets at the ſame time ſounding at the head of their reſpective troops. This is to warn the ſoldiers to forbear firing, and the ſentinels to challenge, till break of day, that the reveille is beat.

The retreat is likewiſe called *ſetting the watch.*

In fortified places, this is a ſignal for the inhabitants to come in before the gates are ſhut. See Drum.

Retreat, or *Relay*, in *Maſonry*, denotes a little receſs or diminution of the thickneſs of a wall, rampart, &c. in proportion as it is raiſed.

The retreat is properly the diminution of a wall, withoutſide, or the contraction of its upper courſes more than the foundation. Where the foundation is very large, they uſually make two or three retreats. Parapets are always built with retreats.

RETRENCHMENT, in a general ſenſe, literally ſignifies the cutting off or taking from a thing: in which ſenſe it coincides with ſubtraction, diminution, &c.

The word is French, *retrenchment*, formed of *re*, and *trencher, to cut.*

Retrenchment, in *Architecture*, *Carpentry*, &c. is uſed not only for what is cut off from a piece when too large, in order to a better proportioning it, or ſome other convenience, but alſo for the projectures taken out of ſtreets, public ways, &c. to render them more even, and in a line.

Retrenchment, in *War*, denotes any kind of work caſt up to ſtrengthen or defend a poſt againſt the enemy.

Such are ditches with parapets, gabions, faſcines, &c. for a covering, &c.

The enemy came with deſign to oblige them to raiſe the ſiege; but could not force the retrenchments.

Retrenchments are either *general* or *particular.*

General retrenchments are a kind of new defence made in a place beſieged, to cover the defendants, when the enemy becomes maſter of a lodgement on the fortification, that they may be in a condition of diſputing the ground inch by inch, and of putting a ſtop to the enemy's progreſs, in expectation of relief; as, if the beſiegers attack a tenaille of the place, which they judge the weakeſt, either by its being ill flanked, or commanded by ſome neighbouring ground; then the beſieged make a great retrenchment, incloſing all that part which they judge in moſt danger. Theſe ſhould be fortified with baſtions and demi-baſtions, ſurrounded by a good ditch countermined, and higher than the works of the place, that they may command the old works, and put the beſiegers to infinite trouble in covering themſelves.

Particular retrenchments, or retrenchments within a baſtion, (*retranchemens dans un baſtion*, Fr.) muſt reach from one flank to another, or from one caſemate to another. It is only in full baſtions that retrenchments can be thrown up to advantage. In empty baſtions you can only have recourſe to retirades, or temporary barricadoes above the ramparts. The aſſailants may eaſily carry them by means of hand grenades, for theſe retrenchments never flank each other. It is neceſſary to raiſe a parapet, about five or ſix feet thick, before every retrenchment. It muſt be five feet high, and the ditches as broad and as deep as they can be made. There muſt alſo be ſmall mines run out in various directions, for the purpoſe of blowing up the aſſailants, ſhould they attempt to force the retrenchments.

Retrenchment is more particularly uſed for a ſimple retirade made on a horn-work or baſtion, when it is intended to diſpute the ground inch by inch. See Retirade.

It is uſually a re-entering angle, whoſe faces flank each other; and is fortified with ditches, parapets, gabions, &c.

RETRIBUTION, Retributio, a handſome preſent, gratuity, or acknowledgment, given in lieu of a formal ſalary or hire, to perſons employed in affairs that do not ſo immediately fall under eſtimation, nor within the ordinary commerce in money.

Thoſe who miniſtered at the altar anciently lived on retributions, which they received for the ſervices they did the church. But theſe retributions were afterwards judged proper to be fixed to preciſe ſums.

RETRIEVE, Retrouver, to recover, get again, or repair a thing loſt or damaged.

To retrieve, in *Falconry*, ſignifies to bring or find partridges again, which have been once ſprung before.

RETROACTIVE, compounded of *retro, backwards,* and *ago, I act,* in *Law*, that which has an influence or effect on time paſt.

New laws and ſtatutes, we ſay, have no retroactive effect; that is, they have no force or effect as to what is already paſſed; nor can be alleged as rules for any thing done before their promulgation. Their authority is wholly as to what is to come.

Indeed we have ſome inſtances of laws that have a retroſpect to retroaction, *i. e.* are made with expreſs deſign to extend to things already paſt. Theſe we uſually call laws *ex poſt facto.*

RETROCESSION, Retrocessio, the act of going backwards, more uſually expreſſed by *retrogreſſion*, or *retrogradation.*

Retrocession *of the Equinox.* See Precession.

Retrocession *of Curves*, &c. See Retrogradation.

RETROGRADATION, or Retrogression, the act or effect of a thing moving backwards.

Retrogradation, in *Aſtronomy*, is an apparent motion of the planets, in which they ſeem to go backwards in the ecliptic, and to move contrary to the order or ſucceſſion of the ſigns.

When a planet moves *in conſequentia*, *i. e.* towards the following ſigns, or according to the order of the ſigns, as from

Aries to Taurus, from Taurus to Gemini, &c. that is, from weſt to eaſt, it is ſaid to be direct.

When it appears for ſome days in the ſame point of the heavens, it is ſaid to be *ſtationary*.

And when it goes *in antecedentia*, *i. e.* towards the antecedent ſigns, or contrary to the order of the ſigns, *viz.* from eaſt to weſt; it is ſaid to be *retrograde*.

The ſun and moon always appear direct. Herſchel, Saturn, Jupiter, Mars, Venus, and Mercury, ſometimes direct, ſometimes ſtationary, ſometimes retrograde.

The ſuperior planets are retrograde about their oppoſition with the ſun; the inferior ones about their conjunction. The intervals of time between two retrogradations of the ſeveral planets are unequal.

Theſe changes of the courſes and motions of the planets are not real, but only apparent: when viewed from the centre of the ſyſtem, *i. e.* from the ſun, they appear always uniform and regular. The inequalities ariſe from the motion and poſition of the earth from which they are viewed, and are thus accounted for:

Suppoſe P N O (*Plate* XIX. *Aſtronomy*, *fig.* 12.) a portion of the zodiac, A B C D the earth's orbit, and E M G H Z the orbit of a ſuperior planet, *e. gr.* Saturn; and ſuppoſe the earth in A, and Saturn in E, in which caſe he will appear in the zodiac at the point O. If now Saturn remained without any motion, when the earth arrives at B, he will be ſeen in the point of the zodiac L, and would appear to have deſcribed the arc O L, and to have moved according to the order of the ſigns from weſt to eaſt. But becauſe, while the earth is paſſing from A to B, Saturn likewiſe moves from E to M, where he is ſeen in conjunction with the ſun, he will appear to have deſcribed the arc O Q greater than that O L. In this ſtate the planet is direct, and its motion is from weſt to eaſt, or according to the order of the ſigns. And its motion, now that it is in conjunction with the ſun, and moſt remote from us, is quicker than at any other time.

The earth arriving in C, while Saturn deſcribes the arc M G, he will be obſerved in the zodiac at R. But the earth being advanced to K, and Saturn to H, ſo that the line K H, joining the earth and Saturn, be for ſome time parallel to itſelf, or nearly ſo, Saturn will be ſeen all that time in the ſame point of the zodiac at P, and with the ſame fixed ſtars; and is therefore at this time ſtationary.

But the earth being come to D, and Saturn arrived in oppoſition to the ſun in Z, he will appear in the zodiac in V, and will ſeem to have been retrograde, or to have gone backwards through the arc P V. Thus the ſuperior planets, on optical conſiderations, are always retrograde, when in oppoſition to the ſun.

The arc which the planet deſcribes while thus retrograde, is called the *arc of retrogradation*.

The arcs of retrogradation of the ſeveral planets are not equal. That of Saturn is greater than that of Jupiter; that of Jupiter than that of Mars, &c.

Retrogradation *of the Nodes*, is a motion of the line of the nodes, by which it continually ſhifts its ſituation from eaſt to weſt, contrary to the order of the ſigns; completing its retrograde circulation in the compaſs of about nineteen years: after which time, either of the nodes, having receded from any point of the ecliptic, returns to the ſame again. See Nodes.

Retrogradation *of the Sun*. When the ſun is in the torrid zone, and has his declination A M (*Plate* XIX. *Aſtronomy*, *fig.* 13.) greater than the latitude of the place A Z, but either northern or ſouthern as that is, the ſun will appear to go backwards, or to be retrograde both before and after noon. This can never happen, without the tropics, in a natural way.

For, draw the vertical circle Z G N to be a tangent to the ſun's diurnal circle in G, and another Z O N through the ſun's riſing, in O, it is evident all the intermediate vertical circles cut the ſun's diurnal circle twice; firſt, in the arc G O, and the ſecond time in the arc G I. Wherefore, as the ſun aſcends through the arc G O, it continually arrives at farther and farther verticals. But as it continues its aſcent through the arc G I, it returns to its former verticals; and, therefore, is ſeen retrograde for ſome time before noon. The ſame it may be ſhewn, after the ſame manner, it does for ſome time after noon. Hence, as the ſhadow always tends the oppoſite way to that of the ſun, the ſhadow will be retrograde twice every day in all places of the torrid zone, where the ſun's declination exceeds the latitude.

Retrogradation, or *Retrogreſſion*, in the *Higher Geometry*, is the ſame with what we otherwiſe call *contrary flexion*. See Flexure and Inflexion.

The general rule given by the marquis de l'Hôpital, for finding the point of reflection in curves whoſe ordinates are parallel, is the ſame as that for finding the point of contrary flexure, and conſiſts in taking the ſecond fluxion of the ordinate of the curve, and ſuppoſing it nothing or infinite: but this rule admits of many exceptions. See Maclaurin's Flux. b. i. c. 9. and b. ii. c. 5.

RETROGRADE, Retrogradus, formed from *retro*, *backwards*, and *gradior*, *I go*, ſomething that goes backwards, or in a direction contrary to the natural one.

If the eye and the object both move the ſame way, but the eye much faſter than the object, the object will appear to be retrograde, *i. e.* to go back, or to advance the contrary way from what it really does.

Hence it is that the planets, in ſome parts of their orbits, appear to be retrograde.

Retrograde order, in matters of numeration, is when, in lieu of accounting 1, 2, 3, 4, we count 4, 3, 2, 1.

Retrograde *Verſes* are ſuch as give the ſame words, whether read backwards or forwards: called alſo *reciprocal verſes*, and *recurrents*. Such is

"Signa te ſigna; temere me tangis et angis."

RETROGRADO, Ital. in *Muſic*, a retrograde motion of a melody, or ſubject of canon. This motion is ſometimes termed by the Italians, *imitatione cancherizante*; imitation of the movement of a crab-fiſh. See Canon.

RETROGRESSION, or Retrocession, the ſame with retrogradation.

RETROMINGENTS, compounded of *retro*, *backwards*, and *mingo*, *I make water*, in *Natural Hiſtory*, a claſs or diviſion of animals, whoſe characteriſtic is, that they ſtale backwards, both males and females. Such are lions, cats, &c.

RETROPANNAGIUM, Retropannage, in our *Ancient Law Books*, *after-pannage*; or what is left when the beaſts have done, or eaten the beſt. See Pannage.

"Et debent habere retropannagium a feſto Sancti Martini uſque ad feſtum Pur. Beatæ Mariæ." Petit. in Parl. temp. Edw. III.

RETROSPECT, a look or view backwards. See Retroactive.

RETROVERSIO Uteri, in *Surgery*. The womb is ſubject to two particular changes in the poſition of its fundus, which may be diſplaced either forwards or backwards. The firſt caſe, ſometimes termed *anteverſion*, is the leaſt frequent; the ſecond, or *retroverſion*, is more often met with. In the inſtance of anteverſion, when the ſurgeon makes an

 examina-

examination with his finger, he finds the fundus of the uterus inclining forwards towards the os pubis over the fundus of the bladder; while the os tincæ is carried backwards towards the facrum, upon the middle of the rectum, fometimes fo high up that it can hardly be reached with the finger. The patient has generally a conftant inclination to make water; preffure juft above the pubes always gives her confiderable pain; whenever fhe gets up to walk, fhe is confcious of a hard fubftance falling upon the bladder, and obliging her to empty it; and, when fhe lies down upon her back, fhe feels the fame hard body flip back again. In one example, a patient had fuch pain in the abdomen and foft parts, that fhe could fcarcely move.

In general, the anteverfion of the womb may eafily be remedied. The patient being laid upon her back, which is to be fomewhat raifed up, the furgeon is to apply his hand above the pubes, and make preffure there, by which means the fundus uteri will be forced backwards, and the os tincæ inclined forwards into its natural fituation. A recurrence of the difplacement is to be prevented by the application of a peffary, which will fupport the os tincæ. The patient is to be kept for a certain time upon her back in bed, and a tight bandage fhould always be put round the body juft over the os pubis. The uterus by degrees commonly becomes fixed again in its right pofition, fo that the ufe of the peffary can be difcontinued. The inftrument muft not be left off too foon, however, left a relapfe fhould be the confequence.

In the retroverfion, the pofition of the womb is altered in a manner precifely the reverfe of what occurs in the foregoing cafe. The os tincæ lies towards the pubes; while the fundus uteri is carried towards the facrum, and is generally funk fo far down betwixt the vagina and the rectum, as to occafion, at the pofterior part of the former canal, a protuberance, which clofes it, and which at the fame time compreffes the rectum in fuch a manner, that the patient cannot void her feces, nor can clyfters be adminiftered. As in this preternatural pofition of the uterus, the bladder and meatus urinarius are unavoidably difplaced, the cafe is always complicated with a retention of urine, which is the more afflicting, as it is ufually very difficult, and even impracticable, to introduce a catheter. The opening of the meatus urinarius is fometimes drawn fo high up, that it is actually higher than the pubes. Hence, the anterior parietes of the vagina are conftantly very much ftretched. When the retention of urine has lafted a certain time, the os tincæ above the pubes cannot be reached nor touched with the end of the finger. In this circumftance the bladder forms, beneath the os tincæ, a large fwelling, which hinders the finger from feeling the latter opening. The patient always fuffers exceffive pain, which not unfrequently refembles that of labour, and arifes partly from the impediment to the evacuation of the urine, and partly from the difplaced condition of the parts. The diforder, therefore, has often been mifunderftood, the patient's fufferings being regarded as labour-pains, and delivery expected. Indeed, when the complaint is not fpeedily removed, a mifcarriage is the confequence. The cafe is frequently attended with fever and inflammation.

The retroverfion of the uterus has never been obferved, except in pregnancy, and always in the fecond, third, or fourth month of that ftate. It is moft apt to occur in fuch women as have a wide pelvis. Fat fubjects are more liable to the diforder than thin. It is obferved to be brought on by bodily exercifes and exertions, as, for inftance, by violent vomiting, falls, the lifting of heavy burdens, &c. But, Richter thinks it unlikely, that the cafe fhould arife and be fuddenly produced by thefe caufes alone. How, he afks, could the gravid, round, diftended uterus be thus fuddenly difplaced, and become depreffed betwixt the rectum and the vagina? He conceives it probable, that a predifpofition to diforder, or rather an incipient ftage of it, muft have exifted. He thinks it likely, that the occurrence of the complaint may be promoted by repeatedly neglecting to make water, and by the confequent diftention of the bladder, whereby not only the fundus uteri is preffed towards the facrum, but alfo the cervix becomes drawn upwards. Richter believes, that a fmall degree of retroverfion, that has exifted a good while, may only be increafed by the caufes already hinted at, fo as to excite notice; and that the fundus of the uterus may now foon be forced by the efforts, refembling thofe of labour, fo far down between the vagina and the rectum, that all thefe parts become as it were adherent together. The foregoing ftatement Richter thinks the more likely to be correct, inafmuch as cafes have actually been obferved, where patients have experienced various flight complaints a confiderable time before the retroverfion was known to exift; but which complaints might be afcribed to the incipient ftage of that fort of difplacement of the uterus. How it happens, that retroverfion of this organ is only met with in the early months of pregnancy, is eafy of comprehenfion. The retroverfion is promoted by the weight of the gravid uterus. During the latter half of the period of geftation, however, the uterus is too large to be capable of defcending betwixt the vagina and rectum; and the occurrence of retroverfion, except in pregnancy, is what can hardly be conceived.

The furgeon fhould always endeavour to put the retroverted uterus, as foon as poffible, into its natural pofition again. The longer the retroverfion has lafted, the more difficult it is of removal, and the more preffing are the dangers, of which there is caufe for apprehenfion. The moft urgent peril arifes from the retention of the urine, and the ftoppage of evacuations from the bowels. The longer thefe functions are obftructed, and the more the urine and feces accumulate, the more violent do the painful labour-like efforts become, whereby the fundus uteri is continually preffed more and more deeply downwards. Befides, the diftention of the rectum and bladder operates itfelf as an immediate impediment to the reduction of the uterus. Patients have been known to lofe their lives in confequence of the bladder giving way. Sometimes abortion happens; and very often the confequences of fuch an event are favourable; the urine foon afterwards being fpontaneoufly voided, and all the complaints fubfiding. (Saxtorph, Collectanea Havnienfia, vol. ii.) The diforder, however, has been known to continue eleven days, and yet admit of being removed in the moft favourable manner.

In difficult cafes, the reduction of a retroverted uterus may be facilitated by previoufly emptying the rectum and bladder; an object which is frequently practicable. The diftended bladder not only renders the reduction difficult, but is attended with fome danger of that organ burfting in the operation, which often requires the exertion of confiderable force, efpecially when the bladder is very much dilated. Hence, before attempting the reduction, the furgeon is called upon always to endeavour to draw off the urine. When the bladder has been emptied, the retroverted uterus fometimes fpontaneoufly returns into its natural pofition, as feveral cafes on record have proved. (Hunter and Chefton in Medical Communications, vol. ii.; Croft in London Medical Journal, vol. xi.) Such facts muft fully convince us, how much the reduction may be facilitated by drawing off the urine in the firft inftance. A catheter may frequently

frequently be introduced; but it ſhould be of the flexible ſort. A curved inflexible one will alſo ſometimes paſs, if care be taken to keep its concavity turned towards the vagina. Rotating the catheter on its axis is here a particularly uſeful plan. When the catheter cannot be paſſed, other means will ſometimes anſwer for bringing about an evacuation of the urine. In ſome caſes, the water will begin to flow out, when two fingers are introduced betwixt the pubes and os tincæ, and the latter part is preſſed towards the ſacrum. Sometimes preſſing the os tincæ downwards with the finger; on other occaſions, raiſing the fundus uteri backwards and upwards, by means of two fingers in the vagina will have the deſired effect.

When the bladder cannot be emptied in this manner, nor by the catheter, and ſhould it be very much diſtended, and the reduction of the uterus attended with great difficulty, there can be no doubt about the neceſſity of puncturing the bladder; for the immediate and moſt urgent danger ariſes from the retention of urine, and, probably, the diſtended bladder is itſelf the chief impediment to the reduction of the womb into its natural poſition. To theſe conſiderations we may add, that the paracenteſis of the bladder has been performed in theſe caſes with complete ſucceſs. (Cheſton in Medical Communications, vol. ii.) The practitioner muſt alſo endeavour to empty the rectum by means of clyſters, though, it muſt be confeſſed, their application is always attended with a degree of difficulty.

The reduction of the retroverted uterus is executed by preſſing with two fingers applied to the fundus of this viſcus. A principal obſtacle to the ſucceſs of the attempt is cauſed by the projection of the os ſacrum. Hence, it is an indication of the greateſt conſequence to remove the fundus of a retroverted uterus as far as poſſible from that bone, in order that the preceding ſort of hindrance to the reduction may be avoided. With this view the preſſure of the fingers ſhould be ſo directed as not to incline towards the prominence of the ſacrum. During the operation, the patient ſhould reſt upon her elbows and knees, as, in this poſition, the uterus will be at a greater diſtance from the ſacrum. Richter diſapproves of the plan, which ſome writers have recommended, and which conſiſts in introducing two fingers into the vagina, for the purpoſe of reaching and drawing downwards the os tincæ. He aſſerts, that ſuch part can ſeldom be reached, and, that if it could be ſo in a few inſtances, it would not admit of being drawn downwards, while the fundus is incapable of following in the ſame direction. Richter alſo obſerves, that the fundus uteri is at this period the leſs likely to be reduced, becauſe the fingers in the vagina have the effect of preſſing it towards the projection of the ſacrum.

The preſſure of the finger, whereby the fundus uteri is to be puſhed up, ſhould be directed forwards and upwards towards the navel. When the preſſure is made directly upwards, the body of the uterus is forced againſt the projection of the ſacrum, and the attempt cannot poſſibly ſucceed. Indeed, when much force is exerted, as is ſometimes requiſite, preſſure thus directed may do injury to the fœtus and the mother, and bring on abortion. It is advantageous to introduce two fingers into the rectum, with their backs towards the ſacrum, and their inſides towards the vagina; for they may then be uſed for keeping the uterus towards the navel. Perhaps it may likewiſe be adviſeable to lay two fingers on the abdomen above the pubes, in order to prevent the os tincæ from inclining upwards. Perhaps, alſo, two fingers, paſſed into the vagina, might be uſefully employed in preſſing the fundus uteri upwards. In difficult caſes, this double kind of preſſure might be abſolutely neceſſary. If the retroverted uterus ſhould not yield to the foregoing practice, an endeavour may be made, at all events, to puſh the diſplaced viſcus upwards on one ſide of the projection of the ſacrum.

In certain examples, it may be proper not to paſs the fingers into the rectum, but merely into the vagina; 1ſt, becauſe we can thus more certainly and effectually make the preſſure act upon the uterus; and 2dly, becauſe, when the poſterior parietes of the vagina are puſhed with the end of the fingers towards the ſacrum, and the upper part of this tube, ſituated betwixt the fingers and the os tincæ, is ſtretched, the vagina acts upon the uterus in a manner particularly well calculated to promote the reduction. Not more than two fingers, however, ought to be introduced, as more have the effect of dilating the vagina laterally, and preventing it from becoming tenſe in the longitudinal direction. Theden's Bemerkungen, 3 Sheil.

When this method is adopted, the uterus in general begins to yield at firſt ſlowly, and afterwards it ſuddenly returns into its natural ſituation. Sometimes the tendency to retroverſion is ſo great, that the diſorder recurs almoſt immediately after the reduction has been accompliſhed. In this circumſtance, the patient muſt wear a peſſary, until all hazard of another retroverſion is removed by the increaſe of pregnancy. (Hunter in Medical Obſervations and Enquiries, vol. iv.) Sometimes, when the bladder has been very much diſtended with urine during the continuance of a retroverſion of the womb, a retention of urine from weakneſs of the bladder will remain after the reduction of the uterus, and demand the uſe of the catheter. Richter's Anfangſgrunde der Wundarzneykunſt; Hunter in Medical Obſervations and Enquiries, vol. iv.; Cheſton, in Medical Communications, &c.

RETSCHITZ Kardasch, in *Geography*, a town of Bohemia, in the circle of Bechin; 15 miles S.W. of Tabor.

Retschitz *Rot*, a town of Bohemia, in the circle of Bechin; five miles N. of Pilgram.

RETTEN, a town of the duchy of Stiria; 12 miles W. of Friedburg.

RETTERHEIM, a town of the duchy of Wurzburg, inſulated in Wertheim; 16 miles W. of Wurzburg.

RETTERSBACH, a town of the duchy of Wurzburg; five miles S. of Gemunden.

RETTERSWALD, a town of Pruſſia, in Pomerelia; ſeven miles S.E. of Marienburg.

RETTINGBERS, a town of Hindooſtan, in Myſore; 38 miles E. of Chitteldroog. N. lat. 14° 5′. E. long. 77° 4′.

RETTLSTEIN, a town of Stiria, on the Muehr; ſix miles S.E. of Pruck.—Alſo, a mountain of Stiria; eight miles E. of Pruck.

RETTO, Ital. in *Muſic*, ſtraight forward, direct, one of the three movements of muſical notes or ſounds in melody; which are, *moto retto*, *moto contrario*, and *moto obliquo*. *Moto retto* is, therefore, a regular aſcent of the ſcale, or a part of it: as moving from the key-note to the 5th through all the intermediate ſounds, in regular order; as c d e f g, &c. Another ſpecies of movement ſeems wanting to expreſs wide intervals, ſuch as ſkips or leaps beyond the regular progreſſion, which in Latin is expreſſed by the words *per ſaltum*, and in Italian either is, or might be, called *moto de ſalto*.

RETUERTO, in *Geography*, a town of Spain, in Old Caſtile; 18 miles S. of Burgos.

RETURN, Returna, or *Retorna*, in *Law*, hath divers acceptations. As,

Return

RETURN *of Writs* by sheriffs and bailiffs, is a certificate made to the court by the sheriff, bailiff, &c. of what is done with regard to the execution of the writ directed to them.

Whence the day, on which the defendant is ordered to appear in court, and on which the sheriff is to bring in the writ, and report how far he has obeyed it, is called the return of the writ; it being then returned by him to the king's justices at Westminster. And it is always made returnable at the distance of at least fifteen days from the date or teste, that the defendant may have time to come up to Westminster, even from the most remote parts of the kingdom; and upon some day in one of the four terms, in which the court sits for the dispatch of business. See RETURNS, infra.

Such also is the *return of a commission*, which is a certificate, or answer of what is done by the commissioners to whom such commissions, precepts, mandates, or the like, are directed,

RETURN is also used in case of a replevin. If a man distrain cattle for rent, &c. and afterwards justify or avow his act, so as it is found lawful, the cattle before delivered unto him that was distrained, upon security given to prosecute the action, shall now be returned to him that distrained them. See RETURNO *Habendo*, and REPLEVY.

RETURN *of Members of Parliament*. See PARLIAMENT.

RETURN *to a Mandamus*. See MANDAMUS.

RETURNS, *Return-days*, or *days in bank*, *dies in banco*, that is, days of appearance in the court of common pleas, usually called *bancum*, or *commune bancum*, to distinguish it from *bancum regis*, or the court of king's bench, are certain days in each term peculiarly set apart for the several kinds of proceedings in any cause to be determined. These days are generally at the distance of about a week from each other, and regulated by some festival of the church. On some one of these days in bank all original writs must be made returnable, and therefore they are commonly called the returns of that term; of which every term has more or less, said by the Mirror (cap. 5. § 108.) to have been originally fixed by king Alfred, but certainly settled as early as the statute of 51 Hen. III. stat. 2. But though many of the return-days are fixed upon Sundays, yet the court never sits to receive these returns till the Monday after; and, therefore, no proceedings can be had, or judgment can be given, or supposed to be given on a Sunday. See DAY.

Hilary term has four such returns; *viz. octabis Hilarii*, eight days after Hilary day; *quindena Hilarii*, fifteen days; *crastina Purificatione*, the day after the Purification; and *octabis Purificationis*, eight days after, inclusive.

Easter term has five returns; *viz. quindena Paschæ*, fifteen days after Easter; *tres Paschæ*, three weeks after; *mense Paschæ*, the day month after Easter; *quinque Paschæ*, the day five weeks from Easter; and *crastino Ascensionis Domini*, the day after Ascension-day.

Trinity term has four returns; *viz. crastino Trinitatis*, the day after Trinity; *octabis Trinitatis*, eight days after, inclusive; *quindena Trinitatis*, fifteen days after; and *tres Trinitatis*, three weeks after.

Michaelmas term has four returns, by stat. 24 Geo. II. cap. 48, *viz. crastino Animarum*, morrow of All-Souls; *crastino Martini*, the morrow of St. Martin; *octabis Martini*, eight days after, inclusive; and *quindena Martini*, fifteen days after.

The first return in every term is, properly speaking, the first day in that term; *e. gr.* the octave of St. Hilary, which falling on the thirteenth of January, the octave, or first day of Hilary term, is the twentieth of January; and this is called the *essoign day of term*. But by reason of the *quarto die post*, the court does not sit, at the beginning of each term, for dispatch of business, till the fourth day, as in Hilary term on the twenty-third of January; and in Trinity term, by statute 32 Hen. VIII. cap. 21. not till the sixth day; which is, therefore, usually called and set down in the almanacs as the first day of *Term;* which see.

RETURN, in the *Military Language*, denotes the list of the sick, given in once a week by the surgeon to the commanding officer of a regiment.

Commissioned officers are not put in the returns, which, on that account, are but an imperfect list of the sick.

Twelve sick, in a battalion of 780 private men, is the lowest return that can be expected, even in the most healthy season and climate, as well as best quarters. Returns are often much higher, but seldom exceed seventy in a battalion.

It is to be observed, that returns include all accidents unfitting a soldier for duty; together with a general state of the army, regiment, or company. See Pringle's Observ. on the Diseases of the Army, p. 12—36.

In section V. of the articles of war, it is expressed, that every officer who shall knowingly make a false return to the king, to the commander-in-chief of the forces, or to any his superior officer authorised to call for such returns, shall, upon being convicted thereof before a general court-martial, be cashiered.

Whoever shall be convicted of having designedly, or through neglect, omitted sending such returns, shall be punished according to the nature of the offence by the judgment of a general court-martial.

Returns are to be made in the same manner of the forces in Ireland to the chief governor or governors thereof; likewise of the forces in North Britain to the officer there commanding in chief: which returns are from time to time to be transmitted to England as it shall appear best for the service.

Exact returns from Gibraltar, &c. and regiments stationed abroad, are by their respective governor or commanders *there residing*, by all convenient opportunities to be transmitted to the secretary at war, in order that the same may be laid before the king.

The life and foot-guards do not make any returns to the commander-in-chief or secretary at war, but to the king direct through their several field officers. This privilege is attached to them upon the principle of being household troops. Upon the same principle they have always, when brigaded, a general of their own attached to each brigade; on which account likewise, no other military honours than those done to their own brigade general are to be paid by them, except to a branch of the royal family, or to a commander-in-chief.

RETURN, *To*, in a military sense, to insert the names of such officers, &c. as are present or absent on the stated periods for the identification of their being with their regiments, on detachment, or absent with or without leave.

Every officer commanding a regiment or detachment, will, on his arrival from abroad, transmit to the adjutant-general's office, and to the war-office, a disembarkation retnrn, a duplicate of which he will also deliver to the general, or other officer commanding at the port at which he disembarks.

Commanding officers of regiments in South Britain, are regularly to transmit to the adjutant-general's office the following returns.

A monthly, on the 1st of each month.

A return

A return of officers, on the 14th of each month.

A weekly ſtate, to arrive on Mondays.

To the war-office.

A monthly return, on the 1ſt of each month.

A return of abſent officers, on the 14th of each month.

Every officer commanding a regiment, or detachment, on embarking for a foreign ſtation, will tranſmit an embarkation return to the adjutant-general's office, and to the war-office, a duplicate of which he will deliver to the general or officer commanding at the port from which he embarks.

On a regiment embarking, the commanding officer is to tranſmit to the adjutant-general's office, a return of the recruiting parties he purpoſes to leave in Great Britain, or Ireland, ſpecifying their ſtrength, their ſtations, and the officers by whom they are commanded; a duplicate of this return is to be tranſmitted to the inſpector-general of the recruiting ſervice in the Iſle of Wight.

All officers belonging to regiments on foreign ſtations, not actually employed on the recruiting ſervice, are to report their arrival from abroad, and the cauſe of their abſence, at the adjutant-general's office, and are to leave their addreſſes with their reſpective agents, and in caſe of their changing their places of reſidence, are immediately to notice the ſame to their agent: any officer whoſe addreſs is not with his agent, will be conſidered as abſent without leave, and guilty of diſobedience of orders.

Officers upon half pay are, in like manner, to leave their addreſſes at the war-office; particularly ſo if they ſhould leave the united kingdoms; and officers belonging to the militia are to leave their names, &c. with the ſeveral adjutants of regiments.

Commanding officers of regiments are to tranſmit to the quarter-maſter-general an half-yearly return of quarters, on the 1ſt of December, and the 1ſt of May, agreeable to the printed form; likewiſe a report of any march performed by the corps under their orders.

All returns, reports, and papers, purely of a military and public nature, which are to be ſent to the adjutant-general, are to be addreſſed, "To the Adjutant-general of the Forces, Horſe-guards, London," without adjoining his name.

All official letters from general or other officers in command, which are deſigned to be laid before his royal highneſs the commander-in-chief, are to be ſigned by the general or commanding officers themſelves.

All official letters, intended for the deputy adjutant-general, or other officers belonging to the department, are to be tranſmitted, under covers, addreſſed as above, to the adjutant-general.

To prevent an improper expence of poſtage, all official letters and returns ſent to the quarter-maſter-general, or officers in his department, are to be ſent, under covers, addreſſed "To the right honourable the Secretary at War, London;" and on the outſide of the covers is to be written, in legible characters, "Quarter-maſter General's Department."

Return, in *Building*, denotes a ſide, or part, that falls away from the foreſide of any ſtraight work.

Returns *of a Trench*, in *Fortification*, are the turnings and windings which form the lines of a trench.

Returns *of a Mine*, in the *Military Art*, are the turnings and windings of the gallery.

RETURNED *next for Purchaſe*. When vacancies occur in regiments upon foreign or domeſtic ſtations, the names of ſuch officers as intend to purchaſe muſt be inſerted in the muſter rolls; they are then ſaid *to be returned next for purchaſe*. This ſerves as a government to the ſeveral agents, and prevents the introduction of perſons into a corps they have not done duty with, to the diſparagement of thoſe who have always followed the colours. The preſent commander-in-chief is particularly ſcrupulous on this head. Every officer that is returned next for purchaſe, muſt take care to apprize his agent that the money will be lodged for that purpoſe.

RETURNING Stroke, in *Electricity*, is an expreſſion uſed by lord Mahon, (now earl Stanhope,) to denote the effect produced by the return of the electric fire into a body from which, in certain circumſtances, it has been expelled.

In order to underſtand the meaning of theſe terms, it is neceſſary to premiſe that, according to the noble author's experiments, an inſulated ſmooth body, immerged within the electrical atmoſphere, but beyond the ſtriking diſtance, of another body charged poſitively, is at the ſame time in a ſtate of threefold electricity. The end next to the charged body acquires negative electricity; the farther end becomes poſitively electrified; while a certain part of the body, ſomewhere between its two extremities, is in a natural, unelectrified, or neutral ſtate; ſo that the two contrary electricities balance each other. Moreover, it may be added, that if the body be not inſulated, or have a communication with the earth, the whole of it will be in a negative ſtate; a certain portion of its natural quantity of electricity being driven into the common maſs, by the preſſure, repulſion, or other action of the electric matter belonging to the charged prime conductor. Let us then ſuppoſe a braſs ball, which we may call A, to be conſtantly placed at the ſtriking diſtance of a prime conductor; ſo that the conductor, the inſtant when it becomes fully charged, explodes into it. Let another large conductor, which we may call the ſecond conductor, be ſuſpended, in a perfectly inſulated ſtate, farther from the prime conductor than the ſtriking diſtance, but within its electrical atmoſphere: let a perſon ſtanding on an inſulated ſtool touch this ſecond conductor very lightly with a finger of his right hand; while, with a finger of his left hand, he communicates with the earth, by touching very lightly a ſecond braſs ball fixed at the top of a metallic ſtand, on the floor, which we may call B; while the prime conductor is receiving its electricity, ſparks paſs (at leaſt if the diſtance between the two conductors is not too great) from the ſecond conductor to the inſulated perſon's right hand; while ſimilar and ſimultaneous ſparks paſs out from the finger of his left hand into the ſecond metallic ball B, communicating with the earth. Theſe ſparks are part of the natural quantity of electric matter belonging to the ſecond conductor, and to the inſulated perſon, driven from them into the earth, through the ball B, and its ſtand, by the elaſtic preſſure or action of the atmoſphere of the prime conductor; the ſecond conductor, and the inſulated perſon, are hereby reduced to a negative ſtate. At length, however, the prime conductor having acquired its full charge, ſuddenly ſtrikes into the ball B, of the firſt metallic ſtand, placed for that purpoſe at the ſtriking diſtance. The exploſion being made, and the prime conductor ſuddenly robbed of its elaſtic atmoſphere, its preſſure or action on the ſecond conductor, and on the inſulated perſon, as ſuddenly ceaſes; and the latter inſtantly feels a ſmart returning ſtroke, though he has no direct or viſible communication (except by the floor) either with the ſtriking or ſtruck body, and is placed at the diſtance of five or ſix feet from both of them. This returning ſtroke is evidently occaſioned by the ſudden re-entrance of the electric fire naturally belonging to his body and to the ſecond conductor, which

which had before been expelled from them, by the action of the charged prime conductor upon them, and which returns to its former place in the instant when that action or elastic pressure ceases. When the second conductor and the insulated person are placed in the densest part of the electrical atmosphere of the prime conductor, or just beyond the striking distance, the effects are still more considerable; the returning stroke being extremely severe and pungent, and appearing considerably sharper than even the main stroke itself, received directly from the prime conductor. Lord Mahon, in the application of this experiment, and of the doctrine deduced from it, observes, that persons and animals may be destroyed, and particular parts of buildings may be considerably damaged, by an electrical returning stroke, occasioned even by some very distant explosion from a thunder cloud; possibly at the distance of a mile or more. It is certainly easy to conceive (says a very ingenious anonymous writer, in his reflections on this subject) that a charged extensive thunder cloud must be productive of effects similar to those produced by the prime conductor. Like the conductor, while it continues charged, it will, by the superinduced elastic electrical pressure of its atmosphere, drive into the earth a part of the electrical fluid naturally belonging to the bodies which are within the reach of its widely extended atmosphere, and which will, therefore, become negatively electrical. This portion, too, of their electric fire will, on the explosion of the cloud at a distance, and the cessation of its action upon them, suddenly return to them, so as to produce an equilibrium, and restore them to their natural state. But the effects are not so great, nor the danger so terrible, as the noble author seems to apprehend. If the quantity of electric fluid naturally contained, *e. gr.* in the body of a man, were immense or indefinite, his lordship's estimate between the effects producible by a cloud, and those caused by a prime conductor, might be admitted; but surely an electrified cloud, how great soever may be its extent and the height of its charge, when compared with the extent and charge of a prime conductor, cannot expel from a man's body (or any other body) more than the natural quantity of electricity which it contains. On the sudden removal, therefore, of the pressure by which this natural quantity had been expelled in consequence of the explosion of the cloud into the earth, no more (at the utmost) than his whole natural stock of electricity can re-enter his body, provided he be so situated, that the returning fire of other bodies must necessarily pass through his body. But we have no reason to suppose that this quantity is so great, as that its sudden re-entrance into his body should destroy or even injure him.

In the experiment above described, the insulated person receives into his body, at the instant of the returning stroke, not only all that portion of his own natural electric fire which had been expelled from it, but likewise transmits through it, at the same instant, in consequence of his peculiar situation, all the electric fire of which the largest second conductor had been robbed, and which must necessarily repass through his body, to arrive at that conductor. To render the case somewhat parallel in natural electricity, the man's body must be so peculiarly circumstanced, supposing him to be in a house, that the electric matter which has been expelled from the house into the earth, by the pressure of an extensive thunder cloud, could not return back into the building, on the explosion of the cloud at a distance, without passing through his body: a case not likely to happen, unless the house were insulated (like the second conductor in the preceding experiment), and his body became the channel through which alone the house could have its electric matter restored to it. It appears much more probable, that the electric matter returns to the house through the same channels by which it before insensibly passed out, and with equal silence, though more suddenly. In the case of a man who is abroad, and in an open field, during the time of an explosion; as he is unconnected with other masses of matter above him, no more than the precise quantity of electric fire, which had been before expelled from his body, will suddenly return into it at the instant of a distant explosion; and that this quantity is not very large, may be inferred from many considerations. Allowing, therefore, the existence of the returning stroke, as sufficiently ascertained, and well illustrated, in a variety of circumstances, by the author's experiments, the magnitude and danger of it are not so alarming as he apprehends. Lord Mahon's Principles of Electricity, &c. 4to. 1779, p. 76—113—131. Monthly Review, vol. lxii. p. 436—442.

RETURNO HABENDO, or *Returnum averiorum*, in *Law*, a writ which lies for him who has avowed a distress made of cattle, and proved his distress to be lawfully taken; for the return of the cattle distrained unto him, which before were replevied by the party distrained, upon surety given to pursue the action.

The same writ is granted when the plaint or action is removed by *recordare* or *accedas ad curiam*, into the court of common pleas; and he whose cattle were distrained makes default, and does not prosecute his action. See REPLEVY.

RETURNUM AVERIORUM, a judicial writ, the same with *retorno habendo.*

RETURNUM *Irreplegiabile*, a judicial writ, sent out of the common pleas to the sheriff, for the final restitution or return of cattle to the owner, unjustly distrained damage feasant, and so found by the jury before justices of assize in the county, or otherwise through default of prosecution.

RETUSAVI, in *Geography*, a name formerly given to a small island of Russia, in the gulf of Finland, on which the town of Cronstadt stands, and now called the isle of Cronstadt; 20 miles W. of Petersburg. This is only remarkable for an excellent haven, strongly fortified, the chief station of the Russian fleet.

RETUSUM FOLIUM, in *Botany*, a retuse, or abrupt, leaf, terminates bluntly, with a broad shallow notch, as in *Rumex digynus*, or Mountain Sorrel. See LEAF.

RETWEYER, in *Geography*, a lake of Bavaria, in the bishopric of Bamberg; 6 miles N.E. of Vilseek.

RETZ, JOHN-FRANCIS-PAUL DE GONDI, *Cardinal de*, in *Biography*, a celebrated political character, was born at Montmirel in 1614. His father, who was general of the gallies, obliged him, against his inclination, to embrace the ecclesiastical profession. He passed through his course of study with distinction, and was made a doctor of the Sorbonne in 1643, in which year he was nominated coadjutor to the archbishop of Paris. In his conduct and character he set at defiance public opinion, and engaged in almost every species of debauchery: he fought several duels, and delighted in political intrigue. According to Voltaire, he was, at the age of twenty-three, eager in carrying on a conspiracy against the life of cardinal Richelieu. The ministry of Mazarin, however, was the period in which he most engaged as a partisan, and he engaged deeply in all the cabals which produced the petty civil war of the Fronde. He imposed upon the people by a feigned devotional seriousness in performing his prelatical functions, and affected the greatest zeal for the privileges of the clergy and the good of the public. He was among the most violent opposers of the court, and once took his seat in the parliament with a poniard in his pocket, the handle of which being seen, it was neatly observed

observed, "there is our archbishop's breviary." He boasted that he had a principal share in urging the Parisians to take up arms on the day of *barricades*. At length, however, he found that the interests of his ambition would be better served by making a secret accommodation with the court, and he was brought over by a cardinalate, to which he was nominated by the king in 1651. Like other deserters, he lost his popularity, and was able only to act a secondary part on the political stage. Continuing his cabals, Mazarin, who hated and dreaded him, procured his arrest at the Louvre, and caused him to be thrown into prison. From the dungeon he escaped, and went to Rome, where he was received with distinction as the enemy of Mazarin. He was present at the election of Alexander VII., but finding that pontiff cool to his interests, he left Italy, and passed some years in wandering through Holland, Flanders, and England. Wearied with a life of exile, he returned to France in 1661, after Mazarin's death, and made peace with his court by the renunciation of his archbishopric, to which he had succeeded at the death of his uncle, obtaining the abbacy of St. Denis by way of recompence. He had hitherto lived in great style, and had plunged himself deeply in debt, but he now resolved to live on a very limited income, till he had satisfied his creditors. This he completely effected, and lived to be in circumstances that allowed him the gratification of being liberal to his necessitous friends. In 1675 he sent back his cardinal's hat, intending to quit the world, but the pope refused to accept his resignation. His conduct in the latter part of his life obtained for him the esteem of men of worth: he died at Paris in 1679, at the age of 66. The character of cardinal de Retz has been drawn by almost all the French historians who have written since his time. By one he is described "as a person who, with the habit of a priest, displayed a disposition better suited to camps or courts; and licentious in manners and profligate in his morals, he acquired an ascendancy over the minds of the people, without condescending to throw a veil over his vices, or employing the popular pretext of religion." Another writer says, he was "daring, turbulent, false, intriguing, with designs rather romantic than great, and conducted rather with dexterity than ability: he seems to have been exactly fitted for the part which he sustained, of a political meteor in troublesome times, among a frivolous and licentious people." Voltaire, speaking of the memoirs of the cardinal, drawn up by himself, says, "they are written with an air of greatness, an impetuosity of genius, and an inequality, which are the image of his conduct. He composed them in his retreat, with the impartiality of a philosopher, but of one who had not always been a philosopher. He neither spares himself nor others." Other writings of cardinal de Retz have been published relative to the times and party.

Retz, in *Geography*, a town of Bavaria; 26 miles N.N.E. of Ratisbon.

RETZBACH, a town of the duchy of Wurzburg; 4 miles S.S.E. of Carlstadt.

RETZIA, in *Botany*, an elegant Cape shrub, so named by professor Thunberg, in the Transactions of the Academy of Lund, in honour of his friend Andrew John Retzius, member of the Stockholm Academy, and of various other learned societies, Professor of Natural History at Lund. This distinguished botanist and worthy man is best known, out of his own country, by his folio volume of *Observationes Botanicæ*; and his *Floræ Scandinaviæ Prodromus*, a systematic octavo work, in the Linnæan manner. He has, besides, published many essays and dissertations, relating to various branches of natural knowledge, both in Latin and Swedish, and is still living.—Thunb. Act. Lund. v. 1. 55. Nov. Gen. 4. Linn. Suppl. 18. Schreb. 115. Willd. Sp. Pl. v. 1. 843. Mart. Mill. Dict. v. 4. Juss. 133. Lamarck Illustr. t. 103.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Convolvuli*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, in five rather deep, lanceolate, acute, unequal segments. *Cor.* of one petal, tubular, cylindrical, villous both within and without, terminating in five ovate, obtuse, concave, erect segments, very hairy at the summit. *Stam.* Filaments five, awl-shaped, inserted into the corolla, shorter than its limb; anthers arrow-shaped, compressed. *Pist.* Germen superior, oblong; style thread-shaped, longer than the corolla; stigma in two small, linear, obtuse segments. *Peric.* Capsule oblong, acute, with two lateral furrows, two cells and two valves. *Seeds* several, minute.

Ess. Ch. Corolla of one petal, cylindrical, externally hairy. Stigma cloven. Capsule of two cells, with many small seeds.

1. R. *spicata*. "Thunb. Act. Lund. v. 1. 55. t. 1. f. 2." Linn. Suppl. 138. Willd. n. 1. (R. capensis; Thunb. Nov. Gen. 5.)—Native of high, dry, hilly situations, at the Cape of Good Hope. Gathered by Mr. Niven in Hottentot's Holland. The *stem* is shrubby, erect, from four to seven feet high, with round, knotty, hairy, leafy *branches*. *Leaves* densely imbricated, somewhat whorled, sessile, linear-lanceolate, rigid, acute, thick-edged, entire, two inches or more in length; hairy about the lower part. *Flowers* axillary, sessile, solitary, plentiful towards the ends of the branches, about as long as the leaves; villous and hoary externally; dark purple within.

The remark of Linnæus the younger, in the Supplement, respecting this genus, is very extraordinary. He says "it is no natural genus, but agrees so much with *Convolvulus*, in habit and character, as to differ in nothing except the tubular corolla, which is externally very hairy." Now in fact, its rigid shrubby habit is altogether that of a *Protea*, nor can any thing be less like a *Convolvulus*, even of the shrubby kind. The character of the *corolla* is also most distinct, being cylindrical, and wanting the five plaits, so essential to *Convolvulus*. It is true that the *Retzia* requires to be observed by some botanist conversant with natural orders, that we might have clearer ideas of its characters and affinities. The plant is a stranger in our gardens.—We have not had an opportunity of consulting the Lund Transactions, to determine whether the specific name is there *capensis* as Thunberg, or *spicata* as Linnæus, cites it. Both are highly exceptionable.

RETZSTADT, in *Geography*, a town of the duchy of Wurzburg; 5 miles S.S.E. of Carlstadt.

RETZTAT, Ober, or *Upper*, a river of Franconia, which rises near Weissemburg, passes by Oettingen, and joins the Unter Retztat, to form the Rednitz.

Retztat, *Unter*, a river of Franconia, which rises near Burg Bernheim, in the principality of Culmbach, and joins the Upper Retztat, three miles N.E. of Spalt, to form the Rednitz.

REVA, a town of Asiatic Turkey, in Natolia; 10 miles E. of Constantinople.

REUCHLIN, John, in *Biography*, a celebrated German philosopher, and assiduous contributor to the revival of learning in the 15th and 16th centuries, descended from a respectable family in Swabia, was born in the year 1454. He made a most rapid progress in school-learning, and when that was completed, he went to Paris with the young marquis of Baden, who had been his class-fellow at school. Here he pursued his studies under the most celebrated masters in Europe, and soon became well skilled in the Aristotelian philosophy. In this city, and in the diligent pursuit of learning, he remained till he was twenty years of age, when he went to Basil, where he was admitted a master in philosophy, and taught the Greek language to numerous pupils, with great reputation. Here he also prosecuted his study of the Hebrew, the elements of which he learnt while very young. At the same time, judging that the best manner of learning is by teaching, he drew up and published a grammar, a lexicon, and vocabulary, which at that period were highly esteemed, and thought to be of great use in instructing young people. Having spent four years at Basil, he went to Orleans for the purpose of studying jurisprudence, and he also taught the Greek language in that city. From this place he removed to Poictiers, where he was admitted to the degree of doctor. He next accompanied the count of Wittemberg in a tour through Italy, and was introduced at the court of Lorenzo de Medici, at Florence, and contracted an intimacy with Ficinus, Politian, Picus, and other illustrious Platonic philosophers, and was induced to embrace their opinions. In these opinions he was confirmed at Rome by the learned Hermolaus Barbarus, who, disliking the harshness of the German name Reuchlin, prevailed upon him to change it for one more musical, namely, CAPNIO, signifying, like *Reuchlin*, *smoke*, and by this he was afterwards known among foreigners. He conducted himself with so much ability and address in his tour, that he was, after his return to Germany, deputed as ambassador from the count of Wittemberg, to the emperor Frederic III. at Vienna. During his residence at this court, he made further progress in the Hebrew language, under the instructions of one of the emperor's physicians, who was a Jew; and it was contrived by the Jew, that among the presents which, according to custom, he was to receive as ambassador, should be included a beautiful and ancient manuscript Hebrew bible, as a special compliment paid to him by the emperor, on account of his eminent literary attainments. Frederic dying in 1493, Reuchlin returned to the court of Wirtemberg, and was appointed to be the count's deputy to the diet of Worms, in which his prince was elevated to the ducal dignity. Scarcely had he enjoyed that honour three months, when he died, leaving his dominions to his nephew Ulric. The power of this prince was contested by another nephew, who assumed the title of Eberhard II., and who carried the point. One of the first acts of this prince was to banish Reuchlin for his attachment to the interests of prince Ulric. He now retired to Worms, and wrote "An Epitome of the History of the four Empires," for the use of the prince Palatine. He also wrote at this time two Latin comedies, abounding with wit and satire, which were afterwards published. In 1498, the elector Palatine, having been involved in a dispute with pope Alexander VI., fixed upon Reuchlin as the person best qualified to defend his cause, and sent him for that purpose to Rome in the capacity of his ambassador. On this occasion he pronounced an able and eloquent oration before the pope and cardinals, concerning the rights of princes, and the privileges of the churches in Germany, which was printed by Aldus. Before he returned to Germany, a revolution had taken place at Wirtemberg, the usurper having been expelled, and Ulric reinstated in his rights. Upon this change, Reuchlin was recalled to the ducal court by the guardians whom the emperor had appointed for Ulric, and very soon after he was nominated to the dignity of one of the triumvirs of the league of Swabia for the emperor and the electors. He was next sent ambassador to the emperor Maximilian; and upon his return, finding the plague raging in Swabia, he retired to Stutgard, where he was hospitably received into a monastery of the Dominicans, and at their request, he drew up a work on the art of preaching. Towards the close of his life he encountered much trouble and danger from the resentment of the monks and other bigots of Cologne, occasioned by his opposition to their enthusiastic rage for the destruction of all Jewish books excepting the bible. It is not necessary to enter at large into the nature of this controversy, it will be sufficient to observe, that Reuchlin found himself compelled to carry his cause to Rome, for the definitive sentence of the papal see. Here he had many friends, and his agent carried with him strong recommendations from princes, prelates, and men of the greatest eminence in the learned world. These recommendations had great weight in the court of Leo X., and Reuchlin was honourably acquitted of the heresy with which he was charged, to the great mortification of his bigotted and malignant enemies. Amidst the troubles which he met with he prosecuted his studies with unabated ardour, and published some very learned and profound works. Although, as we have seen, he triumphed over his enemies at the court of Rome, they did not cease to trouble him, by the invention of groundless calumnies, and the most bitter invectives; so that, notwithstanding his great talents, he was scarcely able, by teaching the Greek and Hebrew languages, to keep himself from want. He died in the year 1521, at the age of sixty-eight. His principal works, independently of those already noticed, are, "The Life of Constantine the Great," written by Eusebius: a treatise "De Verbo Mirifico," in the form of a dialogue between a philosopher, a Jew, and a Christian; and another treatise "De Arte Cabbalistica." For his great and successful attempts towards the revival of learning, his name is deserving of being remembered with gratitude by posterity. His collection of "Letters from illustrious Men," of which an edition was published at Zurich in 1558, is said to be full of valuable information concerning the literary history of his time. Dupin speaks of him as one of the most learned men of that age; and he adds, that notwithstanding his attachment to his peculiar studies, he had a wonderful genius for the belles lettres; was intimately conversant with the Grecian philosophers and orators; was a perfect master of the Greek language, and spoke Latin with an inimitable purity and elegance; and that he was the only person of whom Germany at that time could boast, who deserved to be regarded as a competitor for fame with all the learned men in Italy, who was their equal in the delicacy of his style, while he greatly excelled them in erudition. Moreri. Dupin. Enfield's Hist. Phil. vol. ii.

REUDEN, in *Geography*, a town of Saxony; 5 miles N.W. of Bitterfeld.

REUDZEL, a river of European Turkey, which runs into the Reut, 18 miles W. of Florefzti, in Moldavia.

REVE, or GREVE, in *Ancient Customs*, the bailiff of a franchise, or manor, thus called; especially in the western parts.

Hence, shire-reve, sheriff, port-greve, church-reve, &c. See SHERIFF, PORT-GREVE, &c.

REVE, *Reva*, is also used for a duty or imposition on merchandizes imported.

M. Du-Cange derives the word from the Latin *roga*, of *rogare, to ask*; the word formerly signifying a tribute anciently granted princes at their request, as a free gift.

REVEALED RELIGION. See RELIGION and REVELATION.

REVEALED *Theology*. See THEOLOGY.

REVEILLE, formed of the verb *reveiller*, *to awake*, a beat of drum in the morning, intended to give notice that it is is day-break; and that the soldiers are to arise, and the sentinels forbear challenging.

REVEL, in *Geography*, a town of France, and principal place of a district, in the department of the Upper Garonne; 21 miles N.W. of Carcassone. N. lat. 43° 28'. E. long. 2° 5'.—Also, a town of France, in the department of the Isere; 15 miles S.E. of Vienne.—Also, a sea-port town of Russia, on the Baltic, and capital of a province; the see of a Lutheran bishop, suffragan to the archbishop of Riga. Although this place be not large, it is opulent and well fortified; and has considerable trade. The town and castle were founded, in 1218, by Waldemar II., king of Denmark, on the scite of the convent of St. Michael, founded by his ancestors, and in 1320 included within its walls. Revel, and also the whole duchy of Esthonia, received most of its privileges from the Danish kings; and the arms of Denmark, with inscriptions in the Danish language, are still seen in the churches and other public offices. The houses are generally built of brick, and the streets are somewhat regular. The only congregations here, besides those of the Russian church, are Lutheran. The tolls, belonging partly to the magistracy, and partly to the crown, are considerable. This town has its own arsenal, and maintains a number of matrosses, and a company of soldiers. Revel formerly held a distinguished rank among the Hanse towns, and it is still a staple-town, with a flourishing trade. Its harbour is spacious and convenient, and usually accommodates a part of the Russian fleet. It is surrounded with high walls, strengthened with bastions, and a deep ditch; and it is also fortified with a castle, seated on a rock, and ornamented with several towers. Without the walls the citizens have pleasant gardens. This city was erected into a bishopric by Waldemar II. It was totally destroyed by fire in 1433. In 1710 it was surrendered to Peter the Great, who confirmed its ancient privileges, and restored others of which it had been deprived by the crown of Sweden; 144 miles N. of Riga. N. lat. 59° 20'. E. long. 24° 34'.

Revel's *Island*, a small island near the coast of Virginia. N. lat. 37° 35'. E. long. 75° 43'.

REVE-LAND, the land which in Domesday is said to have been *thane-land*, and afterwards converted into *reve-land*, seems to be such land as, being reverted to the king after the death of the thane, who had it for life, was not since granted out to any by the king, but rested in charge upon the account of the *reve*, or bailiff of the manor. Spelm. Feuds, cap. 24.

REVELATION, Revelatio, formed from *revelo*, of *re*, and *velum*, *q. d. to unveil*, the act of revealing, or making a thing public, which before was a secret, or unknown.

The revelation of a confession, made by the confessor, is adjudged, in the Romish church, to deserve the most exemplary punishment.

Revelation is used, by way of eminence, for the discoveries made by God to his prophets, &c. and by them to the world.

Revelation is more particularly used for the discovery which God has made to the world, by the mouths of his prophets, of certain points of faith and duty, which they could not learn from natural reason.

Religion is divided into natural religion and revelation, or revealed religion. See Religion.

By revealed religion, as distinguished from that which is usually called natural, we are to understand that knowledge of religion which was originally communicated in an extraordinary and supernatural way. A revelation of this kind must either be by an immediate infallible inspiration, or illumination of every particular person, for informing and directing him with regard to the knowledge and practice of religion; or by God's making an extraordinary discovery of himself and of his will to some person or persons, who should be commissioned to communicate it to others in his name. In the former case it could not be properly called extraordinary revelation; for if it were an universal infallible light, imparted to every single person in every nation and every age, from the beginning of the world, it would be as common and familiar to every one as the common light of reason, and by being universal would cease to be extraordinary. Whereas, if there be such a thing as revealed religion, or if it hath pleased God to make discoveries of his will to mankind with respect to religious truth and duty, in a way of extraordinary revelation, the most natural mode of doing it, and that which is best accommodated to the present state of mankind, seems to be, that the revelation should be communicated to some person or persons, to be by them communicated to others in his name; at the same time furnishing them with sufficient proofs and credentials, to shew that they were indeed sent and inspired by him, and that the doctrines and laws which are the matter of such revelation, and which they are authorised to publish to the world in his name, were really and originally communicated by revelation from him. This method admits of sufficient proof being given to satisfy well-disposed minds, and of provision being made for instructing men, unless it be their own fault, in the knowledge of religion, and engaging them to the practice of the duties which it requires; and, at the same time, there is room for the exercise of reason in examining the nature of the evidence, and the trial of men's sincerity and diligence, of their impartial love of truth, and their openness to receive it.

Several questions present themselves to our consideration, with regard to that kind of revelation that has been now stated. The *first* relates to the possibility of it; the *second*, to its usefulness and expediency, and even the necessity of it in the present state of mankind; the *third* relates to the proofs and evidences, by which it may be shewn, that such a revelation hath been actually given.

As to the *first* question, the affirmative cannot reasonably be doubted by any one, much less denied, who believes a God and a Providence. Can it be supposed, that the Author of our being, and of our faculties, hath it not in his power to communicate ideas to our minds, for instructing and informing us in what it nearly concerns us to know?

It is acknowledged, even by lord Bolingbroke, a writer of distinguished rank among the opposers of revelation (Works, vol. ii. p. 468, ed. 4to.), "that an extraordinary action of God upon the human mind, which the word 'inspiration' is now used to denote, is not more inconceivable than the ordinary action of mind upon body, or body on mind;" and "that it is impertinent to deny the existence of any phenomenon, merely because we cannot account for it." Moreover, as God can, if he thinks proper, communicate his will to mankind, he can also do it in such a manner, as to give to those to whom it is originally and immediately made, a full and certain assurance of its being a true divine revelation. Besides, God can commission those to whom he has made an extraordinary revelation of his will, to communicate to others what they have received from him; and can furnish them with such credentials of their divine mission as are sufficient to prove that he sent them, and that the doctrines and laws which they deliver in his name were indeed received from God. The omnipotent Author of nature, and Lord of the universe, can undoubtedly, if he thinks fit, enable such persons to perform the most wonderful works in his name, as a proof that he fent them; works of fuch a nature, and fo circumftanced, as manifeftly to tranfcend all human power, and bear the evident marks of a divine interpofition. (See MIRACLE.) He can alfo endue them with fupernatural gifts, and enable them to deliver exprefs predictions of future contingent events, which no human fagacity could forefee, and which yet fhall be accomplifhed in the proper feafon. (See PROPHECY.) It fhould alfo be further obferved upon this fubject, that not only they who live in the age when the revelation was firft publifhed to the world may have fuch proofs of it as may be fufficient to convince them of its divine authority and original, but that it may be tranfmitted with fuch evidence to thofe who live in fucceeding ages, as may lay them under an obligation to receive and fubmit to it as a revelation from God. Although oral tradition is not a very fure conveyance, yet it is undeniable, that writings may be tranfmitted with fuch a degree of evidence as to leave no room for reafonable doubt. This is the moft fimple and natural way of propagating the knowledge of revelation to fucceeding ages. Such is the fact with regard to the revelation contained in the holy fcriptures: nor is it difficult to prove, that we have greater evidence of the fafe tranfmiffion of thefe facred writings, without any general and material corruption and alteration, than we have concerning other books, the genuinenefs of which is univerfally acknowledged. To this kind of argument it can only be objected, that moral evidence is uncertain, and hiftorical human teftimony fallible; but to the objection the reply is obvious, that this kind of evidence may be, and frequently is, fo circumftanced, that the man would fcarcely be thought in his fenfes who fhould ferioufly deny or doubt of it. It is by moral evidence, and the teftimony of fallible men, capable of deceiving and of being deceived, that a man who has never been at Paris or Rome knows that there are fuch cities, and yet he can no more reafonably doubt of it, than if he had feen them with his own eyes. It is by moral evidence, that we have all our laws and records, and the affurance of any paft facts. And yet is there any man of fenfe, who does not as certainly believe many facts which were done in former ages, as he believes any event that has happened of late years, and within his own memory? It is by this kind of evidence of teftimony that we are neceffarily guided and determined in many cafes of great importance: and why fhould it be thought abfurd to fuppofe, that it fhould be fo ordered by the Author of our frame and the great Ruler of the world, that our knowledge of fome important matters relating to religion fhould be obtained by this mode of conveyance? He that receives divine revelation upon this kind of evidence acts a wife and good part, becoming a reafonable being and a moral agent.

Having fhewn that a revelation from God is poffible, the *fecond* fubject of confideration is the great ufefulnefs and advantage of divine revelation, and the neceffity of it in the prefent ftate of mankind, for fupporting and promoting the interefts of religion and virtue in the world. Such a revelation may be of great ufe even with regard to thofe truths and principles which lie at the foundation of all religion; fuch are the truths which relate to the excellent and unparallelled nature, the perfections and attributes of the one fupreme God. (See GOD.) A divine revelation may alfo be very ufeful in eftablifhing the belief of the providence of God; and further, in communicating inftruction even to thofe, who allow that fome kind of religious worfhip and homage fhould be rendered to God by his reafonable creatures. What kind of worfhip will be moft acceptable to the Supreme Being, and what rites are moft proper to be ufed in his fervice, are queftions which unaffifted reafon cannot pofitively and with certainty determine. The doctrine of the immortality of the foul, and of a future ftate of retribution, is unqueftionably of very great importance to mankind; and the natural and moral arguments to prove it have certainly great weight; but they are affailed by difficulties and objections which weaken the evidence, and may occafion fufpicion and doubt, if natural reafon be our only guide and umpire. Accordingly fome of the moft eminent ancient philofophers either denied this doctrine, or expreffed themfelves doubtfully and waveringly concerning it. If then God himfelf fhould, by a well-attefted revelation, affure us, that death fhall not put an utter end to our being; that the prefent life is only the firft ftage of our exiftence; that we fhall be raifed again from the dead; and that God will call all men to an account, and reward or punifh them in a future ftate according to their behaviour in this; and fhould alfo fignify to us the nature of thofe rewards and punifhments, and the qualifications of the perfons on whom they fhall be conferred or inflicted: this muft needs be of high advantage, and tend to give us fatisfaction in a point of confiderable importance, for encouraging men in the practice of virtue, and delivering them from vice and wickednefs. Moreover, we are led by the light of nature and reafon to entertain fome hope, that God will fhew mercy to finners upon their repentance and amendment; but how far this mercy fhall extend, whether he will pardon fins of every kind, even the moft heinous, frequently repeated, and long perfifted in, merely upon repentance and amendment; and whether his pardon in this cafe will be only a mitigation or remiffion of the threatened penalty, without a full reftitution to grace and favour, and how far he will reward an obedience attended with failures and defects:—thefe things might create anxious doubts and perplexities to ferious and thoughtful minds. Efpecially when it is further confidered, that reafon leads us to regard God as juft as well as merciful, a wife and righteous governor, who will therefore exercife his pardoning mercy in fuch a way as feemeth moft fit to his rectoral wifdom, and will beft anfwer the ends of moral government; and of this fuch fhort-fighted creatures as we are cannot pretend to be competent judges. A revelation from God fatisfying mankind, and efpecially anxious penitents, with regard to thefe interefting queftions, and affuring them by exprefs promife, as well as by its reprefentations of the placability of God, and of the provifion which he has made for the pardon of repenting tranfgreffors in perfect confiftence with all the attributes of his nature and laws of his government, muft be a very great benefit to the world. The affiftance promifed and certified by revelation, to thofe who ufe their own earneft endeavours in the performance of their duty, muft further evince its importance and utility. Befides, the benefits of a divine revelation further extend to thofe laws and duties which we owe to God, our neighbours, and ourfelves, and which are comprehended under the clafs of moral obligations. But though revelation is thus eminently ufeful, and even neceffary, it is not defigned to fuperfede the ufe of our own reafon, or to render the exercife of it needlefs, but to guide, improve, and perfect it. Revelation, fo far from difcarding or weakening any argument that can be juftly brought from reafon, in proof of any truths relating to religion or morality, adds to them the atteftation of a divine authority or teftimony, which is of great weight. This both gives us a farther degree of certainty with regard to thofe things which are in fome degree difcoverable by the light of reafon, and alfo furnifhes us with a fufficient ground of affent, with refpect to thofe things which mere unaffifted reafon, if left to itfelf, would not have difcovered, and which yet it may be of ufe for us to know.

By the common consent of mankind, a competent authority is, in many cases, a good and proper medium to assure us of the truth of things; and to believe upon the credit of such an authority and testimony, is so far from being a renunciation of our reason, as some have pretended, that, on the contrary, it is what reason and good sense require; and to decline it would be to act an absurd and unreasonable part. Admitting that a supposed revelation from God is established upon sufficient evidence, we are bound to receive what is revealed upon the authority of the revealer; insomuch that it would be a contradiction to believe it to be a revelation from God, and yet refuse our assent to it: since it is a most unquestionable principle, that, as God is incapable of deceiving or of being deceived, whatsoever he hath revealed must be true.

This leads us to the *third* subject of inquiry proposed in reference to divine revelation, *viz.* what are the proofs and evidences by which it may be known that such a revelation has been actually communicated to mankind, and that the revelation which we have in our possession is entitled to this character. We may observe in general, that it has been the sense of mankind in all ages and nations, that God hath made a revelation of his will to man; and this prevalent opinion has been probably derived from a tradition of some extraordinary revelation, or revelations, communicated in the earliest times to the first ancestors of the human race, from whom it has been transmitted to their descendants; though, in process of time, it has been in a great measure corrupted and lost. Or at least we may hence conclude, that men have generally thought that a revelation from God to man was both possible and probable; and that this was agreeable to the ideas they had formed of the wisdom and goodness of God, and of his concern for mankind. It would lead us far beyond the limits of this article, particularly to state the proofs that have been alleged for the divine authority of the Jewish and Christian revelation; both of which refer to and confirm the original revelation made to mankind from the beginning. But this is the less necessary, as the subject is discussed in various parts of the Cyclopædia. See BIBLE, CANON, CHRISTIAN *Religion*, RELIGION, RESURRECTION *of Christ*, SCRIPTURE, TESTAMENT, &c.

The Christian revelation is that made by Christ, and his apostles, in the New Testament. The Jewish revelation is that made by Moses and the prophets, in the Old Testament. See CHRISTIAN *Religion*, and JUDAISM.

A late author observes, somewhat invidiously, that it is the common method of all new revelations, to be built on precedent ones. Thus, the mission of Moses to the Israelites supposes a former revelation to Abraham, &c. The mission of Christ supposes that of Moses; and the pretended mission of Mahomet supposes the mission of Christ. The mission of Zoroaster to the Persians supposes the religion of the Magi, &c.

The general foundation of all revelation is this, that God is pleased man should know something relating to himself, his own nature, dispensation, &c. which the natural faculties with which he was pleased to create him could not attain to; and that he requires some duty or service at our hands, more than what necessarily follows from the relation we are under to him as our creator, preserver, &c.

This is also urged by deists, to the discredit of all particular revelations, as derogating from the perfections of God; such supplementary informations and instructions arguing, according to them, a prior deficiency in the established economy of nature, of which he is the author. But many able answers have been given to such cavils.

Particular or occasional revelations have their particular geniuses, characteristics, and designs. That made by Moses and the prophets chiefly related to the nation of the Jews, considered as the descendants of Abraham: its design seems to have been to rescue that people from their slavery; to settle them in a new plantation; to give them a set of laws; to new-form their manners; to support them under difficulties and dangers of their enemies, from an opinion of their being under the immediate direction and appointment of God; to keep them from intermixing again with their neighbours, from an opinion of their being a chosen people, and of a Messiah to be born among them; and thus to preserve and transmit the knowledge of the unity of God, in opposition to idolatry and polytheism, and the hope of the Messiah, till the period of his appearance arrived. To some or other of these ends do all the Old Testament prophecies seem to tend.

The Christian revelation is founded on a part of the Jewish. The Messiah promised in the one is revealed in the other.

All the rest of the Jewish revelation, which related peculiarly to the Jewish people, is here set aside; and only that part of it in which the world in general was interested, and that relating to the advent, offices, and character of the Messiah, are retained.

Indeed, it must be owned, the Jews ever looked on this to be as peculiar to themselves as any of the rest; the Messiah was promised to them; he was to be their deliverer, their restorer, &c. and under this character he actually appeared. But, upon taking place of this new revelation, a new scene was opened, different from what many of them apprehended, because they misinterpreted the prophecies relating to the Messiah. The ceremonial part of their institution, local and temporary in its establishment and use, was abolished; and the Messiah appeared, not, as they erroneously imagined, to be the restorer of their civil sovereignty and liberties, which were now fallen into the hands of the Romans; but to restore and re-establish mankind in general, who had lost their original righteousness, and were become slaves of sin; to preach repentance and remission; and at last to suffer death, that all who believed in him might not die, but have everlasting life.

Such are the tenor and design of the Christian revelation, which, in the event, was so far from being what it had been apprehended to be by the people to whom it was first promised, that it proved the very reverse; and, instead of re-establishing and confirming the other branches of their revelation, it superseded, and set them all aside. The pale was now broken down, and the being of the seed of Abraham ceased to be a privilege, all the world being invited on the same terms with the Jews.

The consequence was, that the Jews, denying this to be the Messiah that had been promised to them, because their pride and prejudice prevented their discerning the accomplishment of their ancient prophecies in him, were generally excluded from the privileges of that mission, which they had vainly supposed to be not only primarily but wholly intended for themselves; and had their ruin completed from the very means whence they expected their redemption: because they expected a redemption, different in its nature from that which their own prophecies, fairly interpreted, proposed.

REVELLO, in *Geography*, a town of France, in the department of the Stura, near the Po, seated on the summit of a very high mountain, fortified both by nature and art. Having formerly served as a place of refuge for the marquises of Saluzzo, and withstood many attacks from their enemies, it was taken by the French; and in 1588 it surrendered to Charles Emanuel I., duke of Savoy. It contains one parochial church, and three other churches, a castle,

castle, a palace, and a convent of Dominicans; 3 miles N.W. of Saluzzo.

REVELS, formed from the French *reveiller, to awake*, as alluding to the night season, when they were chiefly held; entertainments of dancing, masking, gaming, acting comedies, farces, &c. anciently very frequent in inns of courts, at certain seasons, and in noblemen's houses, &c. but now much disused.

The officer who has the direction or ordering of the revels at court, is called the *master of the revels*.

REVELSKOI, in *Geography*, a province of Russia, so called from *Revel* the capital, bounded on the N. and W. by the Baltic, on the E. by the government of Petersburg, and on the S. by the government of Riga; about 144 miles in length, and from 16 to 60 in breadth; formerly the duchy of Esthonia. N. lat. 58° 20′ to 59° 30′. E. long. 23° to 28′. See ESTHONIA and REVEL.

REVENGE, in *Ethics*, is an insatiable desire to sacrifice every consideration of pity and humanity to the principle of vindictive justice. It renders the demands of that terrific giant paramount to every other claim. It is a propensity to retaliate evil, too fervent to be cooled by time, too deep and inveterate to be obliterated by concessions and intreaties. It anticipates joy in the contemplation of sighs and groans, and the only moment of transport is the instant of inflicting misery. This disposition approaches very near to permanent malevolence of the most despicable character. The abstract idea of justice, however, forms a partition between them; for to this, malevolence has no rightful claim. But its more honourable distinction consists in that repentance, which humanity excites in the mind that is not totally obdurate, after the gratification of this dreadful passion.

Anger long indulged to excess is apt to produce revenge. See ANGER.

REVENUE, the yearly rent or profits arising to a man from his lands, possessions, &c.

The word is French, formed from *revenir, to return*. Whence revenue is sometimes also used in ancient authors for a return; as the revenue of Easter.

The revenues of the English clergy were first fixed by king Ethelwulph, anno 853, who granted them for ever the tithe of all goods, and the tenth part of all the lands of England, free from all secular service, taxes, impositions, &c. Though Rapin observes, that tithes were settled on the clergy by the laws of Ina and Offa. But these laws were probably not observed, or perhaps Ethelwulph extended the law of tithes all over England. See TITHE.

The certain revenues of the king of England were anciently greater than those of any king in Europe; and till the time of the civil wars they enjoyed, in domains and fee-farm rents, almost enough to discharge all the ordinary expences of the crown, without any tax or imposition on the subject.

The revenue which the British constitution hath vested in the royal person, in order to support his dignity, and maintain his power, is either *ordinary* or *extraordinary*.

The king's *ordinary* revenue is such as hath either subsisted time out of mind in the crown, though, by reason of royal grants, the king be not at present in the actual possession of the whole of it; or else has been granted by parliament, by way of purchase or exchange for such of the king's inherent hereditary revenues, as were found inconvenient to the subject. Of the king's ordinary revenues there are four, which are of an ecclesiastical kind. Such are, 1. The custody of the temporalities of bishops, or all the lay revenues, lands, and tenements, (in which is included his barony,) which belong to an archbishop's or bishop's see, and which, upon the vacancy of the bishopric, revert immediately to the king, as his right, during the vacancy. This branch of the royal revenue was formerly very considerable, but is now, by customary indulgence, reduced almost to nothing; for, at present, as soon as the new bishop is consecrated and confirmed, he usually receives the restitution of his temporalities, entire and untouched, from the king; and then, but not sooner, he has a fee-simple in his bishopric, and may maintain an action for the profits. (Co. Litt. 67. 341.) 2. A corody out of every bishopric, or a right of sending one of his chaplains to be maintained by the bishop, or to have a pension allowed him till the bishop promotes him to a benefice (F. N. B. 230.); which is now fallen into total disuse; though sir Matthew Hale says, that it is due of common right, and that no prescription will discharge it. 3. The tithes arising in extra-parochial places, which are held, indeed, under an implied trust, that the king will distribute them for the good of the clergy in general. (2 Inst. 647.) 4. The first-fruits and tenths of all spiritual preferments in the kingdom. See FIRST-*Fruits* and TENTHS.

The following branches of the king's ordinary revenue are of a lay or temporal nature. 5. The first of these consists in the rents and profits of the demesne lands of the crown, which are either the share reserved to the crown at the original distribution of landed property, or such as came to it afterwards by forfeitures or other means, and were formerly very extensive, but are now contracted within a very narrow compass, having been almost entirely granted away to private subjects. 6. The advantages which used to arise to the king from the profits of his military tenures, to which most lands in the kingdom were subject, till they were in a great measure abolished by the statute 12 Car. II. cap. 24. to which may be also referred the profitable prerogative of purveyance and pre-emption; which branches of the royal revenue and power were resigned entirely by king Charles at his Restoration; in recompence for which, the parliament settled on him, his heirs and successors for ever, the hereditary excise of fifteen pence *per* barrel on all beer and ale sold in the kingdom, and a proportionable sum for certain other liquors; so that this hereditary excise forms the sixth branch of his majesty's ordinary revenue. 7. The rents payable to the crown by such persons as are licensed to sell wine by retail throughout England, except in a few privileged places, first settled on the crown by the statute 12 Car. II. cap. 25. but abolished by the statute 30 Geo. II. cap. 19. when an annual sum of upwards of 7000*l. per annum*, issuing out of the new stamp duties imposed on wine licences, was settled on the crown in its stead. 8. The profits arising from the king's forests, consisting principally in amercements or fines levied for offences against the forest-laws, for levying which, few, if any, courts have been held since 1632, 8 Car. I. 9. The profits arising from the king's ordinary courts of justice; consisting not only in fines imposed upon offenders, forfeitures of recognizances, and amercements levied upon defaulters, but also in certain fees due to the crown in a variety of legal matters; as for setting the great seal to charters, original writs, and other forensic proceedings, and for permitting fines to be levied of lands in order to bar entails, or otherwise to insure their title. These, in process of time, have been almost all granted to private persons, or else appropriated to certain particular uses. All future grants of these, by 1 Ann. stat. 2. cap. 7. are to endure for no longer time than the prince's life who grants them. 10. The right to royal fish. 11. The revenue arising from shipwrecks, which is is frequently granted out to lords of manors, as a royal franchise. (See WRECK.) 12. The right to mines of silver and gold. (See MINE.) 13. The revenue of treasure-trove. 14. Waifs. 15. Estrays, which the law gives to the king as the general owner and lord paramount of the soil; though they now most commonly belong to the lord of the manor, by special grant from the crown. 16. Forfeitures of lands and goods for offences. (See CONFISCATE and DEODAND.) These are for the most part granted out to the lords of manors, or other liberties. 17. The revenue arising from the escheats of lands, reverting, upon the default of heirs to succeed to the inheritance, to the king, who is esteemed, in the eye of the law, the original proprietor of all the lands in the kingdom. 18. The last branch of the king's ordinary revenue consists in the custody of idiots.

Such is the king's ordinary revenue, or the proper patrimony of the crown, which was formerly very large, and capable of being increased to a magnitude truly formidable: but, fortunately for the liberty of the subject, this hereditary landed revenue is now sunk almost to nothing; and the casual profits, arising from the other branches of the *census regalis,* are likewise almost all of them alienated from the crown. In order to supply the deficiencies of which, we are now obliged to have recourse to new methods of raising money, unknown to our early ancestors; which methods constitute the king's *extraordinary* revenue. See TAX, FUND, and NATIONAL *Debt*.

We shall here observe, that the aggregate fund stood mortgaged by parliament to raise an annual sum for the maintenance of the king's household, and the civil list. For this purpose, in the late reigns, the produce of certain branches of the excise and customs, the post-office, the duty on wine licences, the revenue of the remaining crown lands, the profits arising from courts of justice, (which articles include all the hereditary revenues of the crown,) and also a clear annuity of 120,000*l.* in money, were settled on the king for life, for the support of his majesty's household, and the honour and dignity of the crown. And, as the amount of these several branches was uncertain, (though in the last reign they were computed to have sometimes raised almost a million,) if they did not arise annually to 800,000*l.*, the parliament engaged to make up the deficiency. But his present majesty, soon after his accession, having accepted the limited sum of 800,000*l. per annum* for the support of his civil list, (charged also with three life-annuities, to the princess of Wales, the duke of Cumberland, and the princess Amelia, to the amount of 77,000*l.*) the said hereditary and other revenues were made a part of the aggregate fund, which was charged with the payment of the whole annuity to the crown of 800,000*l. per annum*. The expences formerly defrayed by the civil list were those that in any shape relate to civil government: as the expences of the household; all salaries to officers of state, to the judges, and each of the king's servants; the appointments to foreign ambassadors; the maintenance of the queen and royal family; the king's private expences, or privy purse; and other very numerous outgoings, as secret service money, pensions, and other bounties; which sometimes have so far exceeded the revenues appointed for that purpose, that application has been made to parliament to discharge the debts contracted on the civil list; as particularly in 1724, when one million was granted for that purpose by the statute 11 Geo. I. cap. 17; and in 1769 and 1777, when half a million and 600,000*l.* were appropriated to the like use, by the statutes 9 Geo. III. cap. 34. and 17 Geo. III. c. 47. Many of these expences are now charged on the consolidated fund, and the civil list comprehends the support of his majesty's household.

The civil list is, indeed, properly the whole of the king's revenue in his own distinct capacity; the rest being rather the revenue of the public, or its creditors, though collected and distributed again in the name and by the officers of the crown.

The whole revenue of queen Elizabeth did not amount to more than 600,000*l.* a-year; that of king Charles I. was 800,000*l.*; and the revenue voted for king Charles II. was 1,200,000*l.*; but under these sums were included all kinds of public expence. The same revenue, subject to the same charges, was settled on king James II. (Stat. 1 Jac. II. c. 1.) But by the increase of trade, and better management, it amounted on an average to a million and a half *per annum*, (beside other additional customs, granted by parliament, (ibid. c. 3. and 4.) which produced an annual revenue of 400,000*l.*), out of which his fleet and army were maintained at the yearly expence of 1,100,000*l.* At this time the revenues of the king of France were computed at seven millions sterling; and those of the states of Holland at three millions. After the Revolution, when the parliament took into its own hands the annual support of the forces, both maritime and military, a civil list revenue was settled on the new king and queen, amounting, with the hereditary duties, to 700,000*l. per annum;* and the same was continued to queen Anne and king George I. That of king George II. was nominally augmented to 800,000*l.* (stat. 1 Geo. II. c. 1.); and in fact was considerably more. But that of his present majesty was avowedly increased to the limited sum of 900,000*l.* The clear yearly sum of 100,000*l.*, to commence from the fifth of January 1777, over and above the sum of 800,000*l.* before granted, was granted to his majesty out of the aggregate fund by stat. 17 Geo. III., but is now chargeable on the consolidated fund. Blackst. Com. vol. i. chap. viii. See FUND, and the sequel of this article.

The following particulars, relating to the revenue, are extracted from the Report presented to the house of commons, ending 5th January 1814.

An

REVENUE.

An Account of the Ordinary Revenues and Extraordinary Refources conftituting the Public Income of Great Britain, for the Year ending the 5th of January 1814.

Heads of Revenue.	Grofs Receipt within the Year.			Total Sum to be accounted for, deducting outftanding Balances and Bills.			Net Produce applicable to National Objects, and to Payments into the Exchequer, deducting total Payments out of the grofs Revenue.			Payments into the Exchequer, deducting total Payments out of the net Produce.		
ORDINARY REVENUES.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Permanent and Annual Taxes.												
Cuftoms	10,325,550	19	10¼	10,938,523	16	7½	8,086,313	2	9½	7,015,968	19	11¼
Excife	20,805,852	14	1½	21,119,321	9	6	18,526,879	4	9¾	18,039,713	19	2¾
Stamps	5,638,155	17	10¾	5,873,174	14	7½	5,552,460	1	3¼	5,344,486	13	11
Land and affeffed taxes	7,884,841	3	11¼	8,101,968	7	3¼	7,803,459	3	4¼	7,433,496	18	4¾
Poft office	1,938,517	10	6	2,137,437	12	5¼	1,619,136	10	7¼	1,403,000	0	0
One fhilling in the pound on penfions and falaries	19,648	16	8	20,803	10	8	20,423	5	2	17,325	1	5½
Sixpence in the pound on penfions and falaries	11,728	17	0½	13,521	0	5½	12,151	15	11½	10,707	9	1¾
Hackney coaches	25,181	10	0	25,551	19	3	22,245	6	1½	21,887	0	0
Hawkers and pedlars	20,160	3	2½	20,779	14	4½	18,201	3	1	18,120	0	0
Total	46,669,637	13	3¼	48,251,082	5	2½	41,661,269	13	2	39,304,706	2	1
Small Branches of the Hereditary Revenue.										Hanaper 2,000	0	0
Alienation fines	6,817	3	4	9,539	12	1	8,392	4	1	4,069	12	0
Poft fines	516	13	9½	4,011	17	2	3,953	4	8	——		
Seizures	22,638	4	7	22,638	4	7	22,638	4	7	22,638	4	7
Compofitions and proffers	586	15	2	586	15	2	586	15	2	586	15	2
Crown lands	84,930	13	7	90,096	18	5½	87,703	4	10	11,016	9	8
EXTRAORDINARY RESOURCES.												
War taxes: Cuftoms	3,818,272	14	9¼	3,818,272	14	9¼	3,275,358	5	4¼	3,275,358	5	4¼
War taxes: Excife	6,227,240	13	4	6,259,884	14	7¾	6,117,857	0	3¾	6,073,538	4	5¾
War taxes: Property tax	14,318,816	4	1½	14,889,444	15	3¾	14,583,286	9	6½	13,965,808	7	2
War taxes: Arrears of income duty	1,620	13	8	1,620	13	8	1,593	15	4½	1,593	15	4½
Lottery, net profit (of which one-third part is for the fervice of Ireland)	310,800	0	0	310,800	0	0	278,666	6	6	278,666	6	6
Monies paid on account of the intereft of loans raifed for the fervice of Ireland	3,198,475	2	10	3,198,475	2	10	3,198,475	2	10	3,198,475	2	10
On account of balance due by Ireland on joint expenditure of the united kingdom	3,956,276	0	0	3,956,276	0	0	3,956,276	0	0	3,956,276	0	0
On account of the commiffioners, appointed by act 35 Geo. III. c. 127. and 37 Geo. III. c. 27. for iffuing exchequer bills for Grenada, &c.	54,200	0	0	54,200	0	0	54,200	0	0	54,200	0	0
On account of the commiffioners for iffuing commercial exchequer bills, by act 51 Geo. III. c. 15.	490,591	18	9	490,591	18	9	490,591	18	9	490,591	18	9
Carried forward	79,161,420	11	2½	81,357,521	12	7¾	73,740,848	5	2	70,639,525	3	11½

Heads of Revenue.	Grofs Receipt within the Year.			Total Sum to be accounted for, deducting outftanding Balances and Bills.			Net Produce applicable to National Objects, and to Payments into the Exchequer, deducting total Payments out of the grofs Revenue.			Payments into the Exchequer, deducting total Payments out of the net Produce.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Brought forward -	79,161,420	11	2½	81,357,521	12	7¾	73,740,848	5	2	70,639,525	3	11½
On account of the intereft, &c. of a loan granted to the prince regent of Portugal -	57,170	3	0	57,170	3	0	57,170	3	0	57,170	3	0
Surplus fees of regulated public offices - -	107,355	18	3	107,355	18	3	107,355	18	3	107,355	18	3
Impreft money repaid by fundry public accountants, &c. including intereft - - - -	56,504	1	10¾	56,504	1	10¾	56,504	1	10¾	56,504	1	10¾
Other monies paid to the public - - -	65,660	9	5	65,660	9	5	65,660	9	5	65,660	9	5
Total { independent of loans }	79,448,111	3	9¼	81,644,212	5	2½	74,027,538	17	8¾	70,926,215	16	6¼
Loans paid into the exchequer, including 6,000,000*l.* for the fervice of Ireland - -	35,050,574	17	9	35,050,574	17	9	35,050,574	17	9	35,050,574	17	9
Grand total -	114,498,686	1	6¼	116,694,787	2	11½	109,078,113	15	5¾	105,976,790	14	3¼

A General Statement of the Revenue of Cuftoms of Great Britain.

	England.			Scotland.			Great Britain.		
Grofs receipt within the year, *viz.*	£	s.	d.	£	s.	d.	£	s.	d.
Permanent and annual duties - -	9,367,542	3	8½	713,392	0	9¼	10,080,934	4	5¾
War taxes - - - -	3,523,205	9	8	295,067	5	1¼	3,818,272	14	9¼
	12,890,747	13	4½	1,008,459	5	10½	13,899,206	19	3

An Account of the Grofs Actual Receipt in Money, &c. of the Excife Confolidated Duties, Unconfolidated Duties, Temporary War Taxes, and Tobacco and Malts, annual in England.

Articles.	Grofs Actual Receipt in Money.			Net Produce of each Article.			Net Payments into the Exchequer.		
	£	s.	d.	£	s.	d.	£	s.	d.
Auctions - - - - - -	343,530	16	8¾	335,184	4	1¼	335,184	0	0
Beer - - - - - - -	2,888,298	13	10¼	2,569,272	3	3½	2,569,272	0	0
Bricks and tiles - - - - -	300,184	8	10½	293,249	9	2¼	293,249	0	0
Candles - - - - - -	311,305	15	6½	250,637	6	10¾	250,638	0	0
Cocoa nuts and coffee - - -	124,049	7	2¼	115,655	12	1¼	115,656	0	0
Cyder, perry, and verjuice - - -	25,197	17	8	20,996	4	10½	20,921	0	0
Glafs - - - - - -	614,054	14	8¼	383,531	6	5½	383,531	0	0
Hides and fkins - - - - -	674,751	3	8¼	592,669	0	3	592,669	0	0
Hops - - - - - -	53,537	2	1	36,051	19	2¾	36,052	0	0
Carried forward -	5,334,910	0	3¾	4,597,247	6	4¾	4,597,172	0	0

REVENUE.

Articles.	Grofs Actual Receipt in Money.			Net Produce of each Article.			Net Payments into the Exchequer.		
	£	s.	d.	£	s.	d.	£	s.	d.
Brought forward	5,334,910	0	3¾	4,597,247	6	4¾	4,597,172	0	0
Licences	439,892	15	0½	433,750	5	4¼	433,751	0	0
Malt	1,120,558	12	10	1,119,461	11	9¾	1,119,462	0	0
Paper	419,570	17	3¼	372,976	10	11¾	372,976	0	0
Printed goods	947,029	1	3	322,145	19	0	322,146	0	0
Salt	1,548,092	14	5¾	1,394,253	10	10	1,394,254	0	0
Soap	643,039	16	7¼	551,468	12	9¼	551,468	0	0
Spirits { Britifh	1,636,503	17	1¼	1,620,883	6	3	1,620,883	0	0
Spirits { Foreign	1,499,110	8	8¼	1,423,359	11	5½	1,423,488	0	0
Starch	37,422	6	0¼	29,178	8	5	29,179	0	0
Stone bottles	2,538	3	5¾	2,279	18	2½	2,280	0	0
Sweets and mead	25,453	6	9	25,337	10	3	25,275	0	0
Tea	2,048,096	0	0½	1,914,739	17	7½	1,914,739	4	5¾
Tobacco and fnuff	383,870	9	6	382,001	5	5¼	382,002	0	0
Vinegar	42,593	16	2¾	42,155	2	6	42,154	0	0
Wine	1,100,583	12	3¾	980,652	17	11½	980,653	0	0
Wire	12,887	18	4½	11,537	10	4½	11,532	0	0
Total confolidated duties	17,242,153	16	3½	15,223,429	5	7½	15,223,414	4	5¾
Spirits { Britifh, *per* 51 Geo. III. c. 59.	5,202	3	3	5,129	4	9	5,129	0	0
Spirits { Foreign, do.	28,182	7	0¼	28,174	14	7¼	28,175	0	0
Total unconfolidated duties	33,384	10	3¼	33,303	19	4¼	33,304	0	0
Temporary War Taxes.									
Malt, *per* 43 Geo. III. c. 81.	2,205,229	10	7	2,187,270	1	2½	2,187,270	0	0
Sweets do.	4,220	2	4¾	4,219	11	4¾	4,236	0	0
Spirits { Britifh do.	580,612	6	4	580,465	11	10	580,466	0	0
Spirits { Foreign do.	742,262	2	3¼	742,111	10	1¾	742,111	0	0
Tea	2,055,263	18	8	1,960,299	17	11¾	1,960,300	4	5¾
Tobacco and fnuff, *per* 46 Geo. III. c. 39.	312,534	3	6	310,566	17	6¾	310,567	0	0
Brandy, &c. { *per* 47 Geo. III. c. 27.	58,166	14	2¾	58,050	16	11¾	58,051	0	0
Brandy, &c. { 52 Geo. III. c. 3.	7,821	7	3¼	7,820	1	4¾	7,777	0	0
Total temporary war taxes	5,966,110	5	3	5,850,804	8	6	5,850,778	4	5¾
Annual Duties.									
Tobacco and fnuff, com. 26 March	483,081	9	1	453,262	6	3¼	453,263	0	0
Malt, additional do.	893,592	8	9¾	893,158	16	7¼	893,196	0	0
Malt, old, com. 24 June	552,951	11	2¾	423,808	15	8¾	423,782	0	0
Total annual duties	1,929,625	9	1½	1,770,229	18	7¼	1,770,241	0	0
Totals collected.									
Confolidated duties	17,242,153	16	3½	15,223,429	5	7½	15,223,414	4	5¾
Unconfolidated duties	33,384	10	3¼	33,303	19	4¼	33,304	0	0
Temporary war taxes	5,966,110	5	3	5,850,804	8	6	5,850,778	4	5¾
Annual duties	1,929,625	9	1½	1,770,229	18	7¼	1,770,241	0	0
Grand total	25,171,274	0	11¼	22,877,767	12	1	22,877,737	8	11½

An Account of the Grofs Actual Receipt, &c. of the Excife in Scotland.

	Duties.	Grofs Actual Receipt. £	s.	d.	Net Produce. £	s.	d.
Confolidated.	Auctions	18,190	7	5¾	15,712	12	11¼
	Beer	80,810	2	6	56,188	15	7¾
	Bricks and tiles	5,745	13	5	5,433	2	3½
	Candles	19,051	17	9	15,803	2	2
	Cocoa nuts and coffee	7,543	17	5½	7,343	17	5½
	Cyder and perry	2	7	3¾	2	7	3¾
	Glafs	136,912	5	10¾	40,852	10	5½
	Hides and fkins	76,966	0	8½	66,323	18	6½
	Hops	25	14	2	25	14	2
	Licences	56,259	8	0½	47,981	1	5½
	Malt	36,828	10	1¼	29,399	1	3½
	Paper	43,368	3	0½	27,075	11	10
	Printed goods	263,827	8	4¾	72,446	12	4¼
	Salt	117,112	9	5¼	96,234	2	9½
	Soap	108,702	13	9½	90,099	6	1
	Britifh fpirits	288,879	15	4½	268,157	3	1¾
	Foreign fpirits	125,669	8	1¼	120,178	8	7¼
	Starch	3,160	2	2½	1,478	9	9
	Stone bottles	6	9	4½	6	9	4½
	Sweets	257	2	0	257	2	0
	Tobacco and fnuff	45,815	19	5½	42,299	5	6¼
	Vinegar	794	18	5¼	794	18	5¼
	Wine	67,291	15	0½	58,213	7	11¼
Additional.	Britifh fpirits, 51 Geo. III. c. 59.	82	13	3½	82	13	3½
	Do. do. 52 Geo. III. c. 3.	86,327	12	9	83,027	12	9
	Foreign fpirits, 51 Geo. III. c. 59.	494	4	6	494	4	6
	Do. do. 52 Geo. III. c. 3.	140	2	11¾	140	2	11¾
Temporary.	Malt, 1803	65,148	14	3	50,523	5	2¼
	Britifh fpirits, 1806	9,460	8	10¼	7,610	9	6¼
	Foreign fpirits, 1803	62,002	15	11½	57,819	14	5½
	Do. do. 1807	899	3	3½	899	3	3½
	Sweets, 1803	42	17	0	42	17	0
	Tobacco, 1806	37,108	13	0	34,345	5	3¾
	Fines and forfeitures	16,709	5	4¾	15,392	13	11¾
	Total, Excife	1,781,639	0	9¼	1,312,685	3	10
Annual.	Malt, 23d June: furplus	—			—		
					Minus 584	19	6
	Do. deficient	29	7	5			
	Do. 1813	8,507	18	10	6,510	0	5
	Do. 1814	583	7	7	583	7	7
	Do. 25th March 1812, and preceding	110	12	5	87	6	2
	Do. 1813	13,795	8	11	11,393	3	11
	Do. 1814	923	8	2	923	8	11
	Tobacco, ending 25th March 1813, and preceding	30,214	7	9	29,645	18	1
	Do. 1814	25,887	12	4	25,787	10	10
	Total, annual duties	80,052	3	5	74,345	15	8
	Grand total	1,861,691	4	2¼	1,387,030	19	6

An Account of the Grofs and Net Produce, &c. of the Duties arifing from Stamps in England.

	Grofs Produce.			Net Produce.		
	£	s.	d.	£	s.	d.
Deeds, law proceedings, and other written inftruments, (except legacy receipts, probates and adminiftrations, bills of exchange, and promiffory notes and receipts,) and on licences to pawnbrokers and dealers in thread lace	2,010,598	13	5¾	1,901,235	0	9
Legacies	545,115	6	3	525,134	17	2
Probates and adminiftrations	417,263	5	2	402,576	0	3¼
Bills of exchange and promiffory notes	624,353	17	5	602,542	9	5
Receipts	161,080	9	3	148,827	0	2¾
Newfpapers and almanacs	394,041	0	4	329,069	17	1
Medicine and medicine licences	41,578	11	3½	36,188	11	7½
Fire infurances	437,380	18	6	405,844	2	1½
Cards	24,462	5	0	23,788	9	1
Gold and filver plate	66,198	9	4½	60,030	15	6¾
Dice	723	0	0	712	18	6
Pamphlets	415	13	8	410	0	10
Advertifements	114,111	12	10	110,348	9	9½
Stage coaches	167,239	17	0¾	163,010	6	11¾
Poft horfes	247,467	10	0	244,322	12	2
Race horfes	868	7	0	786	16	10½
	5,252,898	16	7½	4,954,828	8	5½
Lottery	4,469	4	8	3,774	3	7

An Account of the Grofs and Net Produce, &c. of the Duties arifing from Stamps in Scotland.

	Grofs Produce.			Net Produce.		
	£	s.	d.	£	s.	d.
Deeds, law proceedings, and other written inftruments, (except legacy receipts, teftamentary inventories, bills of exchange, and promiffory notes and receipts,) and on licences to pawnbrokers and dealers in thread lace; alfo newfpapers and almanacs	184,800	9	5½	172,864	9	0½
Legacies	26,186	0	2	24,800	0	0
Bills of exchange and promiffory notes	95,543	4	1	91,069	13	10
Teftamentary inventories	16,697	7	11	15,341	7	11
Receipts	11,569	9	11½	10,872	9	11
Fire infurance	15,918	19	4	15,118	6	6
Gold and filver plate	3,425	17	5¼	3,139	11	4½
Medicine and medicine licences	210	17	0	178	15	6
Advertifements	14,623	7	0	13,950	11	4
Stage coaches	11,732	10	3	11,427	2	9
Pamphlets	6	4	0	6	4	0
Race horfes	73	10	0	69	16	8
	380,787	16	7¼	358,838	12	6

An Account of the Grofs and Net Produce, and Payments into the Exchequer, of the Revenue, under the Management of the Commiffioners of Taxes in England and Wales, including the Property Tax.

Taxes.	Grofs Produce, 1813.	Net Produce.
	£ s. d.	£ s. d.
Land tax	1,272,256 16 3¼	1,127,078 8 3½
Affeffed taxes	6,155,867 0 6	5,903,818 10 1¼
Property tax	13,016,041 17 3¾	12,750,408 7 2
Aid and contribution tax	———	———
Income tax	1,020 13 8	993 15 4½
	20,445,186 7 9	19,782,299 0 11¼

An Account of the Grofs and Net Produce, and Payments into the Exchequer, of the Revenue, under the Management of the Commiffioners of Taxes in Scotland.

Taxes.	Grofs Produce, 1813.	Net Produce.
	£ s. d.	£ s. d.
Land tax	31,143 1 1¾	18,700 0 0
Affeffed taxes	414,593 19 1½	383,900 0 0
Property tax	1,255,924 15 7½	1,215,400 0 0
Aid and contribution tax	———	———
Income tax	600 0 0	600 0 0
	1,702,261 15 10¾	1,618,600 0 0

An Account of the Grofs and Net Produce, and Payments into the Exchequer, of the Revenue arifing from the Poft-office in England and Scotland refpectively.

	Grofs Produce.	Net Produce.
	£ s. d.	£ s. d.
Inland	1,532,980 12 11	1,136,027 2 3
Foreign	128,647 14 10	42,456 18 5
Twopenny poft	93,299 15 5	57,675 19 3
Scotland	191,884 15 6	154,094 5 11
Ireland	59,236 18 8	29,962 2 10
Total	2,006,049 17 4	1,420,216 8 8

An Account of the Grofs Receipt and Net Payments into the Exchequer, on the Duty of One Shilling in the Pound on Salaries and Penfions in England and Scotland refpectively.

	Grofs Receipt, 1813.	Net Produce.
	£ s. d.	£ s. d.
England { London, Middlefex and Weftminfter	4,849 6 10	4,393 8 5½
England { Exchequer	11,828 17 8	12,331 13 0
	16,678 4 6	16,725 1 5½
Scotland	2,970 12 2	600 0 0
	19,648 16 8	17,325 1 5½

An Account of the Grofs Receipt and Net Payments into the Exchequer, of the Duty of Sixpence in the Pound on Salaries and Penfions in England and Scotland refpectively.

	Grofs Receipt, 1813.	Net Produce.
	£ s. d.	£ s. d.
England { London, Middlefex and Weftminfter - -	3,750 8 10½	3,941 17 10¾
England { Exchequer - - - - - -	5,928 11 0	6,365 11 3
	9,678 19 10½	10,307 9 1¾
Scotland - - - - - - -	2,049 17 2	400 0 0
	11,728 17 0	10,707 9 1¾

An Account of the Grofs Receipts, &c. of the Revenues arifing from Hackney Coaches and Chairs.

Grofs amount	in the year ending Jan. 5th, 1813	£25,181 10 0
Net produce	in the year ending Jan. 5th, 1813	21,874 16 10½

An Account of the Grofs Receipts, &c. of the Revenues arifing from the Department of the Hawkers and Pedlars.

Grofs amount - - - - -	£20,160 3 2½
Net produce - - - - -	17,581 11 11

An Account of the Grofs and Net Produce, on account of Prefines.

Grofs produce - - - - -	£6,817 3 4
Net produce - - - - -	3,669 15 4

An Account of the Grofs and Net Produce arifing from Poft-Fines.

Grofs produce - - - - -	£516 13 9½
Net produce - - - - -	458 1 3½

An Account of the Sums received by way of Lottery.

On account of Lotteries in 1812 - - -	£840,926 16 5
Do. do. 1813 - - -	95,000 0 0

An Account of the Total Sums of Money paid into the Exchequer, on account of Public Loans.

	£ s. d.
Contributions to annuities in 1812, for raifing 22,500,000*l.* - - - -	651,367 4 2
Contributions by debentures in 1813, for raifing 6,000,000*l.* - - - -	540,773 11 11
Contributions by debentures in 1813, for raifing a further fum - - - -	245,924 7 0
Contributions to annuities in 1813, for raifing 27,000,000*l.* - - - -	25,900,000 7 0
Contributions to annuities in 1814, for raifing 22,000,000*l.* - - - -	7,712,509 14 8

An Account of the Amount of Exchequer Bills, iffued for the Public Service.

Under what Acts iffued.	On what Funds charged, and the total Amount to be iffued under each Act.			Amount iffued and not redeemed within the Year.
			£	£
52 Geo. III. c. 114. - - -	Supplies -	1812	- - - -	1,289,900
53 Geo. III. c. 16. - - -	Supplies -	1814	10,500,000 -	4,248,300
53 Geo. III. c. 26. - - -	Supplies -	1814	5,000,000 -	5,000,000
53 Geo. III. c. 27. - - -	Supplies -	1814	1,500,000 -	1,500,000
53 Geo. III. c. 42. - - -	Supplies -	1813	- - - -	15,879,900
53 Geo. III. c. 118. - - -	Supplies -	1814	5,670,700 -	5,670,700
53 Geo. III. c. 119. - - -	Supplies -	1814	1,000,000 -	545,200
53 Geo. III. c. 161. - - -	Supplies -	1814	5,000,000 -	4,358,000
54 Geo. III. c. 2. - - -	Malt, &c. -	1814	3,000,000 -	2,862,000
				41,354,000

An Account of the Amount of Navy, Victualling, and Tranfport Bills.

	£	s.	d.
Navy - - - - - -	1,535,380	0	3
Victualling - - - - -	1,250,947	1	11
Tranfport - - - - -	913,413	6	0
	3,699,740	8	2

An Account of the Charge upon the Confolidated Fund, diftinguifhed under feveral Heads.

	£	s.	d.
Civil lift. For the fupport of his majefty's houfehold, *per* 17 G. III. -	898,000	0	0
Civil lift. Ditto - 44 G. III. -	60,000	0	0
Civil lift. Ditto - 52 G. III. -	70,000	0	0
Courts of juftice - - -	69,692	3	0
Mint - - - - - -	17,333	17	0
Salaries, Allowances, &c. - -	12,833	13	4
Commiffioners of public accounts -	45,465	14	4½
Commiffioners of Weft India accounts - - - - -	9,656	6	11
Mifcellaneous - - - - -	79,956	5	0
His royal highnefs the duke of Clarence, *per* 31 Geo. III. -	12,000	0	0
His royal highnefs the duke of York, *per* 32 Geo. III. -	14,000	0	0
Her royal highnefs the duchefs of York, *per* 32 Geo. III. -	4,000	0	0
His royal highnefs the prince of Wales, *per* 35 Geo. III. -	65,000	0	0
His royal highnefs the duke of Kent, *per* 39 Geo. III. -	12,000	0	0
His royal highnefs the duke of Cumberland, *per* 39 Geo. III.	12,000	0	0
His royal highnefs the duke of Suffex, *per* 42 Geo. III. -	12,000	0	0
His royal highnefs the duke of Cambridge, *per* 42 Geo. III.	12,000	0	0
His royal highnefs the duke of Clarence, *per* 46 Geo. III. -	6,000	0	0
His royal highnefs the duke of Kent, *per* 46 Geo. III. -	6,000	0	0
His royal highnefs the duke of Cumberland, *per* 46 Geo. III.	6,000	0	0
His royal highnefs the duke of Suffex, *per* 46 Geo. III. -	6,000	0	0
His royal highnefs the duke of Cambridge, *per* 46 Geo. III.	6,000	0	0
Her royal highnefs the princefs Charlotte of Wales, 46 G. III.	7,000	0	0
His highnefs the duke of Gloucefter, *per* 46 Geo. III. -	14,000	0	0
Her highnefs the princefs Sophia of Gloucefter, *per* 46 Geo. III.	7,000	0	0
Her royal highnefs the princefs Elizabeth, *per* 52 Geo. III. -	9,000	0	0
Her royal highnefs the princefs Augufta Sophia, 52 G. III.	9,000	0	0
Her royal highnefs the princefs Mary, *per* 52 Geo. III. -	9,000	0	0
Her royal highnefs the princefs Sophia, *per* 52 Geo. III. -	9,000	0	0
Thefe, with other penfions, amount in the whole to -	1,595,350	6	11¾

For more particulars of this kind, fee POLITICAL *Arithmetic*, *Public* DEBTS, *Public* FUNDS, and TAX.

REVENUE, *Auditors of the*. See AUDITOR.

REVENUE, *Court of*. See COURT *of Exchequer*.

REVENUE, *Officers of*, are excluded from voting in elections for members of parliament by 22 Geo. III.

REVENUE, *Revenu*, in *Hunting*, a flefhy mafs or lump, formed chiefly of a clufter of whitifh worms on the heads of deer, and fuppofed to occafion them to caft their horns, by thofe worms gnawing the roots of them.

The revenue diftilled, is faid to help women in travail.

REVENUE is alfo ufed for a new tail of a partridge, growing out after the lofs of a former. The revenue is meafured by fingers; thus they fay, a partridge of two, three, and four fingers revenue.

REVERA, in *Geography*, a fmall ifland in the Adriatic, near the coaft of Iftria. N. lat. 45° 15′. E. long. 13°.

REVERBERATION, REVERBERATIO, formed from *re*, and *verbero*, q. d. *I beat again*, in *Phyfics*, the act of a body repelling or reflecting another, after impinging on it. In the glafs-men's furnace, the flame reverberates or bends back again to burn the matter on all fides. Echoes are occafioned by the reverberation of founds from arched obftacles.

Reverberation and *refilition* refer to the fame action; only the one to the agent, the other to the patient. A polifhed body reverberates the rays all around; the refilition of the rays does not arife from their ftriking againft the folid parts of bodies. See REFLECTION.

REVERBERATION, in *Chemiftry*, denotes a kind of circulation of the flame, by means of a reverberatory; or the return of the flame from the top of the furnace back to the bottom, chiefly ufed in calcination.

Reverberation is of two kinds. The firft with a *clofe fire*; that is, in a reverberatory furnace, where the flame has no vent at top; being covered with a dome, or capital, which repels its action back on the matter, or the veffel that contains it, with increafed vehemence.

After this manner are refining, the diftillation of acid fpirits, &c. performed.

Reverberation with an *open fire*, is that performed in a furnace, or reverberatory, whofe regifters are all open; ufed in calcination, &c.

REVERBERATORY, or REVERBERATING *Furnace*, is a chemical furnace built clofe all round, and covered at the top with a capital of brick or tiles, fo as not to give any vent to the heat or flame, but to determine it to reverberate or turn back from the brick-work with new force, upon the matters placed at bottom.

When the fire has no vent or paffage at top, it is a *whole* reverberatory; when the middle of the capital is open, and only the fides clofe, fo that there is only a half circulation of the flame, it is called a *half* reverberatory.

The reverberating furnace is chiefly ufed in the fufion and calcination of metals and minerals, and on other occafions, where the moft intenfe heat is required, as in affaying, &c. Whence it is alfo called the *melting-furnace*, and *affaying furnace*. See *Reverberating* FURNACE.

REVERENCE, in *Ethics*, is the veneration, or high degree of refpect, which is paid to fuperior fanctity, intermixed with a certain degree of awe. It is the high refpect paid to the facred character of its object, attended with a confcious inferiority in moral worth.

REVEREND, REVERENDUS, a title of refpect given to ecclefiaftics.

The religious abroad are called reverend fathers; and abbeffes, prioreffes, &c. are called reverend mothers.

With us, bishops are *right reverend;* and archbishops *most reverend.* In France, their bishops, archbishops, and abbots, are all alike *reverendissimes, most reverend.*

REVERIE, a term purely French, frequently used of late in English, to signify a delirium, raving, or distraction. It is an ill sign in fevers when the patient falls into a reverie.

Hence also reverie comes to be used for any ridiculous, extravagant imagination, action, or proposition, a chimera or vision. Thus we say, authors obtrude abundance of their reveries upon us for solid truths.

But the most ordinary use of the word reverie, among English writers, is for a deep, disorderly musing or meditation, equivalent to what we popularly call a *brown study.* Thus, a little distraction I would allow; but for that continued series of reveries some people are guilty of who are ever absent from the place where you see them, and are never present any where, it is inexcusable.

REVERO, in *Geography,* a town of Italy, in the department of the Mincio, on the S. side of the Po, opposite to Ostiglio.

REVERS, Battery de. See Battery.

REVERSAL, in *Law.* See Reverse.

REVERSATA Arma. See Arma.

REVERSE, in the *Military Art,* signifies on the back, or behind. Thus we say, a reverse view, a reverse commanding ground, a reverse battery, &c.

Reverse, formed of *re, again,* and *versus, turned,* in *Law,* &c. To reverse, signifies to undo, repeal, or make void.

A judgment may be reversed or voided for matters foreign to or *debôrs* the record, that is, not apparent upon the face of it, by writ of error, and by act of parliament. The effect of falsifying or reversing an outlawry is, that the party shall be in the same plight as if he had appeared upon the capias; and if it be before plea pleaded, he shall be put to plead to the indictment; if after conviction, he shall receive the sentence of the law; for all the other proceedings, except only the process of outlawry for his non-appearance, remain good and effectual as before. But when judgment, pronounced upon conviction, is falsified or reversed, all former proceedings are absolutely set aside, and the party stands as if he had never been at all accused; restored in his credit, his capacity, his blood, and his estates. But he still remains liable to another prosecution for the same offence. See Attainder, Judgment, and Outlawry.

Reverse of a medal, coin, &c. denotes the second, or back side; in opposition to the head or principal figure, called the face, or obverse.

F. Chamillart, a Jesuit, has an express dissertation on this point, whether or no the reverses of medals have always a regard to the emperors or empresses whose heads are represented on the front side of the medal? He says, that till of late the antiquaries have made no doubt of it; but that there are now several authors of another opinion.

The knowledge of the reverses of medals constitutes a distinguishing part of this science. In the early Greek coins, the reverse seldom affords much fancy of symbol; and in the imperial Greek coins it is chiefly impressed with temples of their deities. To Greek artists we are indebted for the beauty of the Roman imperial coins; and these are so highly finished, that on some reverses, as that of Nero's decursion, the "Adventus" and "Progressio" of various emperors, the "Fundator pacis" of Severus, the features of the emperor riding, or walking, are as exact as on the obverse. No Roman or Etruscan coins have been found of the globular form, or indented on the reverse, like the early Greek. The first Greek are small pieces of silver, while the Roman are large masses of copper: the former are struck, the latter are cast in moulds. The reverses of Roman coins are very uniform, the prow of a ship, a car, or the like, till about 100 years before our era, when various reverses appear on their consular coins in all metals. See Medal.

With respect to the consular medals, it is observed, that the same reverse is common to many of them; as Castor and Pollux on horseback, first used; then a victory, or one of the gods; or the person to whose honour the medal was struck, driving a chariot with two or four horses; whence the denomination of the denarius *bigatus,* and *quadrigatus.* The ratis or ship, or prow of a ship, as an emblem of naval power, was no uncommon reverse on the consular coins; which were, on this account, called *ratiti.* Some of the consular medals, that bore on the face the impress of their ancient kings, preserved on the reverse the record of some worthy action which they had performed, as the famous aqueduct on the reverse of Ancus, in honour of his having begun it. Medals, struck on occasion of founding colonies, have sometimes on the reverse a priest following a yoke of oxen, with a plough; designed to denote the manner in which the boundaries of colonies were marked out, or that they were planted by the common people; and those trophies that are sometimes seen on medals of this kind, signify that they were planted by the veteran soldiers.

The reverses of imperial medals are very various; but the chief of them may be reduced to three classes, *viz.* figures or personages; public monuments or buildings; and inscriptions. The figures are sometimes those of princes in miniature, whose portraits are exhibited more at large on the face; as on the reverses of the emperors of the family of Constantine, we often see the emperor standing with a labarum in his right hand, and a globe, surmounted with a victory, in his left. Sometimes the emperor is disguised under the figure of some god; as on the reverse of a Dioclesian, who had assumed the name Jovius, he appears in the figure of Jupiter, sitting in a chair, with a globe in his hand, surmounted with a Victory; the legend being iovi. h. u. c. c. *i. e. Hec voluerunt consules.* The Greek coins of cities present us with exquisite heads of deities, apparently copied from statues or paintings. The majesty of Jupiter, the modesty of Diana, the beauty of Venus, the ferocity of Mars, and other ideal characters, appear in the Grecian civic coins with a perfection not to be surpassed by human art. Sometimes the figure on the reverse is some relation of that on the face; as Augustus on the reverse of Julius, and Claudius on the reverse of his mother Antonia. Such medals are highly esteemed by antiquarians, not only because it is a rule with them that every coin stamped with portraits on either side is very valuable, but because they identify the personage on the reverse to have been the wife, the son, or the daughter of such a particular prince, and thus help in the adjustment of a series. The figure of some deity is sometimes seen on the reverse; as Minerva on the reverse of a Domitian; and the goddess Salus, with a patera in her hand, sacrificing to Esculapius, on the reverse of a Marcus Aurelius. (See Medal.) The virtues for which the emperors were, or wished to be, celebrated, are also frequently expressed by the figures on the reverses; and thus the fine personifications and symbols to be found on the reverses of the Roman coins render them entertaining, as well as instructive, to a person of poetical imagination. Virtue or Courage is represented by a bold armed woman with a spear in her right hand, and a parazonium in her left, on the reverse of a Domitian; Liberty, carrying in her right hand the cap of liberty, and in her left the wand called rudis or vindicta, appears on the reverse of a Commodus; and Equity, with a spear in her right hand, and a balance in her left, on the reverse of a Vespasian. The virtues of the ladies are also celebrated on the reverses of their medals; as Piety, in the habit of a Vestal virgin, strewing frankincense on an altar, on the reverse of a Faustina; Fœcunditas on another medal of the same, and SPES REIPUBLICÆ, expressed by a female figure, wearing a helmet to represent the republic, and two children at her breasts, on the reverse of a Maximiana Fausta, second wife of Constantine the Great. Happiness has sometimes the caduceus, or wand of Mercury, which Cicero (1 Offic.) tells us was thought to procure every wish. She has, in a gold coin of Severus, heads of poppy, to express that our chief bliss arises from oblivion of misfortune. Hope is represented as a sprightly damsel, walking quickly, and looking straight forwards. With her left hand she holds up her garments, that they may not impede the rapidity of her pace; while, in her right hand, she holds forth the bud of a flower, an emblem infinitely more fine than the trite one of an anchor, which is the symbol of patience, not of hope. This personification, with some others, must have been very familiar to the ancients, for often in this, and a few more instances, no name, as SPES AUG. or the like, is inserted in the legend. Abundance is imaged as a sedate matron, with a cornucopia in her hands, of which she scatters the fruits over the ground, nor does she hold up her cornucopia, and keep its contents to herself, as many modern poets and painters make her do. The emperor Titus, having cause to import a great supply of corn, during a scarcity at Rome, that supply, or the ANNONA, is finely represented as a sedate lady, with a full cornucopia in her left hand, which she holds upright, to indicate that she does not, however, mean to scatter it, as Abundance has a title to do, but to give it to Equity to deal out. This last circumstance is shewn by her holding a little image of Equity, known by her scales, and *hasta pura*, or pointless spear, in her right hand, over a basket filled with wheat. Behind the ANNONA is the prow of a ship, decked with flowers, to imply that the corn was brought by sea, (from Africa,) and that the ships had had a prosperous voyage. The best poet in the world could not have given us a finer train of imagery; and the best painter would be puzzled to express so much matter in so small a compass. Security stands leaning on a pillar, indicative of her being free from all designs and pursuits; and the posture itself corresponds to her name. Horace, in describing the wise man, mentions his being "teres atque rotundus," round and polished against all the rubs of chance;—an image seemingly derived from the column upon which this ideal lady reclines. The happiness of the state is pictured by a ship, sailing before a prosperous breeze; – an image, than which the superlative genius of Gray could not have found one more exquisite; and he has accordingly used it in his most capital production, "The Bard," with due success.

Provinces are also represented by figures or personages, denoting either the emperor's conquest or care of them; as Judæa sitting in a melancholy posture at the bottom of a pillar adorned with trophies, to signify her captive state, on the reverse of a Vespasian; and Italia with a cornucopia in her right hand, to denote her fruitfulness; a crown of towers on her head, to represent her many cities; a sceptre in her left hand, and sitting on a globe, to shew that she was sovereign of nations, on the reverse of a Commodus. Britain is often represented, upon the earliest imperial coins, sitting on a globe, with a symbol of military power, the *labarum*, in her hand, and the ocean rolling under her feet; —an emblem almost prophetic of the vast power which her dominion over the sea will always give her, provided that she asserts her element of empire with due vigour and perseverance, blending moderation and justice with her mighty power. On coins also we are presented with Achaia, Africa, Alamannia, Alexandria, Arabia, Armenia, Asia, Bithynia, Cappadocia, Dacia, Dardania, Egypt, Gallia, Hispania, Italia, Judæa, Macedonia, Mauritania, Pannonia, Parthia, Phrygia, Sarmatia, Sicily, Scythia, Syria, and the rivers Danube, Nile, Rhine, and Tiber. This personification of provinces, so interesting to the imagination, seems to have arisen from the figures of provinces carried in triumphs; as the personification of our old poets sprung from the ideal persons, actually represented in the mysterial plays. Whilst we are on the subject of the poetical imagery of ancient coins, we must not omit the mention, even, of a colonial one and of rude execution, of Augustus and Agrippa, inscribed IMP. and DIVI F. which has a high claim to merit in this way. On the reverse the conquest of Egypt is represented by the apposite metaphor of the crocodile, an animal almost peculiar to that country, and at that period esteemed altogether so, which is chained to a palm-tree, at once a native of the country and symbolic of victory. Moreover, the figure on the reverse is sometimes designed to immortalize some worthy action of the emperor; as the goddess Moneta, with a cornucopia in her left hand, and a balance in her right, on the reverse of a Domitian, to denote his care about the public coin. There are sometimes two, three, or more figures, on the same reverse; as Honos and Virtus on the reverse of Galba; and three kings, with the emperor crowning them, on a medal of Trajan. (See MEDAL.) There are also the figures of animals on the reverses of some medals; as the eagle and peacock, to denote the apotheosis of princes and princesses; the crocodile, as the symbol of Egypt; a serpent, of Esculapius; a camel, of Arabia, &c.; and elephants in trappings on the reverse of an Antoninus Pius and a Severus, importing that these emperors procured these beasts to entertain the people at the public shows. We meet also with fabulous animals, as the griffin on the reverse of one medal of Gallienus, a centaur on another, and a phœnix on some medals of Constantine and his sons, denoting the perpetuity of the empire.

The second sort of reverses comprehends public monuments and buildings; as the temple of Janus shut, on the reverse of a Nero, to signify the universal peace he gave to the empire; the Macellum, or shambles, which he caused to be erected, on another; the sumptuous bridge built by Trajan over the Tiber, on the reverse of one of his medals; and the Amphitheatre and Naval Column, on those of Titus.

The third sort of reverses includes inscriptions on the table or field of the medal. On several Latin and Greek imperial medals, we find nothing on the reverse but S. C. or Δ. E. for δημαρχικης εξυσιας, inclosed in a crown. Others represent signal occurrences; as VICTORIA GERMANICA IMP. VI. COS. III. on the reverse of M. Aurelius. Others have titles of honour granted to the princes; as S. P. Q. R. OPTIMO PRINCIPI, on the reverse of a Trajan, and also of an Antoninus Pius. Other inscriptions again have respect to public vows, which were made for the emperor every ten years, or sometimes, in the lower empire, every five years. Thus we have on the reverse of a Constantius VOTIS XXX. MULTIS XXXX. importing probably their engagement to make new vows at the expiration of thirty years, that he might reign forty years.

Besides the reverses already enumerated, there are others, called by Addison riddles, which cannot be referred to any of the above classes. Thus, Mercury in the form of a Terminus, standing on a thunder-bolt, on the reverse of an an Auguftus, was probably intended for a rebus, to exprefs the fenfe of that emperor's motto, *feftina lente.* Inftruments of religion were fymbols of the pontifex maximus, and fignified the piety of the prince, on whofe coin they appear; as the lituus, the fimpulum, the afperforium, and the capula, on the reverfe of a Nerva. Two hands joined, holding two ears of corn, and a caduceus betwixt them, on the reverfe of a Titus, import the good harmony and union fubfifting betwixt the prince and the public, the peace arifing from fuch an union, and the plenty, which is the fruit of fuch a peace. Pinkerton on Medals, 2 vols. Addifon's Three Series of Medals, in his Works, vol. i. p. 522, &c. See MEDALS.

REVERSE, in *Fencing*, a back-ftroke.

REVERSED, in *Heraldry*, a thing turned backwards, or upfide down.

REVERSED *Arms*, in *Military Language*, denote thofe whofe butts are flung or held upwards.

REVERSED *Talon*, in *Architecture*. See TALON.

REVERSING, or RENVERSING, in *Mufic*, the inverting of the order of the parts; that is, placing the higher part, or treble, in the room of the lower part or bafs.

Reverfing is frequently practifed in figurative counterpoint, where the bafs ferves as treble, and the treble at the fame time as bafs; and all this in fuch manner, as that the harmony, though very different, is yet as correct as before the reverfing, when the parts were in their natural order.

A reverfed fugue, or counter-fugue, called by the Italians *per contrarii movementi,* is when the guida falls, and the other, inftead of imitating by falling, imitates by rifing; or, it is a figure *per arfin et thefin.* See RENVERSÉ.

REVERSION, REVERSIO, in *Law*, is defined by Coke, a returning of lands, &c. into the poffeffion of the donor or his heirs, after the expiration of the term for which they were given or granted to another. Or, an eftate in reverfion, is the refidue of an eftate left in the grantor, to commence in poffeffion after the determination of fome particular eftate granted out by him.

The word has a double acceptation. The firft is, *jus revertendi, cum ftatus poffeffionis defecerit;* which is no more than an intereft in the land, when the occupation or poffeffion of it fhall fall.

The fecond is, when the poffeffion and eftate, which was parted with for a time, ceafeth, and is determined in the perfon of the alienees, affignees, grantees, or their heirs, or effectually returns to the donor, his heirs or affigns, whence it was derived.

This is the moft proper fignification of the word, which is derived from *revertor:* "Et apte dici non poteft reverfio, antequam revertatur in facto." Littlet.

The difference between a reverfion and a remainder confifts in this, that a remainder is general, and may remain or belong to any man but him that granteth or conveyeth the land, &c.

Whereas a reverfion is to himfelf, from whom the conveyance of the land, &c. proceeded, and is commonly perpetual as to his heirs alfo. And yet fometimes reverfion is confounded with remainder.

A reverfion is never created by deed or writing, but arifes from conftruction of law; a remainder can never be limited, unlefs by either deed or devife. But both are equally transferrable, when actually vefted, being both eftates *in præfenti,* though taking effect *in futuro.* The ufual incidents to reverfions, the doctrine of which is derived from the feudal conftitution, are faid to be fealty and rent. When no rent is referved on the particular eftate, fealty however refults of courfe, as an incident quite infeparable, and may be demanded as a badge of tenure, or acknowledgment of fuperiority, being frequently the only evidence that the lands are holden at all. Where rent is referved, it is alfo incident, though not infeparably fo, to the reverfion. (Co. Litt. 143.) The rent may be granted away, referving the reverfion; and the reverfion may be granted away, reverfing the rent, by fpecial words; but by a general grant of the reverfion, the rent will pafs with it, as incident to it; though by the grant of the rent generally, the reverfion will not pafs. The incident paffes by the grant of the principal, but not *e converfo;* for the maxim of law is, *acceforium non ducit, fed fequitur, fuum principale.* Co. Litt. 151, 152.

The law has carefully diftinguifhed remainders from reverfions. Thus, if one feized of a paternal eftate in fee makes a leafe for life, with remainder to himfelf and his heirs, this is properly a mere reverfion (Cro. Eliz. 321.), to which rent and fealty fhall be incident; and which fhall only defcend to the heirs of his father's blood, and not to his heirs general, as a remainder limited to him by a third perfon would have done (3 Lev. 407.); for it is the old eftate, which was originally in him, and never yet was out of him. And fo, likewife, if a man grants a leafe for life to A, referving rent with reverfion to B and his heirs, B hath a remainder defcendible to his heirs general, and not a reverfion to which the rent is incident; but the grantor fhall be entitled to the rent during the continuance of A's eftate. 1 And. 23.

For the affiftance of thofe who have an eftate in remainder, reverfion, or expectancy, after the death of others, againft fraudulent concealments of their deaths, it is enacted by 6 Ann. c. 18. that all perfons, on whofe lives any lands or tenements are holden, fhall (upon application to the court of chancery and order made thereupon) once in every year, if required, be produced to the court or its commiffioners; or, upon neglect or refufal, they fhall be taken to be actually dead, and the perfon entitled to fuch expectant eftate may enter upon and hold the lands and tenements, till the party fhall appear to be living.

It may further be obferved, that whenever a greater eftate and a lefs coincide and meet in one and the fame perfon, without any intermediate eftate, the lefs is immediately annihilated; or, in the law phrafe, is faid to be *merged,* that is, funk or drowned in the greater. Thus, if there be tenant for years, and the reverfion in fee-fimple defcends to or is purchafed by him, the term of years is merged in the inheritance, and fhall never exift any more. But they muft come to one and the fame perfon in one and the fame right; elfe, if the freehold be in his own right, and he has a term in right of another (*en auter droit*), there is no merger. Therefore, if tenant for years dies, and makes him who hath the reverfion in fee his executor, whereby the term of years vefts alfo in him, the term fhall not merge; for he hath the fee in his own right, and the term of years in the right of the teftator, and fubject to his debts and legacies. So alfo, if he who hath the reverfion in fee marries the tenant for years, there is no merger; for he hath the inheritance in his own right, the leafe in the right of his wife. An eftate-tail is an exception to this rule: for a man may have in his own right both an eftate-tail and a reverfion in the fee; and the eftate-tail, though a lefs eftate, fhall not merge in the fee. For eftates-tail are protected and preferved from merger by the operation and conftruction, though not by the exprefs words, of the ftatute *de donis:* which operation and conftruction have probably arifen upon this confideration; that, in the common cafes of merger of eftates for life or years by uniting with the inheritance, the particular tenant hath the fole intereft in them, and hath full power at any time

to

to defeat, destroy, or surrender them to him that hath the reversion; therefore, when such an estate unites with the reversion in fee, the law considers it in the light of a virtual surrender of the inferior estate. But in an estate-tail the case is otherwise: the tenant for a long time had no power at all over it, so as to bar or to destroy it; and now can only do it by certain special modes, by a fine, a recovery, and the like: it would, therefore, have been strangely improvident, to have permitted the tenant in tail, by purchasing the reversion in fee, to merge his particular estate, and defeat the inheritance of his issue: and hence it has become a maxim, that a tenancy in tail, which cannot be surrendered, cannot also be merged in the fee. Blackst. Comm. b. ii.

Reversion *of Series*, in *Algebra*, is the method of finding the value of an unknown quantity, whose powers enter the terms of a finite or infinite series, by means of another series, in which it does not enter. Thus, if we have

$$y = ax + bx^2 + cx^3 + dx^4 + \&c. \text{ or}$$
$$y = ax^m + bx^{m+p} + cx^{m+2p} + dx^{m+3p} + \&c.$$

or if we have

$$\alpha y + \beta y^2 + \gamma y^3 + \delta y^4 + \&c. =$$
$$ax + bx^2 + cx^3 + dx^4 + \&c.$$

and we can find in these, and other similar cases,

$$x = Ay + By^2 + Cy^3 + Dy^4 + \&c.$$

the original series is said to be reverted. The reversion of series was first proposed by Newton, in a letter to Mr. Oldenbourgh, at that time secretary to the Royal Society, with directions to have it communicated to Leibnitz, and in which the author gave one of the earliest proofs of his great analytical powers. It was afterwards published in his "Analysis per Equationes Numero terminorum Infinitas," and has since engaged the attention of many of the most profound analysts; and accordingly different methods have been suggested for this purpose; but that of M. Arbogast, in his "Calcul des Derivations," is the most complete. We have already, under the article *Calculus of* Derivations, explained, as far as was consistent with the plan of this work, the nature of the symbols, notation, and principles of this doctrine; and we may, therefore, under the present article, give that author's formulæ for reversion, referring the reader for the first principles to the article above-mentioned. Still, however, as many of our readers would probably wish to see the same in its plainer English dress, we propose, in the first instance, to shew the methods commonly employed for this purpose by our own algebraists. This consists in assuming a series of a *proper form* for the required unknown quantity, and then substituting the powers of this series, instead of the powers of that quantity, in the proposed series, and finally equating the co-efficients, whereby the values of the indeterminate or unknown co-efficients, above represented by A, B, C, D, &c. will be obtained.

Let $y = ax + bx^2 + cx^3 + dx^4 + ex^5 + \&c.$ be the proposed series, and

$$x = Ay + By^2 + Cy^3 + Dy^4 + Ey^5 + \&c.$$

the assumed reverted series; then, by substituting the several powers of this series, instead of the powers of x in that proposed, we have

$$y = \left\{ aAy + \left.\begin{matrix} aB \\ + bA^2 \end{matrix}\right\} y^2 \left.\begin{matrix} + aC \\ + 2bAB \\ + CA^3 \end{matrix}\right\} y^3 \left.\begin{matrix} + aD \\ + 2bAC \\ + bB^2 \\ + 3cA^2B \\ dA^2 \end{matrix}\right\} y^4 \left.\begin{matrix} + aE \\ + 2bad \\ + 2bBC \\ + 3cA^2C \\ + 3cAB^2 \\ + 4dA^3B \\ + eA^5 \end{matrix}\right\} y^5 + \&c. \right.$$

Consequently we have $aA = 1$, and each of the other co-efficients equal to zero, it being a known property of two identical functions, that the co-efficients of the like powers of the indeterminate quantity are equal to each other; and since, on the first side of the above expression, y enters only simply, it follows, that all the powers of y on the other side must have their co-efficients equal to zero. Whence we have

$$aA = 1$$
$$aB + bA^2 = 0$$
$$aC + 2bAB + CA^3 = 0$$
$$aD + 2bAC + bB^2 + 3cA^2B + dA^4 = 0$$
$$\&c. \qquad \&c.$$

and hence, again, we have

$$A = \frac{1}{a}$$

$$B = -\frac{b}{a^3}$$

$$C = \frac{2b^2 - ac}{a^5}$$

$$D = -\frac{5b^3 - 5abc + a^2d}{a^7}$$

$$E = \frac{14b^4 - 21ab^2c + 3a^2c^2 + ba^2bd - a^3e}{a^9}$$

$$\&c. \qquad \&c.$$

And since a, b, c, d, &c. are known in the original series, the numeral values of A, B, C, D, &c. in the reverted series are thus determined.

With regard to the *proper form* of the assumed series, we may observe, generally, that in order to find the first term of the reverted series, the rule is, to substitute y^n instead of x in the proposed series, and to equate the least power of y arising from this substitution with unity, which will give the required value of n; and as for the indices of the other powers they will be the same multiples of the above value of n, as they are (in the original series) of *unity*.

Let there be proposed, for example,

$$z = x^m + bx^{m+p} + cx^{m+2p} + dx^{m+3p}, \&c.$$

Here, in order to determine the form of the series to be assumed, let z^n be wrote for x in the given equation, according to the usual method; and then the exponents, supposing z transposed, will be 1, nm, $nm + np$, $nm + 2np$, $nm + 3np$, &c. respectively; of which, the two least (1 and nm) being made equal to each other, n is found $= \frac{1}{m}$; and the differences are $\frac{p}{m}$, $\frac{2p}{m}$, $\frac{3p}{m}$, &c. Whence the series to be assumed is

$$x = z^{\frac{1}{m}} + Bz^{\frac{1+p}{m}} + Cz^{\frac{1+2p}{m}} + Dz^{\frac{1+3p}{m}} + \&c.$$

(for it is evident, by inſpection, that the co-efficient (A) of the firſt term muſt here be an unit).

This ſeries being therefore raiſed to the ſeveral powers of x, in the given equation, and the co-efficients of the homologous terms in the new equation compared together, it will be found that,

$$B = -\frac{b}{m}$$

$$C = -\frac{(1 + m + 2p)b^2 - 2mc}{2m^2}$$

$$D = -\frac{(2m^2 + 9mp + 9p^2 + 3m + 6p + 1)b^3}{6m^3} + \frac{(1 + m + 3p)bc}{m^2} - \frac{d}{m}, \text{ \&c.}$$

From the general value of x, found above, innumerable theorems, for reverſing particular forms of ſerieſes, may be deduced.

Thus, if $x + bx^2 + cx^3 + dx^4$ &c. $= z$; then (m being $= 1$, and $p = 1$) x is $= z - bz + (2bb - c)z^3 - (5b^3 - 5bc + d)z^4$ &c.

And, if $x + bx^3 + cx^5 + dz^7 +$ &c. $= z$; (m being $= 1$, and $p = 2$) $x = z - bz^3 + (3bb - c)z^5 - (12b^3 - 8cb + d)z^7$ &c.

Alſo, if $x^{\frac{1}{2}} + bx^{\frac{3}{2}} + cx^{\frac{5}{2}} + dx^{\frac{8}{2}}$, &c. $= z$; then (m being $= \frac{1}{2}$, and $p = 1$) $x = z^2 - 2bz^4 + (7bb - 2b)z^6 - (30b^3 - 18bc + 2d)z^3$ &c. &c.

It may be obſerved, that in all theſe forms of ſerieſes, the firſt term is without a co-efficient (which renders the concluſion much more ſimple). Therefore, when the ſeries to be reverted has a co-efficient in its firſt term, the whole equation muſt be firſt divided thereby. Thus, if the equation was $3x - 6x^2 + 8x^3 - 13x^4$ &c. $= y$; by dividing the whole by 3 it will become $x - 2x^2 + \frac{8x}{3} - \frac{13x^4}{3}$ &c. $= \frac{1}{3}y$; where, putting $z = \frac{1}{3}y$, we have, by For. 1. $x = z + 2z^2 + \frac{16}{3}z^3$ &c. $= \frac{y}{3} + \frac{2y^2}{9} + \frac{16y^3}{81}$ &c.

When there are two ſeries, conſiſting of like powers of x and y, as

$$ax + bx^2 + cx^3 + \text{ \&c.} = \alpha y + \beta y^2 + \gamma y^3 + \text{ \&c.}$$

aſſume, as in the preceding caſes,

$$x = Ay + By^2 + Cy^3 + Dy^4 + \text{ \&c.}$$

and let his, and its powers, be ſubſtituted for x, and the powers of x, and we ſhall have

$$\alpha y + \beta y^2 + \gamma y^3 + \delta y^4 + \text{ \&c.} =$$

$$aAy + \left.\begin{matrix} aB \\ bA^2 \end{matrix}\right\} y^2 + \left.\begin{matrix} aC \\ + 2bAB \\ + cA^3 \end{matrix}\right\} y^3 + \left.\begin{matrix} aD \\ + 2bAC \\ + bB^2 \\ + 3cA^2B \\ + dA^4 \end{matrix}\right\} y^4 + \text{ \&c.}$$

in which, inſtead of equating all our co-efficients to zero, they muſt now be equated to $\alpha, \beta, \gamma, \delta, \varepsilon$, &c.; that is

$$\begin{aligned} &aA = \alpha \\ &aB + bA^2 = \beta \\ &aC + 2bAB + cA^3 = \gamma \\ &aD + 2bAC + bB^2 + 3cA^2B + dA^4 = \delta \\ &\quad\text{\&c.} \qquad\qquad\qquad \text{\&c.} \end{aligned}$$

Whence we have the following values of A, B, C, D, &c. *viz.*

$$A = \frac{\alpha}{a}$$

$$B = \frac{\beta - bA^2}{a}$$

$$C = \frac{\gamma - 2bAB - cA^3}{a}$$

$$D = \frac{\delta - bB^2 - 2bAC - 3cA^2B - dA^4}{a}$$

$$E = \frac{- 2bBC - 2bAD - 3cAB^2 - 3cA^2C - 4dA^3B - eA^5}{a}$$

whence the values of A, B, C, D, &c. become determined as before.

In all the above caſes, the ſeveral co-efficients a, b, c, d, &c. are conceived to be totally independent of each other, and when this is the caſe, that is, when no ſpecific law obtains between them, it is obvious, that we can proceed no farther in the practical ſolution than we have derived terms in the theoretical inveſtigation; but if, as moſt commonly happens, the ſeries we are deſirous of reverting ariſe from the expanſion of any function, ſo that an uniform law is obſerved between its ſeveral co-efficients; a ſimilar law may frequently be diſcovered in the reverted ſeries, though this generally depends rather upon an induction than from any peculiar form under which the reverted co-efficients ariſe, which is indeed the great imperfection of this method of reverſion.

Let us take, for example, the ſeries

$$x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \frac{x^5}{5} \text{ \&c.} = z,$$

to find the value of x in terms of z.

This agrees with our firſt form; where $a = 1$, $b = \frac{1}{2}$, $c = \frac{1}{3}$, $d = \frac{1}{4}$, &c. and we have

$$\frac{1}{a} = 1$$

$$- b = -\frac{1}{2}$$

$$+ (2b^2 - ac) = \frac{1}{2} = \frac{1}{3} = \frac{1}{6} = \frac{1}{2 \cdot 3}$$

$$- (5b^3 - 5abc + a^2d) = \frac{1}{24} = \frac{1}{2 \cdot 3 \cdot 4}$$

$$+ (14b^4 - 21ab^2c + 3a^2c^2 + 6a^2bd - a^3e) = \frac{1}{120} = \frac{1}{2 \cdot 3 \cdot 4 \cdot 5}.$$

And hence, inferring the ſame law to have place throughout, we have

$$x = z - \frac{1}{2}z^2 + \frac{1}{2 \cdot 3}z^3 - \frac{1}{2 \cdot 3 \cdot 4}z^4 + \frac{1}{2 \cdot 3 \cdot 4 \cdot 5}z^5 - \text{ \&c.}$$

We muſt not, however, look for the like uniformity of reſult in all caſes. As an example of the contrary, let there be propoſed the ſeries

$$x - \frac{1}{2}x^2 + \frac{1}{2 \cdot 3}x^3 - \frac{1}{2 \cdot 3 \cdot 4}x^4 + \frac{1}{2 \cdot 3 \cdot 4 \cdot 5}x^5 - \text{ \&c.}$$
$$= \frac{1}{2}y + \frac{1}{3}y^2 + \frac{1}{4}y^3 + \frac{1}{5}y^4 + \frac{1}{6}y^5 + \text{ \&c.}$$

to find x in terms of y.

Here

$$\text{Here } a = 1,\ b = \frac{1}{2},\ c = \frac{1}{2 \cdot 3},\ d = \frac{1}{2 \cdot 3 \cdot 4},\ \text{\&c.}$$

$$\alpha = \frac{1}{2},\ \beta = \frac{1}{3},\ \gamma = \frac{1}{4},\ \delta = \frac{1}{5},\ \text{\&c.}$$

whence

$$\frac{\alpha}{a} = \frac{1}{2} = \mathrm{A}$$

$$\frac{\beta - b\,\mathrm{A}^2}{a} = \frac{11}{24} = \mathrm{B}$$

$$\frac{\gamma - 2b\,\mathrm{A\,B} - c\,\mathrm{A}^3}{a} = \frac{11}{24} = \mathrm{C}$$

$$\frac{\delta - b\,\mathrm{B}^2 - 2b\,\mathrm{A\,C} - 3c\,\mathrm{A}^2\mathrm{B} - d\,\mathrm{A}^4}{a} = \frac{1381}{2880} = \mathrm{D}$$

$$\frac{\varepsilon - 2b\,\mathrm{B\,C} - 2b\,\mathrm{A\,D} - 3c\,\mathrm{A\,B}^2 - \text{\&c.}}{a} = \frac{1543}{3840} = \mathrm{E}$$

whence the propofed feries is

$$x = \frac{1}{2}y + \frac{11}{24}y^2 + \frac{11}{24}y^3 + \frac{1381}{2880}y^4 + \frac{1543}{3840}y^5 + \text{\&c.}$$

in which no law of continuation can be difcovered, either by induction, or otherwife.

In this refpect the fymbols and notation of Arbogaft have a decided advantage, as by thefe means the law of formation in the reverted feries is exhibited in the cleareft poffible point of view. Taking for example our firft feries, under the form

$$y = \beta x + \gamma x^2 + \delta x^3 + \varepsilon x^4 + \text{\&c.}$$

$$\text{to find } x = b y + c y^2 + d y^3 + e y^4 + \text{\&c.}$$

Here the general refult is expreffed by

$$x = \beta^{-1} y + \frac{1}{2} \cdot \mathrm{D} \cdot \beta^{-2} \cdot y^2 + \frac{1}{3}\genfrac{}{}{0pt}{}{\mathrm{D}^2}{\mathrm{C}} \cdot \beta^{-3} \cdot y^3 + \frac{1}{4}\genfrac{}{}{0pt}{}{\mathrm{D}^3}{\mathrm{C}} \cdot \beta^{-4} \cdot y^4 + \text{\&c.}$$

where the law is clearly expreffed by means of the fymbol D; and if it be requifite, the co-efficients may be eafily expreffed in terms of β, γ, δ, &c. thus $\beta^{-1} = \beta^{-1}$.

$$\frac{1}{2}\mathrm{D} \cdot \beta^{-2} = -\beta^{-3}\gamma = \frac{-\gamma}{\beta^3}$$

$$\frac{1}{3} \cdot \genfrac{}{}{0pt}{}{\mathrm{D}^2}{\mathrm{C}} \cdot \beta^{-3} = \frac{1}{3 \cdot 2} \cdot \mathrm{D}\,(-3\,\beta^{-4} \cdot \gamma)$$

$$= \frac{1}{3 \cdot 2}(-3 \cdot -4\,\beta^{-5} \cdot \gamma^2 - 3\,\beta^{-4} \cdot 2\,\delta)$$

$$= 2\,\beta^{-5} \cdot \gamma^2 - \beta^{-4} \cdot \delta = \frac{2\gamma^2 - \beta\delta}{\beta^5}$$

$$\frac{1}{4} \cdot \genfrac{}{}{0pt}{}{\mathrm{D}^3}{\mathrm{C}} \cdot \beta^{-4} = \frac{1}{4}\Big(\mathrm{D}\,\beta^{-4} \cdot \genfrac{}{}{0pt}{}{\mathrm{D}^2}{\mathrm{C}} \cdot \gamma + \genfrac{}{}{0pt}{}{\mathrm{D}^2}{\mathrm{C}} \cdot \beta^{-4} \cdot \mathrm{D} \cdot \gamma^2 + \genfrac{}{}{0pt}{}{\mathrm{D}^3}{\mathrm{C}} \cdot \beta^{-5} \cdot \gamma^3\Big)$$

$$= \frac{1}{4}\Big(4\,\beta^{-5} \cdot \varepsilon + \frac{4 \cdot 5}{1 \cdot 2}\beta^{-6} \cdot 2\gamma\delta - \frac{4 \cdot 5 \cdot 6}{1 \cdot 2 \cdot 3}\beta^{-7} \cdot \gamma^3$$

$$= \frac{5\beta\gamma\delta - 5\gamma^3 - \beta^2\varepsilon}{\beta^7}$$

which will be found to agree with our former refult.

We refer the reader who may not be acquainted with the ufe and fignification of the above fymbols and notation, to our article DERIVATIONS.

In thefe formulæ the quantities β, γ, δ, &c. although totally independent, are yet apparently connected by means of the fymbol of derivation D; but the application is generally made to feries which exprefs the evolution of fome function, and the co-efficients of which feries are confequently formed after a certain law: for inftance

$$1 + x + \frac{x^2}{1 \cdot 2} + \frac{x^3}{1 \cdot 2 \cdot 3} + \text{\&c.}$$

is the evolution of e^x, and if y be put

$$= 1 + x + \frac{x^2}{1 \cdot 2} + \frac{x^3}{1 \cdot 2 \cdot 3} + \text{\&c.}$$

then, by the theorem for reverfion,

$$x = \beta^{-1}(y - 1) + \frac{1}{2}\mathrm{D} \cdot \beta^{-2} \cdot (y-1)^2 + \frac{1}{3}\genfrac{}{}{0pt}{}{\mathrm{D}^2}{\mathrm{C}} \cdot \beta^{-3} \cdot (y-1)^3\ \text{\&c.}$$

but in the propofed form

$$\beta = 1 \,.\, \mathrm{D} \,.\, \beta = \frac{1}{1 \cdot 2} \cdot \genfrac{}{}{0pt}{}{\mathrm{D}^2}{\mathrm{C}} \cdot \beta = \frac{1}{1 \cdot 2 \cdot 3},\ \text{\&c.}$$

$$\text{therefore } x = (y-1) - \frac{1}{2}(y-1)^2 + \frac{1}{3}(y-1)^3 - \text{\&c.}$$

And in the fame way from reverfion, if

$$z = x + \frac{x^3}{2 \cdot 3} + \frac{3x^5}{5 \cdot 8} + \text{\&c.}$$

$$\text{by reverfion}\quad x = z - \frac{z^3}{1 \cdot 2 \cdot 3} + \frac{z^5}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5} - \text{\&c.}$$

We refer the reader for more on this fubject to Woodhoufe's "Principles of Analytical Calculation," and Arbogaft's "Calcul des Derivations;" and for the principles of the method ftated in the former part of this article, to Simpfon's "Fluxions," vol. ii. p. 302; Maclaurin's Algebra, p. 263. See alfo Newton's "Analyfis per Equationes," aad Bonnycaftle's Algebra, vols. i. and ii.

REVERSIONS, in the *Doctrine of Annuities*, are either contingent or abfolute. (For the former fee the article SURVIVORSHIPS.) Of abfolute reverfions, the cafes are very few, and the folutions fimple and eafy. An *abfolute* reverfion, whether it is to take place after the extinction of a fingle life, or of any number of lives, or after the expiration of a given number of years, muft neceffarily be more valuable, in general, than a *contingent* reverfion; which, depending on events altogether uncertain, will be of lefs value in proportion as thofe events are lefs probable. The following problems include the principal cafes of abfolute reverfions, and their folutions being almoft felf-evident, require no explanation.

PROBLEM I.

To find the value of the reverfion in fee of an annuity after a given number of years.

Solution.—Deduct the value of an annuity for the given term from the perpetuity; multiply the remainder into the annuity, and the product will be the value required.

Example.—Let the annuity be 15*l.* the term 15 years, and the rate of intereft 4*l.* *per cent.* By Tab. III. (fee ANNUITIES) the value of an annuity for 15 years is 11.118, which being deducted from 25 (the perpetuity), the remainder, or 13.882, multiplied into 15 (the given annuity),

nuity), produces 208.23*l.* or 208*l.* 4*s.* 7*d.* nearly for the value required.

Corollary.—In like manner, the value of an annuity for a given term of years, after the expiration of another term, may be obtained by ſubtracting the value for the preſent term from the value during the preſent and reverſionary terms: thus, the value of an annuity of 10*l.* during 15 years, after the expiration of 12 years, is found by ſubtracting 9.385 (the value for 12 years at 4*l. per cent.* by Tab. III. ANNUITIES) from 16.329 (the value by the ſame table for 27 years), and multiplying 6.944, the difference, into 10; which produces 69.440*l.* or 69*l.* 8*s.* 10*d.* nearly for the value required.

PROB. II.

To find the value of the reverſion in fee of an eſtate, or annuity, after the extinction of a given life.

Solution.—Deduct the value of an annuity on the given life from the perpetuity; multiply the remainder into the annual produce of the eſtate, or into the annuity, and the product will give the value ſought.

Example.—Let the annual produce of the eſtate or annuity be 18*l.* the age of the poſſeſſor of ſuch eſtate or annuity 35, and the rate of intereſt 3*l. per cent.* By Tab. VI. (LIFE-*Annuities*), the value of an annuity on a life of 35, at 3*l. per cent.* is 15.938. The perpetuity, at the ſame rate, is 33.333; the difference between theſe two values, or 17.395, multiplied into 18, produces 313.110*l.* or 313*l.* 2*s.* 2*d.* for the anſwer.

Corollary.—The reverſion in fee after two or three joint lives, or after the longeſt of two or three lives, is found in the ſame manner, by deducting the values of thoſe lives from the perpetuity. Thus the value of two joint lives, aged 30 and 35, by Tab. VIII. (LIFE-*Annuities*), at 3*l. per cent.* is 12.131, which being deducted from 33.333, and multiplied into 5, will give 106.01*l.* or 106*l.* 0*s.* 2*d.* for the value of the reverſion in fee of an eſtate of 5*l. per annum* after the extinction of thoſe *joint* lives. In like manner, the value of the reverſion in fee of an eſtate of 10*l. per annum,* after three joint lives, aged 30, 35, and 40 years, and computing at 4 *per cent.* may be found by Prob. IV. (LIFE-*Annuities*) to be 163.81*l.* or 163*l.* 16*s.* 2*d.*; and after the longeſt of thoſe three lives, it may be found by Prob. V. (LIFE *Annuities*) to be 59.980*l.* or 59*l.* 19*s.* 7*d.* nearly.

PROB. III.

To find the value of a given *ſum,* payable on the extinction of a given life.

Solution.—Deduct, as in the preceding problem, the value of an annuity on the given life from the perpetuity; multiply the remainder by the given ſum, and divide the product by the perpetuity increaſed by unity; the quotient will be the anſwer.

Example.—Let the ſum be 1000*l.* the age of the given life 45 years, and the rate of intereſt 5*l. per cent.* By Tab. VI. (LIFE-*Annuities*), the value of an annuity, on a life of 45, at 5 *per cent.* is 11.105, which being deducted from 20, the perpetuity, leaves 8.895. This remainder, multiplied into 1000, and divided by 21, gives 423.571*l.* or 423*l.* 11*s.* 5*d.* for the value required.

In the ſame manner may be found the value of a given ſum, payable on the extinction of two or three joint lives, or of the longeſt of two or three lives. Thus, the value of two joint lives, of 40 and 50, at 4 *per cent.* by Tab. IX. (LIFE-*Annuities*), being 8.834; the difference between this value and 25, the perpetuity, will be 16.166; which being multiplied into 1000, and the product divided by 26, will give 621.77*l.* or 621*l.* 15*s.* 5*d.* for the preſent value of 1000*l.* payable on the extinction of thoſe joint lives. Again, by the rule in the article on LIFE-*Annuities*, and Tables VI. and IX. the value of an annuity on the longeſt of two lives, aged 40 and 50, at 4 *per cent.* may be found equal to 15.627, which being deducted from 25, and the remainder multiplied into 1000, will produce 9373, and this, divided by 26, will give 360.5*l.* or 360*l.* 10*s.* for the value of 1000*l.* payable on the deceaſe of the ſurvivor of thoſe two lives.

Remark.—It will be obſerved, that the value of the reverſion of an *annuity* is greater than the value of the reverſion of a *ſum,* in the proportion of 1*l.* increaſed by its intereſt for a year to 1*l.*; or, which is the ſame thing, in the proportion of the perpetuity increaſed by unity to the perpetuity. In the one caſe, the payment of the annuity becomes due at the end of the year, in which the life or lives become extinct; in the other caſe, the ſum only becoming payable at the end of that year, the annual intereſt upon it cannot be received till the end of the ſucceeding year. See Dr. Price's Treatiſe on Reverſionary Payments. Note E, Appendix.

PROB. IV.

To find the value of an annuity for a given term of years after the extinction of any number of lives.

Solution.—Subtract the value of an annuity on the life or lives from the perpetuity; multiply the remainder into the preſent value of an annuity for the given term, and divide the product by the perpetuity; the quotient multiplied into the annuity will be the value ſought.

Example.—Let it be required to determine the value of an annuity of 10*l.* for 20 years, which is not to commence till the extinction of a life of 25, reckoning intereſt of money at 5 *per cent.*. By Tab. VI. (LIFE-*Annuities*) the value of an annuity on a life of 25, is 13.567; this value, ſubtracted from 20, and multiplied into 12.4622, the value of an annuity for 20 years, by Tab. III. (ANNUITIES) produces 80.1693; which being divided by 20, and the quotient multiplied into 10, gives 40.085*l.* or 40*l.* 1*s.* 9*d.* nearly for the anſwer. By proceeding in the ſame manner, the value of an annuity of 15*l.* for 25 years, after the extinction of two *joint* lives, aged 30 and 40, and after the longeſt of thoſe lives, computing at 4 *per cent.* may be reſpectively found to be equal to 136*l.* and 70*l.* 8*s.* 2*d.* by Tab. VI. and IX. (LIFE-*Annuities*), and Tab. III. (ANNUITIES).

PROB. V.

To find the value of an annuity after the deceaſe of a given life, or of any number of lives, during the continuance of another life, or of any number of lives, to be nominated at the time of ſuch deceaſe.

Solution.—This differs very little from the preceding problem, and is anſwered much in the ſame manner. Subtract the value of an annuity, on the life or lives, from the perpetuity; multiply the remainder into the value of the life or lives at the time of their nomination, and alſo into the given annuity; divide the product by the perpetuity, and the quotient will be the anſwer.

Example.—Required the value of an annuity of 100*l.* after the deceaſe of a perſon aged 30, during the continuance of the life of a perſon to be nominated at the time of ſuch deceaſe, whoſe age may be ſuppoſed to be then about 15 years, reckoning intereſt of money at 4*l. per cent.*

By Tab. VI. the value of a life of 30 is 14.781, which being ſubtracted from 25, and the remainder multiplied into 16.791 (the value by the ſame table of an annuity on a life of 15), and alfo into 100, the given annuity produces 17.158.7. This fum, divided by 25, gives 686.3*l.* or 636*l.* 6*s.* for the value fought.

If, inftead of a fingle life of 30, the annuity had been to commence after the longeft of two lives, aged 30 and 35, to continue during the longeft of two lives, fuppofed to be 10 and 15 years of age at the time of the deceafe of the former lives, the prefent value in that cafe, at the fame rate of intereft, would be, according to the values in Tab. VI. and VIII. (LIFE-*Annuities*), equal to 583.234*l.* or 583*l.* 4*s.* 8*d.* nearly. See Simpfon's Select Exercifes; Dr. Price's Treatife on Reverfionary Payments; and Mr. Morgan's Doctrine of Life Annuities.

REVERT, in *Law*. A thing is faid to revert when it returns or falls back to its firft owner.

All honours and royal fees alienated revert to the crown, or are revertible. Apanages, or portions of younger fons of kings, are granted on condition of reverfion.

REVERTENS, Lat. returning or defcending: as, *Ductus revertens, conducimento, ritornante*, all imply a regular defcent of found; which the Italians likewife call *defcendente di grado.*

REVERTER, *Formedon in the*, in *Law*. See FORMEDON.

REVES, JAMES DE, in *Biography*, a learned Dutch Proteftant divine and profeffor, the fon of a Dutch burgomafter of Deventer, was born in 1586. While he was very young he was taken to Amfterdam, where he was inftructed in the Latin, Greek, and French languages, and then fent to purfue his ftudies at the univerfity of Leyden. From this place he removed to the univerfity of Franeker, where he learned the Hebrew under the two Drufiufes. In 1610 he travelled into France for farther improvement, where he refided two years, chiefly at Saumur, Rochelle, and Orleans. He next entered upon the duties of the Chriftian miniftry, and was, in 1641, chofen principal and firft profeffor of the theological college of the ftates of Holland and Weft Friefland at Leyden. He died at Leyden in 1658, at the age of 72. His works are very numerous, of which the titles are given in the General Biography: among thefe may be mentioned, "Belgicarum Ecclefiafticarum Doctrina et Ordo," &c.; "Hiftoria Pontificum Romanorum contracta, et ad Annum 1632 contracta;" "Daventriæ illuftratæ, five Hiftoriæ Urbis Daventrienfis, Lib. vi." 1651, 4to. De Reves publifhed an improved edition of "The Book of Pfalms," in Dutch verfe, by Peter Dathænus, and he was concerned in revifing the Dutch verfion of the Old Teftament, which was printed at Leyden in 1637.

REVETEMENT, in *Fortification*, is a ftrong wall built on the outfide of the rampart and parapet, to fupport the earth, and prevent its rolling into the ditch. See CORDON.

REVEZ, in *Geography*, a town of Portugal, in the province of Tras os Montes; 10 miles N.E. of Lamego.—Alfo, a town of France, in the department of the Sambre and Meufe; 20 miles S. of Bruffels.

REUGNY, a town of France, in the department of the Indre and Loire; 9 miles N.E. of Tours.

REVIERS, a town of France, in the department of the Calvados; 8 miles N. of Caen.

REVIEW, in *Chancery*. A *bill of review* is where the caufe has been heard, and a decree therein figned and enrolled; but fome error in law appears in the body of the decree, or fome new matter is difcovered in time, after the decree made. A bill of review is not exhibited but by leave of the court.

A *commiffion of review* is a commiffion fometimes granted, in extraordinary cafes, to revife the fentence of the court of delegates; when it is apprehended they have been led into a material error. This commiffion the king may grant, although the ftatutes 24 and 25 Hen. VIII. declare the fentence of the delegates definitive; becaufe the pope, as fupreme head by the canon law, ufed to grant fuch commiffions of review; and fuch authority, as the pope heretofore exerted, is now annexed to the crown by ftats. 26 Hen. VIII. cap. 1. and 1 Eliz. cap. 1. But this is not matter of right, which the fubject may demand *ex debito juftitiæ*, but merely a matter of favour, and which, therefore, is often denied. See APPEAL.

REVIEW, in *Literary Hiftory*. See JOURNAL and MAGAZINE.

REVIEW, in *Military Language*, is the appearance of an army, or part of an army, arranged in form of battle, and exercifed, in prefence of the king or of a general. The firings in reviews are generally thirty-fix rounds, *viz.* by companies; by grand divifions; by fub-divifions; obliquely, advancing, retreating; by files; in the fquare; ftreet-firings, advancing and retreating; and, laftly, a volley.

The intention of a review is to know the condition of the troops, and to fee that they are complete, and that they perform their exercife and evolutions well.

REVIGNY, in *Geography*, a town of France, in the department of the Meufe, and chief place of a canton, in the diftrict of Bar-fur-Ornain; 15 miles S. of St. Menehould. The place contains 1800, and the canton 9087 inhabitants, on a territory of $162\frac{1}{2}$ kiliometres, in 17 communes.

REVILING *the Ordinances of the Church*, in *Law*, is an offence punifhable by ftatute. Thus it is provided by 1 Edw. VI. cap. 1 and 1 Eliz. cap. 1. that whoever reviles the facrament of the Lord's fupper fhall be punifhed by fine and imprifonment. See COMMON *Prayer*.

REVILLA GIGEDO, in *Geography*, an ifland in the North Pacific ocean, nearly of an oval form, 50 miles long from N. to S., and 23 in breadth. Capt. Vancouver called it by this name from refpect to Conde de Revilla Gigedo, viceroy of New Spain. N. lat. 55° 6′ to 55° 55′. E. long. 228° 27′ to 229° 15′.

REVILLA *Gigedo, Canal of*, a ftrait of the North Pacific ocean, between the forementioned ifland and that of Gravina.

REVILLY, a town of France, in the department of the Indre; 9 miles N. of Iffoudun.

REVIN, a town of France, in the department of the Ardennes, on the Meufe; 6 miles N.E. of Rocroy.

REVINGHEIM, a town of France, in the department of the North; 5 miles N. of Bailleul.

REVISE, among *Printers*, a fecond proof of a fheet to be printed, taken off after correcting the firft.

REVIVAL *of perfons hanged*. See EXECUTION.

REVIVER. See REVIVOR.

REVIVIFICATION, RESUSCITATION, or *Reduction*, in *Chemiftry*, the art of reftoring a mixed body to its firft ftate, after it had been altered and difguifed by diffolution, calcination, and the like. See REDUCTION, and the feveral metals.

REVIVIFIED ANTIMONY. See ANTIMONY.

REVIVING, in *Law*, a renewing of rents and actions after they had been extinguifhed.

REVIVOR, or REVIVER, *Bill of*, is where a bill has been exhibited in chancery againft one who anfwers: but, before the caufe is heard, or at leaft before the decree is enrolled, one of the parties dies.

In this cafe, a bill of revivor muft be brought, praying the

the former proceedings may ftand revived, and be put in the fame condition as at the time of the abatement.

REUNION, *Ifle de la*, in *Geography*. See Bourbon.

REVOCATION, Revocatio, in *Law*, the act of revoking, calling back, or annulling, a power, grant, &c. made before.

The revocation of an offer, after it is accepted of, is invalid. All preceding wills or teftaments are revoked by the laft; but the republication of a former will revokes one of a later date, and eftablifhes the firft again.

The cancelling or revoking of a teftament is one of the three ways of avoiding it. For, though I make a laft will and teftament irrevocable in the ftrongeft words, yet I am at liberty to revoke it, becaufe my own act or words cannot alter the difpofition of law, fo as to make that irrevocable which is in its own nature revocable. (8 Rep. 82.) For this, fays lord Bacon (Elem. c. 19.) would be for a man to deprive himfelf of that which of all other things is moft incident to human condition; and that is, alteration or repentance. It hath alfo been held, that without an exprefs revocation, if a man, who hath made his will, afterwards marries and hath a child, this is a prefumptive or implied revocation of his former will, which he made in his ftate of celibacy. (Ld. Raym. 441. 1 P. Wms. 204.) The Romans were alfo wont to fet afide teftaments as being "inofficiofa," deficient in natural duty, if they difinherited or totally paffed by (without affigning a true and fufficient reafon) any of the children of the teftator. (Inft. 2. 18. 1.) But if the child had any legacy, however fmall, it was a proof that the teftator had not loft his memory or his reafon, which otherwife the law prefumed; but was then fuppofed to have acted thus for fome fubftantial caufe; and, in fuch cafe, no "querela inofficiofi teftamenti" was allowed. Hence probably has arifen that groundlefs vulgar error of the neceffity of leaving the heir a fhilling, or fome other exprefs legacy, in order to difinherit him effectually: whereas the law of England makes no fuch conftrained fuppofition of forgetfulnefs or infanity; and, therefore, though the heir or next of kin be totally omitted, it admits no "querela inofficiofi" to fet afide fuch a teftament.

The revocation of a devife of lands and tenements muft be in writing, figned by the teftator, or fome other perfon in his prefence, and by his exprefs direction; and be fubfcribed, in his prefence, by three or four credible witneffes.

A prior clauftral is revocable at pleafure. The revocation of the edict of Nantes was fatal to the French Proteftants.

REVOCATION *of Ufes*. See Use.

REVOLAX, in *Geography*, a town of Sweden, in the government of Ulea; 13 miles E. of Braheftad.

REVOLSKOI, a town of Ruffia, in the government of Viborg; 128 miles N.W. of Povenetz.

REVOLUTION, formed from *revolvo, to roll backwards*, in *Politics*, denotes a grand turn or change of government.

There are no ftates in the world but have undergone frequent revolutions. The abbot de Vertot has furnifhed us with two or three good hiftories of the revolutions of Sweden, the revolutions of Rome, &c.

The Revolution, ufed with us by way of eminence, denotes the great turn of affairs in England in 1688, when king James II. abdicating, the prince and princefs of Orange were declared king and queen of England, &c. See *Right of* Crown.

The declaration of the prince of Orange, which was difperfed over the kingdom previoufly to his arrival, and which was received with univerfal approbation, contained an enumeration of the grievances of the nation, and the ftatement of which evinced the abfolute neceffity of a change in the government. Thefe grievances were the difpenfing and fufpending power exercifed by the king; the court of ecclefiaftical commiffion; the filling of all offices with Catholics, and the raifing of a Jefuit to be privy-counfellor; the open encouragement given to popery, by building every where churches, colleges, and feminaries for that fect; the difplacing of judges, if they refufed to give fentence according to orders received from court; the cancelling of the charters of all the corporations, and the fubjecting of elections to arbitrary will and pleafure; the treating of petitions, even the moft modeft, and from perfons of the higheft rank, as criminal and feditious; the committing of the whole authority of Ireland, civil and military, into the hands of papifts; the affuming of an abfolute power over the religion and laws of Scotland, and openly exacting in that kingdom an obedience without referve; and the violent prefumptions againft the legitimacy of the prince of Wales. The redrefs of thefe grievances was the prince's profeffed object; and for this purpofe he propofed to have a loyal and free parliament affembled, in order to provide for the fafety and liberty of the nation, as well as to examine the proofs of the prince of Wales's legitimacy. The prince, at the fame time avowed, that he had no other defign than to procure the full and lafting fettlement of religion, liberty, and property. On the moment of alarm the Englifh minifters redreffed fome of the grievances of which complaint had been made; but there ftill remained the foundation of all grievances upon which they could again in an inftant be erected, an arbitrary and defpotic power in the crown. For this ufurpation there was no poffible remedy, but by a full declaration of all the rights of the fubject, in a free parliament. On the 21ft of October 1688, the prince fet fail from Helvoetfluys, with a fleet of near 500 veffels, and an army of above 14,000 men. A ftorm drove him back, but he foon repaired his lofs, and made fail with a fair wind towards the weft of England. The fame wind detained the king's fleet in its ftation near Harwich, and enabled the Dutch to pafs the ftraits of Dover without oppofition. Both fhores were covered with multitudes of people, who, befides admiring the grandeur of the fpectacle, were held in anxious fufpenfe by the profpect of an enterprize, the moft important, which, during fome ages, had been undertaken in Europe. The prince had a profperous voyage, and landed his army fafely in Torbay, on the 5th of November, (1688,) the anniverfary of the gunpowder treafon. The firft perfon who joined the prince was major Buerington; and he was quickly followed by the gentry of the counties of Devon and Somerfet. Sir Edward Seymour made propofals for an affociation, which every one figned. By degrees, the earl of Abingdon, Mr. Ruffel, fon of the earl of Bedford, Mr. Wharton, Godfrey, Howe, came to Exeter. All England was in commotion. Lord Delamere took arms in Chefhire, the earl of Danby feized York, the earl of Bath, governor of Plymouth, declared for the prince, and the earl of Devonfhire made a like declaration in Derby. The nobility and gentry of Nottinghamfhire embraced the fame caufe; and every day there appeared fome effect of that univerfal combination into which the nation had entered againft the meafures of the king. Even thofe who took not the field againft him, were able to embarrafs and confound his counfels. A petition for a new parliament was figned by 24 bifhops and peers of the greateft diftinction, and was prefented to the king. No one thought of oppofing or refifting the invader. The army deferted him; and feveral officers of diftinction informed Feverfham, the general, that they could not in confcience

fight

fight against the prince of Orange. Prince George of Denmark and the princess Anne abandoned the king: an event which, concurring with several other incidents that had occurred, and which threatened the overthrow of his royal authority, occasioned an alarm approaching to consternation, and a grief that caused him to shed tears. In this state of distress, deserted by his friends and family, and despised by his enemies, he was as much depressed, as he had before been vainly elated by prosperity. He issued writs for a new parliament, and deputed commissioners to treat with the prince of Orange. The king every day more and more alarmed by accounts of the general disaffection that prevailed, and misled by imprudent counsel operating upon his fears, precipitately embraced the resolution of escaping into France, having sent before him the queen and the infant prince. Nor before his departure did he provide for the exercise of the administration; he threw the great seal into the river, and recalled all the writs that had been issued for the election of the new parliament. During this temporary dissolution of government, the populace became masters, rose in a tumult, destroyed the mass-houses, and even attacked and rifled the houses of the Florentine envoy and Spanish ambassador, where many Catholics had lodged their valuable effects. Having discovered Jefferies, the chancellor, notwithstanding the disguise he had assumed in order to fly the kingdom, they so abused him that he died soon after. Feversham disbanded the troops, and without either disarming or paying them, let them loose to prey upon the country. In this extremity, the bishops and peers, who were in town, assembled, and having chosen the marquis of Halifax speaker, gave directions to the mayor and aldermen for keeping the peace of the city, and issued orders, which were readily obeyed, to the fleet, the army, and all the garrisons; and they made applications to the prince of Orange, whose enterprize they highly applauded, and whose success they joyfully congratulated. The prince, availing himself of the popularity of his cause, approached nearer and nearer to London. In the mean while the king, though disguised, was discovered and seized by the populace at Feversham, where he was attempting to make his escape, and soon after arrived in London. Whilst he remained at Whitehall he received few marks of attention and respect; and whilst he remained there the Dutch guards took possession of the palace. In consequence of a message conveyed to him from the prince by Halifax, Shrewsbury, and Delamere, which commanded him to leave the palace, he removed to Ham, a seat of the duchess of Lauderdale's. Having obtained permission he retired to Rochester, where he remained for some days. But finding that the church, the nobility, the city, the country, all concurred in neglecting him, and leaving him to his own counsels, he submitted to his melancholy fate; and being urged by earnest letters from the queen, he privately embarked on board a frigate which waited for him; and he arrived safely at Ambleteuse in Picardy, whence he hastened to St. Germains. The prince, in compliance with an address from about 90 peers and bishops, summoned a convention, which completed the revolution.

The true ground and principle upon which that memorable event proceeded, was an entirely new case in politics, which had never before happened in our history; the abdication of the reigning monarch, and the vacancy of the throne thereupon. Accordingly, in a full assembly of the lords and commons, met in *Convention* (which see) on occasion of this vacancy, both houses came to this resolution (Jan. 22, 1689): "That king James the Second, having endeavoured to subvert the constitution of the kingdom, by breaking the original contract between king and people; and, by the advice of Jesuits, and other wicked persons, having violated the fundamental laws; and having withdrawn himself out of this kingdom, has abdicated the government, and that the throne is thereby vacant."

The facts themselves thus appealed to, *viz.* the king's endeavour to subvert the constitution, by breaking the original contract, his violation of the fundamental laws, and his withdrawing himself out of the kingdom, were evident and notorious: and the consequences drawn from these facts (namely, that they amounted to an abdication of the government (see ABDICATION); which abdication did not affect only the person of the king himself, but also all his heirs, and rendered the throne absolutely and completely vacant) it belonged to our ancestors to determine. For, whenever a question arises between the society at large and any magistrate vested with powers originally delegated by that society, it must be decided by the voice of the society itself: there not being upon earth any other tribunal to which to resort. And that these consequences were fairly deduced from these facts, our ancestors have solemnly determined, in a full parliamentary convention representing the whole society. The reasons upon which they decided may be found at large in the parliamentary proceedings of the times, our ancestors having most indisputably a competent jurisdiction to decide this great and important question, and having in fact decided it, it is now become our duty at this distance of time to acquiesce in their determination; being born under that establishment which was built upon this foundation, and obliged, by every tie, religious as well as civil, to maintain it.

The lords and commons having determined this fundamental article, that there was a vacancy of the throne, proceeded to fill up that vacancy in such manner as they judged the most proper. And this was done by their declaration of the 12th of February, 1689, in the following manner: "That William and Mary, prince and princess of Orange, be, and be declared king and queen, to hold the crown and royal dignity during their lives, and the life of the survivor of them; and that the sole and full exercise of the regal power be only in, and executed by, the said prince of Orange, in the names of the said prince and princess, during their joint lives; and after their deceases the said crown and royal dignity to be to the heirs of the body of the said princess; and for default of such issue, to the princess Anne of Denmark, and the heirs of her body; and for default of such issue, to the heir of the body of the said prince of Orange." This transaction, founded in equity, and strictly agreeable to the spirit of our constitution, and the rights of human nature, formed a new era in the history of our country, in which the bounds of prerogative and liberty have been better defined, the principles of government more thoroughly examined and understood, and the rights of the subject more explicitly guarded by legal provisions, than in any other period of the English history.

To the settlement of the crown was annexed a declaration of rights, in which all the points that had, of late years, been disputed between the king and people were finally determined; and the powers of royal prerogative were more narrowly circumscribed and more exactly defined than in any former period of the English government. It is worthy of observation, says judge Blackstone, that the convention avoided with great wisdom the wild extremes into which the visionary theories of some zealous republicans would have led them. They held that this misconduct of king James amounted to an *endeavour* to subvert the constitution; and not to an actual subversion, or total dissolution of the government, according to the principles of Mr.

Locke (Gov. p. 2. c. 19.); which would have reduced the ſociety almoſt to a ſtate of nature; would have levelled all diſtinctions of honour, rank, offices, and property; would have annihilated the ſovereign power, and in conſequence have repealed all poſitive laws; and would have left the people at liberty to have erected a new ſyſtem of ſtate upon a new foundation of polity. They therefore very prudently voted it to amount to no more than an abdication of the government, and a conſequent vacancy of the throne; by which the government was allowed to ſubſiſt, though the executive magiſtrate was gone, and the kingly office to remain, though king James was no longer king. Thus the conſtitution was kept entire; which, upon every ſound principle of government, muſt otherwiſe have fallen to pieces, if ſo principal and conſtituent a part as the royal authority had been aboliſhed, or even ſuſpended. Blackſt. Comm. book i, &c. book iv. Hume's Hiſt., vol. viii.

Revolution, *French*, in its moſt popular ſenſe, was for ſeveral years, after 1789, underſtood in England to conſiſt of thoſe events which at the outſet deſtroyed the uſual order of things, *viz.* the Pariſians' revolt, the capture and deſtruction of the Baſtile, and the ſubmiſſion of the monarch. But theſe events, ſingular and important as they were, could not conſtitute a political revolution: this muſt have required a change in the government. It is capable, ſays Mr. (now ſir James) Mackintoſh, of three ſenſes. The king's recognition of the rights of the ſtates-general to a ſhare in the legiſlation, was a change in the actual government of France, where the whole legiſlative and executive power had, without the ſhadow of interruption, for nearly two centuries, been enjoyed by the crown; in that ſenſe, the meeting of the ſtates-general was the revolution, and the 5th of May 1789 was its epoch. The union of the three orders in one aſſembly was a moſt important change in the forms and ſpirit of the legiſlature. This, too, may be called the revolution: and the 23d of June of the ſame year will be its epoch. This body, thus united, formed the new conſtitution, which may be called a revolution; becauſe, of all the early political changes, it was the moſt important, and its epoch was determined by the concluſion of the labours of the National Aſſembly, on the 30th of September 1791, when the king, Louis XVI., came to the aſſembly, and having addreſſed the members, the preſident proclaimed in his own name, and in the name of the whole body, that "the conſtituent aſſembly declares that its power is at an end, and that it will ſit no longer." In whatever ſenſe the phraſe be taken, the effects have been ſo momentous, as to claim the attention, and excite the awe of the whole civilized world. In a work of this kind it is impoſſible to enter into the detail of the various events connected with the French revolution: theſe muſt require the pen of the hiſtorian, who can devote years to the inveſtigation of facts, and to the developement of the motives by which the great actors have been impelled to engage in the ſeveral parts connected with their names. The hiſtory of the French revolution will afford ample ſcope and abundant materials for the moſt intereſting narrative of modern times. The New Cyclopædia, embracing every topic connected with human knowledge, cannot devote much ſpace to the hiſtory of any country, and ſtill leſs to a ſingle event connected with an individual ſtate. In the articles France and Lewis XVI. we have given a pretty full account of the cauſes which led to the French revolution, and of the changes which took place previouſly to the deſtruction of the Baſtile: of the confederacy of the crowned heads againſt the popular governments, which were eſtabliſhed, one after another, on the ruins of the old conſtitution: of the proſcriptions and maſſacres which were perpetrated in Paris; and finally, of the decapitation of the king, queen, and the king's ſiſter. We have then traced the progreſs of Bonaparte, from his conſulſhip to the high dignity of emperor, and noticed the vaſt and unprecedented power to which he attained over almoſt the whole continent of Europe, mentioning the kings that had been created by his fiat, and the ſtates that had been ſubject to his controul, or that ſtood in awe of his power. This mighty conqueror we followed, in the article France, to his divorcement of Joſephine, and marriage with the daughter of the emperor of Germany.

In addition to the above-named articles, to which the reader is referred, we have now to trace the ſteps of this man from the year 1810, to his expulſion from the throne and empire of France, and ſhew by what means his obſtinacy and ambition cauſed him to fall from the higheſt dignities, to which perhaps mortal man ever arrived, to a ſtate of mortification and almoſt inſignificance as the exile to Elba, which may be regarded as the end of the revolution.

For ſome time the very nature of commerce muſt have operated as much to the prejudice of his own merchants, as they could do to the prejudice of the merchants of this country; he ſtruck more directly and fatally at the liberty of his ſubjects by his decrees reſpecting priſons, domeſtic ſervants, and the preſs.

In the decree reſpecting priſons, to which we referred in the article France, it was explicitly declared, that there were many perſons, in that country, accuſed of crimes againſt the ſtate, whom it was neither ſafe to liberate nor to bring to trial: for the purpoſe of keeping theſe priſoners in ſafe cuſtody, a number of ſtrong priſons were reared in the heart of the country, in which it was determined they ſhould be confined. There might have been ſome plea for this mode of conduct during the convulſions of the revolution:—then it might not have been ſafe nor prudent either to have brought to trial, or to have liberated men whoſe popular character, or cauſe, probably would, in the one caſe, have excited freſh diſturbances; and in the other have aſſured their acquittal, however ſtrong and full the proofs of their guilt might have been. But under the exiſting order of things it was impoſſible for the emperor of France to pronounce a ſtronger libel on his own government, than could be inferred from ſuch a decree. At this time, indeed, he reigned with the moſt deſpotic ſway over the French, and he ſeemed reſolved to eſtabliſh, in the heart of Europe, and over a people enlightened by ſcience, a deſpotiſm unknown even to the ignorant and enſlaved nations of the Eaſt. By his decree reſpecting ſervants it was evident, that its object was not to be confined to perſons in that condition of life, but that it was meant, by putting them under ſuch ſtrict and harſh regulations, to have always at command ſpies in every family,—and thus to eſtabliſh a more regular and perfect ſyſtem of eſpionage. To theſe acts he iſſued his mandate, which went to deſtroy every advantage which attaches to a free preſs: this, indeed, was not calculated to excite aſtoniſhment, for in all deſpotic countries the liberty of the preſs has been the object of the tyrant's fear and hatred. At no period did France ever enjoy a free preſs; but Bonaparte, who ſeems to have examined and compared all the tyrannical proceedings and meaſures of deſpotic governments, both ancient and modern, with a view to improve upon them, and from them to eſtabliſh a perfect ſyſtem in France, which ſhould cruſh the powers of the human mind, had gone beyond all former precedent. By his decrees in the year 1810, of which we are ſpeaking, only a certain number of printers were allowed to carry on their buſineſs within the French territories, and theſe were to be under the moſt ſtrict and watchful

ful superintendance of the police; so that nothing could be printed, but what government thought proper to allow and sanction. This has always been the object in despotic countries; but it was obtained with great difficulty, and never with such perfect success as was desired. By diminishing the number of printers, Bonaparte removed the chief difficulty towards destroying the liberty of the press, and succeeded in placing France in a state of mental bondage, perhaps without a parallel in the history of the world.

During this period the emperor of France was employing his troops in Spain, with a view of subjugating that country and Portugal, and uniting the whole peninsula to his already too vast empire. By the exertions chiefly of Great Britain his plans were frustrated. Bonaparte seems, indeed, to have been completely thrown out of his expectations and calculations with respect to the resistance, which he met with in his designs on the independence of Spain; and the protracted and obstinate nature of the contest proved that for a considerable length of time he carried on the war there in a desultory manner, by armies apparently unconnected with each other, and by means not acting in concert and co-operation. About the beginning of 1811, however, a regular plan appears to have been formed by Bonaparte for conducting the war in Spain. The principal feature in this plan was the occupancy of the chief cities in the peninsula: and at the end of the year the French had made considerable progress, they had taken possession of most of the chief towns in Spain; their progress had been slow, attended with great difficulty, interrupted with many reverses, and purchased at heavy expences; still they had made progress, and the emperor, if he could accomplish his objects, never regarded the cost.

In the domestic history of France, the only thing that occurred worthy of notice was the birth of a son to the emperor, who was immediately designated as king of Rome, and in that character received the servile homage of the legislators of the empire. It was the subject of frequent remark, that after the second marriage of Bonaparte, he for many months seemed to abandon his restless and ambitious projects (with the exception of his attempts on Spain), or that he took much longer time for their execution. During the year 1811, rumours of war between France and Russia frequently arose, and as frequently subsided without any act of hostility on either side. It was not till the spring of 1812 that the war commenced, which was ultimately the cause of the overthrow of the French emperor.

On the 9th of May, 1812, Bonaparte set out from St. Cloud, on the 6th of June he crossed the Vistula, and on the 22d of that month he formally declared war against Russia; two days after this he crossed the Niemen, entered the Russian territories, and immediately commenced hostilities by the capture of Kowno, and on the 28th he entered Wilna, the capital of Russian Poland. In this war he expected considerable assistance from the Poles; he knew their rooted enmity to Russia, and though he had already deceived them, in the expectations which he had led them to form of his erecting Poland again into a kingdom, yet he well knew how to inspire them again with confidence in him: as soon, therefore, as he had entered Poland, his first public act was to proclaim it anew. A diet was immediately assembled, a constitution framed, and the name and form of liberty were restored to the Poles.

Bonaparte had not been long in Russia before he began to experience the disasters of the climate. In the month of July, and when his army was not much farther north than Wilna, a tremendous tempest arose; torrents of rain fell; thousands of his horses perished, and many pieces of artillery were buried in the mud. His disappointment and chagrin began to manifest themselves; he broke out into invectives on the barbarity of the Russians for laying waste their country in their retreat. Although many severe battles were fought, still the Russians refused to hazard a general engagement. Their perseverance in the plan of retreating astonished the world, and mortified, beyond conception, their enemies, who had no means of preventing this kind of warfare. It was imagined, that for a short time only they would follow up this system, and that their steadiness, passive courage, and patriotism would give way, when they perceived the enemy advancing, notwithstanding their obstinate perseverance, the advanced state of the season, and the desolation of the country. But Russia was animated with one soul, the dread and detestation of the French rose superior to every feeling: considerations of personal interest or comfort, even the sight of their families driven from their homes, and those homes abandoned to the enemy or the flames, had no room in the breast of the Russians: there dwelt only the determination to expel the French, and to obey every command of their sovereign, issued by him or his generals for that purpose. The proclamations of Alexander encouraged the enthusiasm and animated the patient and heroic sufferings of the people; they said, that the emperor was determined to make no peace with Bonaparte, while his legions polluted the soil of Russia: that he would sacrifice all, even Petersburg and Moscow, rather than they should fall into the hands of the enemy. In all the proclamations of Alexander there was no irresolution, no despondence, no expression, that could lead Bonaparte to indulge the hope, that he would propose, or even listen to terms of peace; or his subjects to apprehend, that he would not persevere in what he had begun. New levies were ordered to be raised; the Russian people were invoked by all those powerful feelings and prejudices, which ignorance and superstition create; and when a Russian is told, that what he has to do, or to suffer, is for the sake of his sovereign or his religion, he is made insensible to danger and misery.

Kutusoff continued his retreat, at the head of the main Russian army, till he arrived at Borodino, within a short distance of Moscow. The position here was extremely favourable for defence; though it did not cover the capital, as there were other roads leading to it. On the 7th of September the famous battle of Borodino was fought; it continued from six in the morning till night, when the French, though masters of one part of the field, retreated. The loss on this occasion was immense; not less than 60,000 men are supposed to have fallen on both sides. Both sides claimed the victory; and at Petersburg it was imagined, that Moscow was rendered perfectly secure by the defeat of the enemy. The French, however, retreated, only for the purpose of meeting a strong reinforcement which was advancing, and which actually arrived within a day or two of this tremendous engagement. At the head of these he put himself, and prepared to march by another road for Moscow. As soon as the Russian general was informed that Bonaparte had been reinforced, and that he was manœuvring to get to Moscow by turning the Russians, he resolved to abandon that capital to its fate. Bonaparte therefore advanced to Moscow unmolested, but on his entrance into the city, on the 11th of September, he found its governor and inhabitants animated with the true Russian spirit. They made every resistance in their power to the entrance of the enemy: a great part of the effective population was armed, and as soon as the

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advanced guard of the enemy appeared they attacked them in the ſtreets, and from the houſes, impeding their progreſs, and cauſing great deſtruction; and, when it was no longer practicable to prevent the entrance of the enemy, the city was ſet on fire, and, as it was built principally of wood, the fire ſpread rapidly in all directions; and before the French could ſtop the progreſs of the flames, only a tenth part of it remained unconſumed. It is impoſſible to deſcribe or even imagine the diſappointment, mortification, and wrath of Bonaparte when he beheld Moſcow in flames. He had promiſed his ſoldiers reſt from their fatigues, refreſhments, proviſions in abundance, and comfortable winter-quarters in it. Theſe were now all at an end: amidſt the ruins of Moſcow his army would in vain ſeek for ſhelter from the inclemencies of the approaching winter, or for a ſupply of proviſions. His indignation ſoon broke out in conduct at once tyrannical, cruel, and mean: he ſeized on the men who had ſet fire to the city, and cauſed them to be executed.

The ſituation of the French army in Moſcow was now moſt critical: they were ſurrounded with armies almoſt as numerous as themſelves, and which were daily increaſing. Winter was already making its appearance: the troops had been completely worn down by their long march, and at the end of it, they had met with a reception which neither their leader nor they could have anticipated. The former was certain in his own mind that a complete victory muſt be the reſult of the battle of Borodino, and that, as a price of peace, Alexander would find a ſupply for all their wants, at the expence of his own ſubjects. Inſtead of this, the victory was not at all deciſive, and Bonaparte advanced with the moſt cautious ſteps into Moſcow, well knowing, by a fatal experience, that he beheld an enemy in every Ruſſian he met. He ſoon ſaw that he could not remain in the ruins of the city till ſpring ſhould open to him a communication with the ſouthern provinces; and if they retreated, how were they to obtain proviſions, and endure a march of 500 miles in a ſevere and deſolating winter, through deep ſnows, and by the hidden and almoſt impaſſable roads of Ruſſia? The Ruſſian generals, true to the cauſe of their country, and inſpired by the animating proclamations of their emperor, took the moſt active meaſures to force Bonaparte from Moſcow, by cutting off his ſupplies; and when they had compelled him to retreat, to haraſs him in every inch of his journey. For this purpoſe a great number of Coſſacks, beſides thoſe who had been already employed, were collected, and this was the ſeaſon of their utility and triumph.

Bonaparte was now ſenſible of the dreadful error he had committed: unleſs he actually expected to dictate terms of peace at Moſcow, it was the extreme of madneſs to have proceeded thither at the beginning of a Ruſſian winter; and if he did expect either to dictate terms of peace, or to have his own offers accepted, he muſt have been ignorant of the determined hatred which all ranks in Ruſſia bore towards him. The apology he offers in his bulletins, for his military career in Ruſſia, is a paltry one; according to him, the Ruſſian winter this year commenced earlier than uſual; as if the circumſtance of the froſt ſetting in a very few days ſooner or later could have ſaved or deſtroyed his army! What muſt be the military prudence of that man, who calculates for the ſafety of his army, and the ſucceſs of his meaſures, on ſo uncertain a thing as climate! The fact is, Bonaparte, in all his former campaigns, had been indebted for his ſucceſs to the boldneſs of his advances into the very heart of the enemy's country; that this boldneſs did not aſſume the character, deſerve the name, and produce the conſequences of raſhneſs, was leſs owing to his own foreſight and circumſpection than to the puſillanimity, treachery, and want of talents of his opponents: without adverting to the different circumſtances in which he was placed in Ruſſia, from a difference of climate and national character, he followed his uſual plan, thus proving that he was defective in one great feature of a man of abilities, the adaptation of general principles and plans to particular circumſtances.

Perceiving that, though he was in the heart of the Ruſſian empire, and amidſt the ruins of its ancient capital, no terms of peace were propoſed, and that the Ruſſians were gathering round him on all ſides, he ſent to Kutuſoff to propoſe terms of accommodation, or, at leaſt, an armiſtice. The Ruſſian commander received the French negociator in the midſt of his generals, and replied to him with the utmoſt frankneſs: he told him, that he was not authoriſed to receive any propoſals either for peace, or an armiſtice; that he would not even ſend to Alexander nor receive the letter which Bonaparte had ſent; and that, with reſpect to an armiſtice, the Ruſſian army had no occaſion for it, and they were in poſſeſſion of too many advantages to throw them away by accepting it. The negociator then began to complain of the ſavage manner in which the war had been conducted; to this Kutuſoff replied in language which ought always to be had in remembrance by invaders: "The French (he ſaid) had introduced the barbarities of which they complained; they had commeneced hoſtilities without reaſon; had invaded Ruſſia; had inflicted as much miſery on its inhabitants as they could; and now, when vengeance and retaliation were at hand, they wiſhed for peace; peace muſt not even be mentioned till the invaders had retraced their ſteps, and had again croſſed the Viſtula; Bonaparte had nothing to do but get out of Moſcow how he could, ſince he came thither without being invited; the Ruſſians, he might depend upon it, would do their duty,—and the duty which they owed their ſovereign, their country, their murdered or deſolate wives and helpleſs children, demanded that they ſhould make their invaders ſuffer as much miſery as poſſible: Bonaparte had proclaimed the campaign at an end at Moſcow, but with the Ruſſians it was only beginning." At another time, when the French complained of the exceſſes of the Coſſacks, who had even fired upon their flags of truce, they were told by the Ruſſian general that the Coſſacks acted according to orders: "we want," ſaid he, "not to hear of parleys; our object is to fight, not to negociate; take your meaſures accordingly." Perceiving that there was no chance of peace, or an armiſtice, and that the Ruſſians were fully ſenſible of their own power, and of the reduced and miſerable ſtate of the French army, and had formed their plans in ſuch a manner, as to take the utmoſt advantage of their own good fortune, Bonaparte, after having been upwards of a month in Moſcow, prepared for his retreat. A retreat of greater difficulty, and accompanied with more miſery, has never been recorded in the annals of hiſtory. On the firſt days of it, the ſufferings of the ſoldiers were feelingly and accurately deſcribed in an intercepted letter from the viceroy of Italy. "Three days of ſuffering have ſo broken down the ſpirits of the ſoldiers, that I look upon them, at the preſent moment, as ſcarcely capable of making any effort whatever. Many of them have died of hunger or of cold; many others have gone and ſurrendered themſelves to the enemy." The ſufferings of the French, however, were greatly to be increaſed by hunger, and the ſeverity of the climate.

Early in November the Ruſſian winter ſet in with more than its accuſtomed rigour: hitherto the roads had been only deep and heavy, now they became ſo exceſſively ſlippery, that the men could ſcarcely keep their feet: hitherto the horſes, neceſſary both for the artillery and for the ſuſtenance

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of the soldiers, for they were compelled and glad to feed on horse flesh, had proceeded feebly and slowly on, or dropped dead only, a few hundreds every day; but the first day of the frost, nearly 30,000 perished. All possibility of carrying forward their artillery was now at an end; the spirits of the soldiers completely deserted them: they crawled on, exposed to the most dreadful cold, exhausted with fatigue and hunger, emaciated, and almost naked. The road was literally blocked up with the dead and the dying: they had no power to defend themselves against the Cossacks, who constantly hovered round them: they had no inclination to do it: death to them would have been a blessing: at the sight of the Cossacks they hoped their miseries would soon be terminated: but their enemies were not so merciful as to put them to death; piercing them with wounds, stripping off the little covering they had, they left them on the snow, there bleeding and naked, exposed to the rigours of a Russian winter. Whenever the French entered any village where there was the least chance of repose or food, they exerted their little remaining strength, and crawled on their hands and feet to seek it. Frequently, just as they had stretched out their hands to seize a little food, or reached the threshold of a wretched hut, under which they looked for shelter from the weather, perhaps for a few minutes sleep, the remnant of their strength failed them, and they expired.

With what feelings and sentiments did they now regard Bonaparte! No longer the adored general, who seemed to have chained victory to his car, to be more than mortal, and to be destined to render all Europe subservient to the interests and glory of France; they cursed him as the author of all the misery under which they were writhing; on his person they willingly would have inflicted vengeance; but sensible of their indignation, he had gathered round his person his principal officers, mounted on almost the only horses that remained. For some time he rode in a coach, till the dreadful voice of his soldiers commanded him to walk as they did, and to share their fatigue; he still, however, defended himself from the inclemency of the weather with a cloak; "off with your cloak" was another stern command, that he durst not disobey. Such was the situation,—such the feelings of the French army during their dreadful retreat, in which every thing that could accumulate or sharpen misery beset them. It scarcely needed the presence of an enemy to complete the work of destruction; the climate of Russia, aided by hunger, was amply sufficient.

In fact, the French soldiers could no longer be said to compose an army; they were straggling in all directions, anxious indeed to avoid the Cossacks, since from them they experienced only an aggravation of their misery, but not unwilling to fall in with the regular Russian troops, in the hope of being taken prisoners, or falling in battle. Their ignorance of the country, and the state of the roads, were such, that the different divisions of the French army could not support one another; and frequently when expecting to fall in with the main body, they encountered the enemy and were taken prisoners. On the 10th of November, before they reached Smolensk, general Augereau, with 2000 men and 60 officers, surrendered themselves; this was the first instance, during the present war, of a whole corps laying down their arms. It is computed that in three days time, prior to that date, they lost 20,000 men, besides nearly 20,000 more that fell in the previous engagements; nearly 300 pieces of cannon had also either fallen into the hands of the Russians, or had been spiked and buried by the French. But these losses, enormous as they were, were only preludes to greater ones.

It is extremely difficult to form an estimate of the loss of the French in this dreadful campaign. The Russian official accounts state that they took upwards of 150,000 men; and it was calculated that the number of killed, and of those who perished by hunger, fatigue, and cold, amounted nearly to 100,000; so that reckoning that the French army when it crossed the Niemen, and began the campaign, amounted to 300,000 men, scarcely more than 50,000 escaped out of Russia; and of those, a large proportion must have suffered so dreadfully as to be absolutely unfit for future service. Such is a bare outline of this disastrous campaign, the consequences of which have proved so important to the liberties of Europe. In it we have seen the first general of his age, at the head of one of the finest armies that was ever raised, and which placed in him the most unbounded confidence, flying, beaten, disgraced, bereft of the greatest part of his troops, and the object of detestation to the remainder. This is an event which, taken under all its circumstances, cannot be parallelled in history. No war, ancient or modern, exhibits such destruction and misery; more, no doubt, have fallen in the field, in the course of a campaign; but no army ever perished with such lingering and varied misery. The cause of the failure of the Russian campaign under the auspices of that same general, who had on almost all great occasions been successful before, is the business of the historian to investigate, and will long afford matter for speculation and curious discussion. "It has scarcely ever fallen to the lot of the historian or annalist," says the intelligent writer in the New Annual Register, "to narrate such disasters; and when we consider that these disasters befel a man who, from a low station in society, had raised himself to the very summit of power, to an extent of dominion and influence never before witnessed in Europe; that this man, for the purpose of a mad, bloody, and desperate ambition, had trampled on all the laws and usages of justice and civilized society; and that he considered himself, and called upon the world to acknowledge and fear him, as absolutely beyond the reach of fate, as something more than mortal; when we moreover reflect on the peculiar interest which this country felt in all that befel him, since against this country was his most implacable and deadly hatred directed; and from that hatred, his ruin indirectly originated; when we take all these things into our account, we must acknowledge that we cannot examine too closely, or scrutinize too minutely, the causes of his failure in the Russian campaign."

It appears, then, that these causes may be classed under two general heads, *viz.* those which proceeded from the nature of the country which he invaded, and the characteristic qualities of its inhabitants; and those which originated from the peculiar character of the invader.

In the first place, the constitution of the Russian army, and the character of the Russian soldiers, contributed in no small degree to the fate of Bonaparte. The Russians, from their infancy, are most devoutedly attached to their emperor, and to their nobility. Philosophers may ridicule the idea, or disbelieve the assertion, that the common people of Russia are attached to those who act towards them, in too many instances, as tyrants. But history is conversant with facts, not with theories and speculations; and the fact is, that the Russian common people, even before they enter the army, are most devoutly attached to their emperor and nobility. This attachment becomes still more strong and influencing when they enter the army:—they then regard themselves, in a more special manner, as entirely at the service of their sovereign; and look upon it as the highest honour which can befall them, to suffer any privation or misery, or even death itself, at his command, and for his sake.

fake. Military difcipline, with the troops of moft other nations, is a habit acquired late in life, irkfome and abhorrent to former habits, and broken through whenever it can be done with fafety. But it is far otherwife with the Ruffian foldier: he knows no habits; he has no feeling or fentiments incompatible with the ftricteft military difcipline: on the contrary, all his other habits, feelings, and fentiments, work to the accomplifhment of the fame end: all ferve and contribute to render him an excellent foldier, fo far as ftrictnefs of difcipline is concerned. Knowing no difgrace fo great as difobedience to the orders of his officers, and efpecially to the commands or even wifhes of his fovereign, he never ftirs from his poft till he is exprefsly directed fo to do: the idea of flight never enters his mind. But his fteadinefs is not merely paffive; endowed with great bodily ftrength, and with a robuftnefs of conftitution fuperior to every fatigue or privation, he wearies out his more fkilful and experienced opponent, by whom he may be outmanœuvred or flain, but cannot be forced to fly.

Hence Bonaparte never met with more obftinate refiftance than he did from the Ruffians at the battle of Eylau: his troops were weary with flaughter, but ftill they could not defeat the Ruffians; and had the French emperor been a man who could be taught mortifying or difagreeable truths by experience, after his firft campaign againft the Ruffians, on the borders of their own country, he never would have attempted to conquer them, in the very heart of their empire, and in the midft of a Ruffian winter.

In the fecond place, the character of the Ruffian generals contributed not a little to the defeat of Bonaparte: his avowed object in the invafion of Ruffia, was to compel the emperor Alexander to adhere to the continental fyftem, that was, to forbid all trade between Ruffia and England; but this would have been the ruin of the Ruffian nobility, whofe incomes were almoft exclufively derived from this commerce. Bonaparte, therefore, was making war upon them, and they muft have regarded his invafion as peculiarly directed againft them. This feeling would contribute to render them faithful and fteady to the caufe of their country, and at the fame time ftimulate them to put forth all their activity and talents in the conteft. Befides, the Ruffian nobility partake with the common people in that phyfical attachment to the foil and inftitutions of their country, which excites their hatred moft ftrongly againft all invaders. Hence they were above the influence of Bonaparte's promifes and bribes.

In the third place, the plan of the campaign which the Ruffian government had laid down, contributed very effentially to the overthrow of Bonaparte's hopes and projects. This plan was, on every occafion, where they could oppofe Bonaparte, there to oppofe him, but never in fuch a manner as might bring on a general action, or an action that could be decifive againft themfelves. Thus, the farther he advanced the weaker he became; and after every engagement, though he apparently fucceeded in driving back the enemy, the real ftate of his affairs was rendered worfe: he was led further from his refources, deeper into the heart of a country utterly incapable of fupporting a large army, and more completely furrounded by the Ruffians.

In the fourth place, the character of the Ruffian peafantry contributed much to the defeat of Bonaparte: thefe could not be feduced from their allegiance; they uniformly, and to a man, refufed to hold any communication with the enemy: while Mofcow was in the hands of the French, they brought no goods in for fale: they regarded it as a polluted city, and would have fhuddered to have entered it. To thefe caufes muft be added the firmnefs of Alexander; and the nature and climate of the country.

The next clafs of caufes which contributed to Bonaparte's difcomfiture and ultimate ruin, muft be fought for in his own peculiar character, in which the moft predominant and influential is his obftinacy. Accuftomed to fee all his plans fucceed, all his predictions, however extravagant, verified, he could ill-brook difappointment: he could not even fuffer himfelf to admit that he had acted an imprudent and rafh part, and preferred perfeverance in error, to the acknowledgment and rectification of it. His obftinacy operated in giving rife to the invafion of Ruffia, as well as influencing his conduct during that invafion. He probably pufhed forward into Ruffia notwithftanding the loffes which he fuftained, and afterwards continued in Mofcow till winter had rendered his retreat almoft impoffible, under expectation, or at leaft the hope, that Alexander would be induced to propofe terms of conciliation. This certainly influenced his conduct; "but," fays a good writer, "whoever has ftudied the character of obftinate people, muft be convinced that at laft, when their obftinacy is got to its greateft height, they perfevere in the courfe which muft infallibly conduct to ruin, without even the moft groundlefs hope of extricating themfelves. The impulfe in this ftate of mental diforder, for fo it may be denominated, is blind, and almoft mechanical. So it probably was with Bonaparte, when he determined to remain fo long at Mofcow."

How different were the affairs of this man at the commencement of 1812, from what they were at the fame period in the following year. At the *former* every thing was profperous, except perhaps the war in the peninfula; and that, it was generally believed, he could, at any time, turn in his favour by fending a larger army there. Ruffia, though uneafy under the operation of the hard terms to which fhe fubmitted at the peace of Tilfit, would fcarcely have ventured to commence a new war; while the fubferviency of Pruffia to his will, his abfolute command of her fortreffes which are on the confines of Ruffia, and his alliance and family connexion with Auftria, feemed to promife him the eafy conqueft of Ruffia whenever he fhould think proper to attack her. At the latter period he no longer appeared as the invincible conqueror, but as the fallen general, who had fled to his capital with unexampled celerity, to avoid the indignation of the fragments of that army which had been facrificed to the madnefs of his ambition. He who had always detailed victories the moft fplendid, who had, in direct language, held himfelf out as fuperior to all the cafualties of war, was now obliged, in his own bulletins, to confefs that his army was broken, and it was returning towards France defeated and haraffed by the Tartars of Afia.

Thus changed in power, in feelings, and in profpects, the Parifians faw their emperor at the beginning of the year 1813, and they, as well as Europe in general, were extremely anxious for the meeting of the legiflative body, in order that they might be able to develope his future plans. At this meeting, on the 14th of February, he declared it to be his determination ftill to carry on the war, and to facrifice nothing for the fake of obtaining peace: "The French dynafty," fays he, "reigns, and will reign, in Spain. I am fatisfied with all my allies; I will abandon none of them; I will maintain the integrity of their ftates; the Ruffians fhall return to their frightful climate. I defire peace, but I will never make any but an honourable peace, and one conformable to the interefts and grandeur of my empire." The whole tone of his addrefs was warlike, and he immediately fet on foot a new confcription, which, by means of his gens

d'armes,

d'armes, he readily carried into effect, at leaft to a certain point. By means of uncommon exertion and activity, joined to the moft tyrannical defpotifm, he fucceeded, by the beginning of April, in collecting a large force on the banks of the Elbe, though that force was of a very different defcription from the veteran army which he had loft in Ruffia. His cavalry and artillery were particularly inferior; and it was on thefe two branches, efpecially the artillery, that the French ufed to depend for their victories; it is even faid that, in confequence of his having loft upwards of 1000 pieces of cannon in Ruffia, he was under the neceffity of fupplying his army, in a great meafure, with cannon from the fhips at Antwerp, which were, of courfe, of a defcription by no means fuited for military purpofes.

Before Bonaparte left Paris, to take the command of his army, he judged it expedient to fettle the form of a provifional government during his abfence: he had fo narrowly efcaped deftruction in his Ruffian campaign, at a time when he had taken no meafures refpecting the government of France while the king of Rome was a minor, that he refolved to guard againft all accidents for the future. Accordingly his emprefs was regularly declared regent during his abfence; and the king of Rome was nominated, in a more folemn manner than heretofore, his fucceffor. It is probable that the appointment of the emprefs as regent had other objects in view; Bonaparte knew well the temper and difpofition of the Parifians; he knew that the beft mode of drawing off their thoughts and fpeculations from the difafters that had occurred, or might occur, was by keeping up the fplendour, buftle, and pageantry, of a court; and this could be done with the beft effect by invefting his emprefs with the name and dignity of regent. Having thus taken what he conceived to be all due precautions, and fent on before him immenfe bodies of troops, he clofed the feffion of the legiflative body in a fpeech full of his ufual confidence and haughtinefs, in which he led them and the French nation to expect, that on the banks of the Elbe he fhould regain all thofe laurels which he had loft amidft the fnows of Ruffia.

Having thus detailed the preparations which Bonaparte made for the commencement of what has been denominated the German campaign, we muft notice briefly the preparations of thofe powers who were to oppofe him. Alexander, at the head of his army, advanced with great rapidity into the north of Germany. As foon as he croffed his own boundaries into thofe of Pruffia, he ordered a declaration to be iffued, explanatory of his motives and views. The Ruffian emperor was every where hailed as a deliverer, and upon his entrance into Berlin he was received with the utmoft enthufiafm by all ranks of the people, and in the end Pruffia became a noble ally to the northern potentate. She was indeed deftined to act a confpicuous part in avenging her own wrongs and thofe of Germany. Her armies were put on the beft footing. Blucher, who had already immortalized himfelf by his conduct, had a leading and extenfive command; and it feems to have been the wife policy of the continental fovereigns, in this laft ftruggle for their independence, to felect thofe generals againft whom Bonaparte had difplayed the greateft rancour; they thus fecured themfelves from treachery, while they called forth all the talents of their commanders. Befides the regular army of Pruffia, the landwehr or militia were called out; all were anxious to be enrolled to co-operate in the deliverance and defence of their country.

In the mean time the Ruffian army continued to advance, and having liberated great part of Pruffia, directed their efforts towards the emancipation of Saxony. Count Wittgenftein, who commanded the Ruffian army, addreffed to the Saxons a moft noble and infpiriting proclamation, which, though it probably made a deep impreffion, did not, at the time, produce the confequences which the Ruffian general anticipated. The king of Saxony was with the French, and no fmall part of their country was occupied by thofe people, circumftances which naturally prevented many from joining the allies whofe wifhes were cordially with them; when, however, an opportunity did occur, it will be feen that the Saxons proved themfelves worthy of the name of Germans, and of their anceftors. A hope was now excited that Bernadotte, the crown prince of Sweden, and his numerous army, would be brought to act in favour of the allies; this expectation was confiderably ftrengthened by treaties which were concluded between the courts of Sweden, Ruffia, and Great Britain. By thefe treaties, the army under the crown prince was immediately to be employed in the common caufe, and in return for his acceffion of force, Great Britain, befides granting a fubfidy to Sweden, agreed to give up to her the ifland of Guadaloupe, and to guarantee the kingdom of Norway when it fhould be conquered from the Danes.

Thus it was known that early in the year 1813, Great Britain, Ruffia, Pruffia, and Sweden, were decidedly againft France. Hoftilities commenced, and in many parts the French were decidedly victorious; Hamburgh, and many other places in the north of Germany, fell into their hands. The firft great battle in which Bonaparte was himfelf engaged, was at Lutzen, on the 1ft of May; the Pruffians, having partially fucceeded in breaking into the fquares of the enemy, committed great carnage, and the conflict on all fides was moft defperate and fanguinary. For a confiderable time the allies were the affailants, but towards evening, Bonaparte called in that divifion of his army which was near Leipfic, and collecting all his referves, made a moft furious attack, for which the allies were not prepared; night however put an end to the combat. The allies remained mafters of the field that evening, but judged it prudent, early on the next day, to commence a retreat, in confequence of which Bonaparte claimed the victory in the battle of Lutzen. But it was not fuch a victory as he ufed formerly to boaft of; and on the 21ft of May another bloody battle was fought at Bautzen, which was ftill in favour of the French, and the allies again found it expedient to retreat. The lofs of the enemy in this obftinate battle was very fevere; though Bonaparte gained ground by it, he gained it at fuch an expence of men, and with fuch a conviction of the bravery and fkill of the allies, that he muft have been very unwilling to have obtained many fuch victories. But the moft alarming circumftance which occurred during the battle of Bautzen, was the defertion of a whole battalion of Wurtemburghers, as well as a body of Saxon troops, which muft have convinced Bonaparte how little dependence he could place on the German troops. The allies continued their retreat, and on the 24th of May their head quarters were within 18 leagues of Berlin. On the 4th of June, through the mediation of the emperor of Auftria, an armiftice was agreed on, which was to continue till the 20th of July. It was a matter of great difficulty to determine on which fide the advantage of this armiftice lay; both parties were probably defirous of it, and as the emperor of Auftria preffed it moft earneftly, each party readily agreed to it, in the hope of gaining his affiftance, or avoiding his hoftility. It was, however, extremely unpopular throughout Germany, and efpecially in the Pruffian ftates; fo much fo, that the king deemed it neceffary to iffue a proclamation, in which he declared that the armiftice had not been fought for by the allied powers, and that they would only ufe it to re-inforce their armies, and attack the common enemy, at its expiration, with more vigour. Bonaparte, on his own part, complained that the terms of the armiftice were not faithfully kept by the allies; this complaint, which was well founded, arofe from a circumftance which augured fatally for his future fuccefs; for the landwehr of Pruffia, and even all the inhabitants who could procure any kind of arms, notwithftanding the fufpenfion of hoftilities, were continually attacking and haraffing the French, and in many cafes they captured their fupplies of ftores and provifions, and rendered precarious and difficult their communication with France.

It was foon evident that the armiftice would not lead to peace, each party was exerting itfelf to the utmoft to recruit and re-inforce their army. The emperor Alexander ordered frefh troops to be brought acrofs the Viftula, and in a fhort time the re-inforcements that joined the allied army from Ruffia alone, amounted to 75,000 men. The king of Pruffia contributed as much to the common caufe as the exhaufted ftate of his country, and of its finances, would allow. Bonaparte was equally active; oppofite to the main army of the allies he had collected nearly 130,000 men.

The armiftice was prolonged till the middle of Auguft, during which a congrefs was held at Prague, at which little or nothing was done, or perhaps even attempted. The mediation of the emperor of Auftria was of no avail; the terms which he propofed as juft and equitable to all parties, were peremptorily rejected by Bonaparte. No alternative, therefore, he faid, remained for him to adopt, but to unite his forces with thofe of the emperor of Ruffia and the king of Pruffia. Still, however, he, as well as they, were going to fight, not for the purpofes of ambition or conqueft, but folely for the attainment of a juft, honourable, and lafting peace. As foon as this could be brought about, they would moft cheerfully lay down their arms; but till it was brought about, they would continue united in hoftilities, and exert themfelves to the utmoft.

Ruffia, Auftria, Pruffia, and Sweden, were now to try their ftrength againft France; the jealoufies and felfifhnefs of the allied fovereigns, which had rendered former coalitions of no value, were abforbed in the deep and awful conviction that now they were fighting for their own exiftence; befides, in the former contefts, they were averfe from, or indifferent to, the caufe of their fovereign; now they were cordial and zealous in their co-operation. The allied powers alfo very wifely made ufe of other weapons than thofe of warfare; the moft eloquent and popular writers in Germany were employed to roufe the people, to hold out Bonaparte as no longer formidable; as having been conquered; but ftill as the implacable enemy of the happinefs and peace of Germany, as the common deftroyer of the liberty of the fovereign and the peafant.

Befides the crown prince of Sweden, another Frenchman entered into the lifts againft Bonaparte, *viz.* general Moreau, who, after he had been liberated by him, had gone over to America, where, in peace, quiet, and retirement, he had fpent fome years of his life. It is not known by what particular motives he was induced to enter again into public fervice; but it appears that the emperor Alexander, as foon as he found that war with Bonaparte was inevitable, fent over a confidential perfon to America, with whom general Moreau returned to Europe. He joined the allied army foon after the congrefs at the Prague was diffolved.

On the 17th of Auguft hoftilities recommenced, and a moft fevere battle was, a few days after, fought at Drefden, in which, after a terrible flaughter on both fides, the French fucceeded in repulfing the allied armies, but the moft difaftrous event in the courfe of this battle was, the death of Moreau, who had both his legs fhot off by a cannon ball.

Bonaparte reprefented the battle of Drefden as moft decidedly favourable to him, and he probably confidered the lofs and difcomfiture of the allies as much more ferious than they really were, as in order to intercept their retreat into Bohemia, he difpatched Vandamme, one of his generals, with a force which it would have been madnefs to have fent againft them, had he not believed their army to have been not only much reduced in numbers, but retreating in great diforder. In the attack, Vandamme, and fix other generals, were taken prifoners, befides 10,000 men, 60 pieces of artillery, and 6 ftandards.

In Silefia the campaign opened on the 18th of Auguft, the allies in this quarter moving on towards Drefden; they firft attacked and defeated a corps under marfhal Ney, which induced Bonaparte to fet out to re-inforce his general; the French having now greatly the fuperiority, general Blucher retreated, and took up a ftrong pofition behind the Katzbach. The plan of the allies being to diftract and divide Bonaparte's forces, they fell farther back, while the grand army from Bohemia, as we have feen, marched on to Drefden, and drew off Bonaparte to that quarter. On the 25th and 26th the French advanced againft Blucher, but on the latter of thofe days the Pruffian general attacked them. The battle was fought near the Katzbach, and from that takes its name; in it Blucher and the Pruffians proved their determination to avenge the difgrace which their country had fo long fuffered by having been under the tyranny of France. They fought with the moft unparalleled bravery, and gained a complete victory. Among the fruits of their fpoil were 18,000 prifoners, 103 pieces of cannon, and 280 ammunition waggons. In another quarter the crown prince was likewife victorious over the French; and in a fecond battle, *viz.* that of Juterbock, it was calculated that the vanquifhed French had loft from 16 to 18,000 men, more than 50 pieces of cannon, and 400 ammunition waggons.

After thefe defeats the fituation of Bonaparte became more critical, yet he ftill remained at Drefden, and continued there till the 7th of October, when he quitted it, taking with him the royal family of Saxony. Hitherto the allies of Bonaparte had remained more faithful to him than might have been expected, but about this period the king of Bavaria deferted him, and concluded a treaty of alliance and concert with Auftria, by which 35,000 Bavarian troops were immediately to co-operate with thofe of Auftria.

On the 14th of October Bonaparte collected his whole force in and round Leipfic, and on the 18th the famous battle of Leipfic was fought, in the courfe of which two Saxon battalions, and two Weftphalian regiments of huffars, quitted the ranks of the enemy and joined the allies; the artillery which they brought over with them, they immediately turned againft the French, and the crown prince headed the men in a charge againft their former oppreffors. In the battle of this day the French loft at leaft 50,000 men in killed, wounded, and prifoners, befides 65 pieces of artillery. Bonaparte now left Leipfic, and in two hours afterwards the allied armies entered that town.

The retreat of Bonaparte from Leipfic with the wreck of his army, to the amount of 80,000 men, was fcarcely furpaffed in diforder and mifery by his retreat from Mofcow. As foon as he reached the Rhine he left his army, haftened to Paris, and on his arrival, another confcription of 300,000 men was ordered, but France was now too much exhaufted to anfwer the demand; the Ruffian and German campaigns had almoft entirely ftript her of the efficient military population; befides, there was wanting that enthufiafm which had,

twenty

twenty years before, been characteristic of the country, so that it was almost deaf to this new demand.

In the mean time the mighty edifice which Bonaparte had erected out of the ruins of the independence and liberties of the continent, and which had been cemented by the blood of hundreds of thousands, was falling to pieces; the victory of Leipsic, by freeing the minds of the princes of Germany from all apprehensions of his power, proved how eager they were to resume their legitimate character and authority. Wurtemburgh deserted him, and made her peace with the allies; and the confederation of the Rhine was dissolved; so that, to use his own words, no sovereigns remained attached to him except the king of Denmark and the king of Naples.

Holland, which had long groaned under French tyranny, early in the month of November broke her shackles, dismissed the constituted authorities, established a provisional form of government, and by the assistance of Great Britain she was at length enabled to hold up her head as a free and independent nation, recalling her hereditary prince, and investing him with new powers, and higher titles than the members of the house of Orange had formerly exercised and claimed. Rather before this period the allied troops, under the command of the crown prince, had entered Hanover, which they liberated from French thraldom, much to the satisfaction of the inhabitants, and by the end of November almost all the strong places between the Elbe and the Rhine were in possession of the allies, and such as were not, were closely invested. On the 1st of December they issued their famous proclamation, which, from its justice and moderation, probably did them as much, or more, service, than any of their victories. "The allied powers," say they, "do not make war upon France, but against that preponderance which, to the misfortune of Europe and of France, the emperor Napoleon has too long exercised beyond the limits of his empire.

"Victory has conducted the allied armies to the banks of the Rhine. The first use which their imperial and royal majesties have made of victory, has been to offer peace to his majesty the emperor of the French. An attitude strengthened by the accession of all the sovereigns and princes of Germany has had no influence on the conditions of that peace. These conditions are founded on the independence of the French empire, as well as on the independence of the other states of Europe. The views of the powers are just in their object, generous and liberal in their application, giving security to all, honourable to each.

"The allied sovereigns desire that France may be great, powerful, and happy; because the French power, in a state of greatness and strength, is one of the foundations of the social edifice of Europe. They wish that France may be happy, that French commerce may revive, that the arts (those blessings of peace) may again flourish, because a great people can only be tranquil in proportion as it is happy. The allied powers confirm to the French empire an extent of territory which France, under her kings, never knew; because a valiant nation does not fall from its rank, by having in its turn experienced reverses in an obstinate and sanguinary contest, in which it has fought with its accustomed bravery."

Immediately after the issuing of this declaration, the allies having completed their arrangements, crossed the Rhine for the purpose of invading France; as, however, the strong fortresses near Mentz rendered the passage in this place rather difficult, they preferred passing through Switzerland, by the inhabitants of which country they were hailed as friends, and afforded every assistance.

The allied army entered Switzerland on the 20th of December, penetrated to Zurich and Berne, and crossed the Rhine at Basle without firing a shot, and before the end of the year detachments of the allies made their way to Langres, in Champagne, which was about 100 miles within the old French frontier. The year 1814 opened with an invasion of France, not only by the allies in the east and north, but on the south by lord Wellington, while the Austrian forces in Italy, aided by the naval exertions of Great Britain, and by detachments from our garrisons in the Mediterranean, completely kept the viceroy in check. Every event tended to shew that Bonaparte's power was tottering, and he must have been convinced that he had only one thing to depend on, *viz.* his own personal prowess. He accordingly left Paris on the 25th of January to take command of the armies, and on the 1st of February a great battle was fought between him and marshal Blucher, which was decided in favour of the allies, and the retreat of Napoleon from his positions about Brienne, with the loss of 4000 prisoners, was the consequence of his defeat.

On the 7th of February the position and town of Troyes was taken possession of by the allies; this town was thought to be of great importance to their cause, on account of its resources, its population, and of the number of roads leading to it from different parts of France. At this period negociations were carrying on at Chatillon-sur Seine for the purpose of effecting a peace, during which the allies had gained several conquests over the French armies. Bonaparte had been beaten in several engagements with Blucher and prince Schwartzenburg, whose armies, at the close of February, were at Troyes and Chalons, while he himself was at Rheims. On the 19th of March the negociations were to terminate, and on that day Napoleon refused the terms that were offered him, though by those terms he would have continued at the head of the French, with dominions as extensive and powerful as had ever been enjoyed by any of the former monarchs.

On the day that the conferences at Chatillon were terminated, the French army moved upon Arcis, behind which the corps commanded by field marshal count Wrede was posted.

The allies, under Schwartzenburg, concentrated on the Aube, near Pougy and Arcis, and a general attack was made by the allies on the 20th, in which the enemy was defeated at all points, with great loss, and Arcis was taken.

At this juncture, Napoleon formed the desperate and extraordinary plan of passing between the two armies of the allies, and of striking at their communications with the Rhine, intending at the same time to liberate the garrison of Metz. For this purpose he moved by Chalons on Vitry and St. Dizier, his head-quarters being, on the 22d, at Obcomte, between the two latter places. This bold and characteristic resolution was formed in the expectation that it would alarm the allies so much for their own safety, as not only to draw them away from Paris, but actually entangle them in the very difficulties with the prospect of which he endeavoured to terrify them;—this movement was fortunately defeated by their resolution of marching upon Paris, a resolution which was—considering the time and circumstances in which it was taken—one of the grandest that ever entered into the mind of man, and does the highest honour to the names of the emperor Alexander and prince Schwartzenburg;—to which of those great men the idea suggested itself, perhaps they themselves are not conscious; but it is certain they both eagerly adopted it, and must equally share in the glory of that great enterprise in which they risked themselves and their armies for the deliverance of mankind.

For two days after this determination and change of march, Bonaparte was employed, as he hoped, in anticipating the allies, and in preparing the fprings in which his victims were to be caught; but no enemy came—no intelligence arrived: from Paris he heard nothing—from the reft of France little; and a hoftile army of 200,000 men muft be, he knew, at no great diftance from him, but he could not guefs where. Over Winzingerode, who was in his vicinity, near St. Dizier, with a fmall force, he obtained fome, and claimed greater advantages; but thefe fucceffes left him as much in the dark as ever.

He was convinced that this corps was but the advanced guard of the Ruffians; and when one of his generals reported it was not fo, and that the main body of the allies had fufpended their retreat, he himfelf thought the news almoft too good to be believed, and calculated that the time thus loft would enable him to perfect his plans for their deftruction.

In thefe circumftances, it was Napoleon who thought his enemies undone; and far from confidering them as having refumed the offenfive, he faw in their movement of concentration only a meafure of retreat. He announced it triumphantly to the emprefs in letters written with his own hand: thefe letters were intercepted by the allies. They were then certain of having deceived him, and they urged with great precipitation their movement againft the capital.

Of the march upon Paris either he never thought, or his arrogance haftily rejected the idea; but at laft, after a lofs of three days, he felt that it became abfolutely neceffary to afcertain the enemy's pofition, and he accordingly haftened by forced marches through Bar-fur-Aube towards Troyes. A junction was, however, formed by prince Schwartzenburg and marfhal Blucher; and the whole allied force marched upon Paris, with a rapidity that infured its fuccefs. The defences which had been raifed in the neighbourhood of that city were attacked late in the day of the 30th March, and the enemy, under the command of Marmont, made a moft determined refiftance; but the allies were almoft every where fuccefsful.

At the moment of thefe decifive advantages, a flag of truce was fent from Marmont, intimating a defire to receive any propofitions that it might have been intended to make to him by a flag of truce, which had previoufly been refufed admittance. An armiftice was alfo propofed by him for two hours; to obtain which, he confented to abandon every pofition he occupied without the barriers of Paris.

On the 31ft in the morning, the allies entered Paris. In the evening, Caulincourt came from Bonaparte to the emperor of Ruffia, offering to accede to the terms of peace which the allies had offered at Chatillon. The emperor gave no other anfwer, than that the time was paft for treating with Bonaparte as fovereign of France.

Immediately, by the defire of the emperor of Ruffia, the fenate met, and chofe a provifional government, confifting of Talleyrand and four other members. At their fecond fitting, they declared that Bonaparte had forfeited his right to the empire, and that his dynafty was at an end. They alfo refolved, that the fenate and legiflative bodies fhould form fundamental parts of the new conftitution.

On the 1ft of April the provifional government inftalled itfelf, and of this Bonaparte feems to have been aware; and on the 2d he collected at Corbeil, Fontainebleau, and the neighbourhood, at leaft 20,000 men, whom he reviewed and thus addreffed: "The enemy is in Paris. I do not wifh to fpeak of the inhabitants of that city, but a horde of emigrants, whom I had recalled, reftored, and laden with perfonal favours, have offered their fervices to the emperor of Ruffia, and have hoifted the white cockade. The tri-coloured cockade we won in our revolution; we have ennobled it in our empire. It has fhared too many triumphs with us ever to be abandoned. If Paris is to be retaken at the point of the bayonet, I will march at your head. May I reckon upon you? Am I right? Will you ever abandon this national cockade?" "Never, never; vive l'empereur! vive Napoleon! à Paris!" was the anfwer of the whole line of troops.

The marfhals prefent at this fcene were far from partaking or encouraging this enthufiafm: they that fame night affembled in the palace, and when admitted to Napoleon's prefence, with many references to their former fervices, and profeffions of duty and affection, acquainted him that all was loft; that at moft he could collect but 56,000 men, and that for them he had not two days provifions; but the only means of faving any thing from this great fhipwreck, was to abdicate in favour of the king of Rome.

Bonaparte, for the firft time in his exiftence, heard a remonftrance in filence, and ultimately affented to the propofal. On the 3d, marfhal Ney put into his hands the Paris journals, in which the déchéance, pronounced by the fenate the day before, was publifhed; and, in the name of his brethren, on the public parade, gave him that advice fo terrible to the ear of a tyrant, "Sire, il faut abdiquer; c'eft le vœu de la France et de l'armée." Napoleon, thunderftruck, retired into the palace. On the 4th he figned his own abdication, and addreffed an order of the day to his army, in which, after contrafting forcibly and juftly the former fervility and prefent tergiverfation of the fenate, he intimates, that if he is the only obftacle to peace, he is ready to make the laft facrifice for France; and that he has fent Ney, Caulincourt, and Macdonald to Paris, "pour entamer des negociations." Thefe negociations, which had for their object the continuance of Bonaparte's power under the cloak of a regency, to be adminiftered by his wife, in her own name, or that of her fon, happily failed. Others then enfued, in which the difcuffions were not queftions of policy, power, or government, but of pounds, fhillings, and pence; and on the 11th of April was figned the famous treaty, by which Bonaparte abandoned for himfelf and his family the thrones of half the world, and ftipulated only for the empty titles of his better days, a retreat in the obfcureft corner of his late dominions, and a penfion of 2,000,000 of livres *per annum* from the civil lift of Lewis XVIII.; and, finally, on the 12th he figned the formal inftrument of his abdication on the part of himfelf and his dynafty.

Such was the termination of this difaftrous revolution; and in a very few weeks after the depofition of Bonaparte, Lewis XVIII. returned, and took a quiet poffeffion of the throne of his fathers. Of the ftability of the new government we prefume to offer no conjectures. Of the character of the prefent fovereign much might be faid in applaufe; of the new conftitution, at prefent, we know but little: and into what it may ultimately fettle it is difficult to fpeak. Many recent occurrences in different parts of Europe have mortified the friends to human happinefs; the fociety of Jefuits, always inimical to the interefts of mankind, has been re-eftablifhed. The Inquifition, which Bonaparte abolifhed, and which it was imagined could, in this enlightened age, never more rear its horrid head, has been revived in Spain, to the everlafting difgrace of the prince who ordered its eftablifhment, and to the people who permitted it. When we read the decree, that "the tribunal of the Inquifition is abolifhed, as derogatory to the fovereign power, and to civil authority," we did anticipate a new era, even for Spain, and are mortified, beyond the power of language to defcribe, to find that feveral of the beft and moft virtuous inhabitants of that country are now fuffering under a tribunal which curfed the world for fo many centuries, which, for the boldnefs and wickednefs of the original conception, the immenfe extent of its power, the audacity of its attempts, the greatnefs of its fuccefs, and the length of its domination, finds no parallel in the records of the world.

We might, as a conclufion to this article, take fome notice of the principal actors and fufferers in the revolution which we have been contemplating, but we are afraid of transgreffing the allowed limits. Befides, in our alphabetical arrangement, we have already noticed feveral of the moft diftinguifhed of thefe perfons; fee particularly the articles Bailly, Condorcet, Marat, Mirabeau, Lewis XVI., Malesherbes, and Neckar, and to fome others, according to the plan of our work, diftinct articles will hereafter be given. (See Roland-Turgot, Robespierre, Vergniaud, &c.) Of Danton, who took a very active part in fome of the bloodieft fcenes in Paris, and who fell a victim to the axe which he had fharpened for others, we may obferve, that he was educated to the law, and in the progrefs of the revolution was fucceffively the affociate of Mirabeau, Marat, and Robefpierre. He organized fome of the chief tumults and maffacres in the city, particularly that of the 10th of Auguft. After the fall of royalty, he obtained an appointment of adminiftrator of juftice, a ftation in which money poured on him from all fides, and which was fpeedily diftributed by him to procure adherents and reward atrocities. He was deeply involved in the horrid maffacres of September, and, when fubfequently called to account for the diftribution of the money charged for fecret fervice, he declared, that "in a revolution there could be no reckoning in detail." It was Danton who prevented the national affembly from leaving Paris on the approach of the Pruffians. He was brought to the guillotine by Robefpierre, who was his rival, but his inferior in every thing but cunning and hypocrify. For this article, we refer, as authorities, chiefly to the volumes of the New Annual Regifter.

Revolution *of America*. See America, and United States.

Revolution *in Poland*. See Poland.

Revolution, in *Geometry*. The motion of any figure quite round a fixed line, as an axis, is called the revolution of that figure; and the figure fo moving is faid to revolve.

Thus, a right-angled triangle, revolving round one of its legs, as an axis, generates, by that revolution, a *cone;* which fee.

Revolution, in *Aftronomy*, denotes the period of a ftar, planet, comet, or other phenomenon; or its courfe from any point of its orbit, till it return to the fame.

The planets have a twofold revolution. The one about their own axis, ufually called their *diurnal* rotation, which conftitutes what we call their *day*.

The other about the fun, called their *annual* revolution or *period*, conftituting their year. See *Motion of the* Planets.

REVOLUTUM Folium, in *Botany*. See Leaf.

REUS, in *Geography*, a town of Spain, in Catalonia, where feveral merchants at Barcelona have agents for the purchafe of wine, brandy, and fruit, with which the country abounds.

REUSS, a river that rifes from a lake in Mount St. Gothard, croffes the canton of Uri, paffes through the lake of the Four Cantons to Lucerne, and then taking a northerly courfe, runs into the Rhine, two miles N. of Klingnan, in the county of Baden.

REUSSEN, a princely county of Saxony, divided into feveral branches, which take their names from the towns which they poffefs, all fituated in the Vogtland.

REUSSIN, or Redzen, a town of the duchy of Warfaw; 40 miles S.S.W. of Pofen.

REUT, a town of Bavaria, in the bifhopric of Bamberg; three miles E. of Forcheim.—Alfo, a river of European Turkey, which runs into the Dniefter, near Uftia, in the province of Moldavia.

REUTELE, in *Ichthyology*, a name ufed by fome for the *umbla minor*, or red charr, a fifh common in the lakes of Germany, and of the northern parts of England and Wales. The name is originally German.

REUTLINGEN, in *Geography*, a town of Wurtemberg, on a fmall river, which runs into the Neckar. It has only one parochial church, together with one hofpital, an orphan-houfe, and a grammar-fchool. The magiftrates and burghers are Lutherans. Near it was difcovered, in 1716, a fulphurous fpring; 32 miles W. of Ulm. N. lat. 48° 30'. E. long. 9° 8'.

REUTO, a town of Saxony, in the Vogtland; 6 miles W.S.W. of Plauen.

REUTTE, a town of Germany, in the county of Bregentz; 9 miles S.S.E. of Bregentz.

REUTTEN, or Reita, a town of the Tyrolefe, on the borders of Swabia; 32 miles N.W. of Infpruck.

REVULSION, in *Medicine*, the derivation of the fluids of the body, from a part in which they are morbidly accumulated, to another part, whether near or diftant.

This principle is much acted upon in the practice of medicine, although confiderably lefs than by the advocates of the humoral pathology. Thefe practitioners carried the principle fo far as to make their evacuations generally at fome point oppofite and diftant to the part difeafed; thus, to relieve the head, they would bleed from the foot, or from the hæmorrhoidal veins about the anus; and if a pleurify occurred in the left fide, they would open a vein in the right arm; and fo forth. Thefe were mere hypothetical refinements, and have fallen into difufe in this country. Much of the practice of medicine, however, in acute and in fome local chronic difeafes, hinges upon the principle of revulfion. Thus, for the removal of inflammatory congeftion in any internal organ, as in the lungs or brain, a counter-inflammation is excited externally in the fkin of a contiguous part, by applying a blifter, or a ftimulating liniment, to the furface of the cheft, to the neck, or on the fcalp: and thus by bringing an afflux of the fluids to thefe external parts, which are of lefs importance to life, the congeftion in the veffels of the more important and vital organs is diminifhed, and the inflammation cured. In a fimilar manner, the derivation of the fluids to the inteftines by cathartic medicines, to the kidnies by diuretics, and to the fkin by fudorifics, tends to diminifh the congeftion of the circulating fyftem at large, and confequently of particular organs. Blood-letting, whether by directly opening the veins and fmall arteries, or by the application of leeches, or of cupping-glaffes after fcarification, likewife operates upon the principle of revulfion.

Confiderable errors, however, have been committed, efpecially by the humoral pathologifts, by carrying this doctrine too far. For in their attempts to procure evacuations of the fluids, efpecially from the fkin, they have employed heat, and ammoniacal, fpirituous, and other ftimulant medicines, which, by the excitement and irritation which they

 occafioned

occasioned in the nervous and vascular system, produced much more inflammatory action, than the revulsion, resulting from the evacuation, could possibly subdue. See Humoral *Pathology*.

Revulsion is also used for a spontaneous turn or reflux of humours in the body. Sudden diseases are occasioned by great revulsions of humours, which fall all at once on certain parts.

REWAH, in *Geography*, a town of Hindoostan, in the country of Allahabad; 57 miles S.S.W. of Allahabad. N. lat. 24° 35′. E. long. 81° 36′.

REWARDS. Military rewards, among the Athenians, consisted sometimes in crowns presented to those that had merited them; on which their names and noble actions were inscribed. Some had leave granted them to erect pillars or statues in honour of some god, with inscriptions setting forth their victories. This was a favour that was seldom granted; Cimon indeed was honoured with it, but Themistocles could never obtain the like. Another honour conferred at Athens on the valiant, was to have their arms placed in the citadel, and to be called *Cecropidæ*, or citizens of the true old blood. Others were presented with a πανοπλια, or complete suit of armour. Songs of triumph were honorary compliments paid to some. The children of those who were killed in battle were maintained at the public expence, till they came to maturity; at which time they were presented before the assembly of the Athenian people with a complete suit of armour, one of the public ministers proclaiming before them, "that hitherto, in remembrance of their fathers' merits, the commonwealth had educated these young men, but now dismissed them so armed, to go forth and thank their country by imitating their fathers' examples."

Solon made a farther provision for the parents of those that died in the wars, it being extremely reasonable that they should be maintained at the public expence, who had lost their children, the comfort and support of their declining age, in the service of the public.

As for those who were any wise disabled, they had an allowance from the public towards their maintenance. Potter, vol. ii.

Triumphal honours were reckoned among the military rewards which the ancients voted to their best generals. Fabius Maximus, Paul Emilius, Camillus, and the Scipios, were satisfied with this recompence for their services. With respect to old infirm soldiers, who were invalided, they were provided for by receiving, each, a lot of ground, which they cultivated and improved. Lands, thus appropriated, formed part of the republican or national domains, or were divided amongst them in the conquered countries.

The Roman officer was rewarded for his services, or for particular acts of bravery, in three ways: 1st. By marks of honour or distinction, which consisted of two sorts, *viz.* of that which was merely ornamental to their own persons, or limited to the investiture for life; and of that which may be called *rememorative*, such as statues, &c. The latter descended to their posterity, and gave their families a certain rank in the republic. 2dly. By pensions or allowances. And 3dly. By a grant of lands which exceeded the lots given to private soldiers.

The French, who got possession of the country which was formerly occupied by the Gauls, had, at first, no other method of recompensing their generals than by giving them a certain proportion of land. This grant did not exceed their natural lives, and sometimes it was limited to the time they remained in the service.

These usages insensibly changed, and by degrees it became customary for the children of such men as had received grants of national territory, to continue to enjoy them; upon condition, however, that the actual possessors of such lands should be liable to military service. Hence the origin of fiefs in France, and the consequent appellation of *milice des fieffés*, or militia, composed of men who held their lands on condition of bearing arms when called upon. The French armies were for many years constituted in this manner; and the custom of rendering military service in consideration of land tenure, only ceased under Charles VII.

In process of time, those lands which had been originally bestowed upon men of military merit, descended to their children, and were gradually lost in the aggregate lots of inheritable property. Other means were consequently to be resorted to by the state, in order to satisfy the just claims of deserving officers and soldiers. The French, therefore, returned to the ancient custom of the Romans, and rewarded those, who distinguished themselves in war, by honorary marks of distinction.

Honorary rewards and compensations for service were not confined to individual officers and soldiers. Whole corps were frequently distinguished in the same manner. When several corps acted together, and one amongst them gave signal proofs of gallantry and good conduct, that one frequently took precedence of the others in rank, or was selected by the sovereign to be his personal guard. Sometimes, indeed, the king placed himself at the head of such a corps on the day of battle, thereby testifying his approbation of their conduct, and giving a proof of his confidence in their bravery.

It is now usual, in most countries, to confer marks of distinction on those corps that have formed part of any army that has signalized itself. Thus the kettle-drums, under the appellation of *nacaires*, were given to some regiments, as proofs of their having behaved gallantly on trying occasions.

The military order of St. Louis, which was created by Louis XIV. in 1693, and that of Maria Theresa, as well as many other orders in different countries, were only instituted for the purpose of rewarding military merit. The establishment of hospitals for invalids, such as Chelsea, &c. owes its origin and continuance to the same just sense of what is due to deserving officers and soldiers. Hence, likewise, our invalid companies and retired lists.

Philip Augustus, king of France, first formed the design of building a college for soldiers who had been rendered infirm, or were grown old in the service. Louis, surnamed the Great, not only adopted the idea, but completed the plan in a grand and magnificent style. Charles II. on his restoration to the crown of Great Britain, established Chelsea, and James II. added considerable improvements to this royal institution. During the present reign, military merit has been rewarded by titles and pensions; but, what is still more creditable to the government, and reflects honour upon his royal highness the duke of York (for his co-operation with those who originally suggested the idea) old and meritorious soldiers are taught to expect a secure retreat in the decline of life; and every rank is provided for according to the claims and services of individuals.

Rewards, in a *legal sense*. There are rewards given in many cases, by statute, for the apprehending of criminals, and bringing them to justice; as a reward of 40*l.* to those who apprehend robbers on the highway, and prosecute them to conviction, by 4 & 5 W. & M. c. 8, to be paid to them (or, if killed in the endeavour to take them, their executors) by the sheriff of the county; to which the statute 8 Geo. II. c. 16. superadds 10*l.* to be paid by the hundred indemnified by such taking. Also the like reward of 40*l.* for apprehending

hending and profecuting of burglars. Stat. 5 Ann. cap. 31. See LARCENY.

The fame reward for apprehending of money-coiners, or clippers, &c. 6 & 7 W. III. And the like reward for the apprehenfion of thief-takers, not profecuting felons; and of perfons refifting the officers of the cuftoms, by force of arms, &c. 6 Geo. I. cap. 20. 22. See DISCOVERY *of Accomplices*.

REWARI, in *Geography*, a circar of Hindooftan, in the Subah of Delhi, between Ballogiftan on the N. and Mewat on the S.—Alfo, a town of Hindooftan, and capital of the forementioned circar; 48 miles S.W. of Delhi. N. lat. 28° 13′. E. long. 36° 52′.

REWEY, a term among *Clothiers*, fignifying cloth unevenly wrought, or full of *rewes*. 43 Eliz. cap. 10.

REX AMARORIS, in *Botany*, Rumph. Amboin. v. 2. 129. t. 41, a fhrub or tree, fo called on account of its fupreme bitternefs, as well as its reputed medical virtues. The natives of Ternate, according to Rumphius, efteem it a perfect panacea. In cholera, pleurify, and various kinds of fevers, it is particularly recommended. The fruit, of a compreffed heart-like fhape, and coriaceous texture, is cut into fmall pieces, and chewed with Betle-nut. Its exceffive bitternefs caufes a naufea, fuppofed to be beneficial to the patient. Linnæus cites the above chapter of Rumphius, in his *Syft. Veg.* under *Ophioxylon*, but incorrectly, *Rex amoris*. A fpecimen of the true plant is found in his herbarium, but it has no affinity to *Ophioxylon*. We have a more perfect fpecimen, gathered in the ifland of Honimoa, by the late Mr. Chriftopher Smith, in March 1797, by which the plant feems to belong to *Pentandria Digynia*. The *leaves* are elliptical, entire, a fpan long, alternate, on long ftalks; their under fides filky, efpecially when young; with one ftout midrib, and many ftraight parallel tranfverfe veins. *Flowers* very fmall, in numerous, fimple, filky, axillary, folitary clufters. *Calyx* minute, apparently of only two acute leaves. *Petals* five, larger than the calyx, uniform, oblong, concave, at length reflexed. *Stamens* awl-fhaped, fimple. *Anthers* roundifh, fimple, two-lobed. *Germen* fuperior, obovate, compreffed, cloven at the top. Styles none. *Stigmas* obtufe, converging. The ripe *fruit* we have not feen. Rumphius fays it confifts of two cells, with a white feed, like that of a cucumber, in each. The foliage bears confiderable refemblance to fome of the *Contortæ*, but there is no character of that tribe in the fructification; as far, at leaft, as we can difcern. The *germen* and *ftigmas* are not unlike thofe of *Ulmus*. The half-formed *fruit* proves intenfely bitter, as foon as it is put into the mouth.

REX *Minftrellorum*, king of the minftrels. About the year 1330, the minftrels of Paris formed themfelves into a company, and obtained a charter. The police frequently repreffed their licentioufnefs, and regulated their conduct. Philip Auguftus banifhed them the firft year of his reign; but they were recalled by his fucceffors, and united under the general name of *meneftraudie*, minftrelfy; having a chief appointed over them who was called king of the minftrels. Lewis IX. exempted them from a tariff or toll at the entrance into Paris, on condition that they would fing a fong, and make their monkies dance to the tollman, perhaps to prove their title to fuch indulgence; and hence arofe the well-known proverb, " Payer en gambades et en monnoïe de finge."

The affociated minftrels inhabited a particular ftreet, to which they gave the name, which it ftill retains, of St. Julien des Meneftriers. It was here that the public were provided with muficians for weddings, and parties of pleafure; but as a greater number of them ufually attended on fuch occafions than were ordered, and all expected to be paid the fame price, William de Germont, provoft of Paris, in 1331 prohibited the jongleurs and jonglereffes from going to thofe who required their performance in greater numbers than had been ftipulated, upon a fevere penalty. In 1395 their libertinifm and immoralities again incurred the cenfure of government, by which it was ftrictly enjoined that they fhould henceforth, neither in public nor private, fpeak, act, or fing any thing that was indecorous or unfit for modeft eyes and ears, upon pain of two months' imprifonment, and living on bread and water.

In the reign of Charles VI. they feem to have relinquifhed the juggling art, and to have confined themfelves more particularly to the practice of mufic. It was about this time that treble and bafe rebecs, or viols with three ftrings, began to be in ufe, either to play in octaves to each other, or perhaps in a coarfe kind of counterpoint, of which the laws were now forming: on this occafion the minftrels affumed the title of players on high and low inftruments (joueurs des inftrumens tant haut comme bas), which feems to imply treble and bafe inftruments. And the charter under this denomination was confirmed in 1401.

REX *Mullorum*, in *Ichthyology*, a name given by fome authors to a fpecies of mullet, diftinguifhed from all the others by its having a prominent belly, and having no beards under the mouth.

REX *Sacrificulus*, the *King-prieft*, in *Mythology*, was inftituted, after the expulfion of the kings of Rome, to perpetuate the memory, according to Dionyfius Halicarnaffeus, of the great fervices fome of their kings had done to Rome. A law was made, that the pontiffs and augurs fhould choofe one of the oldeft to have the charge of divine worfhip; but for fear that the name of king fhould again create jealoufy, it was appointed at the fame time, that the rex facrificulus fhould be fubject to the high prieft. He had likewife the name of " Rex Sacrorum," and his wife that of " Regina Sacrorum." The firft perfon that was chofen under this appellation, after the expulfion of the Tarquins, was Maxim Papirius, of Patrician extraction.

REX, in *Ornithology*, a fpecies of *Turdus*; which fee.

REX *Vulturum*. See VULTUR *Papa*.

REY, in *Geography*, a town of Perfia, in the province of Irak, called *Rae*; which fee.

REY, a river of England, in Wiltfhire, which runs into the Thames, near Cricklade.

REY *Ifle*, a fmall ifland in the bay of Panama. N. lat. 8°. W. long. 79° 46′.

REY-*Grafs*, in *Agriculture*, a hardy early fort of grafs, much efteemed among farmers. See LOLIUM *Perenne*, and RAY-*Grafs*.

REYES, in *Geography*, a town of New Navarre; 64 miles S. of Cafa Grande.—Alfo, a town of Peru, in the Audience of Lima; 12 miles N. of Tarma.

REYES, *Los*, a town of South America, in the province of St. Martha; 140 miles W. of Maracaybo. N. lat. 10° 15′. W. long. 73° 30′.—Alfo, a fmall ifland near the coaft of Patagonia, at the entrance of Port Defire. S. lat. 47° 50′.

REYES *Magos*, a town of Brazil; 40 miles N. of Spiritu Santo.

REYES *le Yapey*, *Los*, a town of South America, in the province of Buenos Ayres; 180 miles S.E. of Corrientes.

REYGADA, a town of Portugal, in the province of Beira; fix miles N.N.E. of Pinhel.

REYGATE, or REIGATE, a borough and market-town in the weft half hundred of Reygate, and county of Surrey, England, is fituated at the diftance of 19 miles eaft from Guilford,

Guilford, and 21 ſouth by weſt from London. It is of great antiquity, and is mentioned in the General Survey by the appellation Cherchefelle, or Cherchfield; but it ſoon afterwards became generally known by that of Ridge-gate, ſince corrupted into Reygate. The manor was formerly veſted in the crown; and, previous to the Conqueſt, conſtituted part of the property ſettled by king Edward the Confeſſor on his queen, Edith. King William Rufus granted it to the illuſtrious family of the Warrens, earls of Warren and Surrey, ſeveral of whom obtained conſiderable privileges for the town. John, earl of Warren, in the reign of Edward II. procured for the inhabitants the charter, under which they now enjoy the right of holding a weekly market on Tueſday. Another, held on the firſt Wedneſday of every month, was eſtabliſhed by charter from Charles II.; it was for many years diſuſed, but has lately been revived.

Reygate is a borough by preſcription only. The government is veſted in a bailiff, conſtable, tythingman, ale-taſter, fleſh-taſter, fiſh-taſter, and leather-ſeller, with a conſtable for the foreign diviſion, and a tythingman for each of the forenſic ſubdiviſions, or tythings. This town originally ſent members to parliament in the twenty-third year of Edward I. The electors are the freeholders of meſſuages or burgage tenements within the precincts of the borough, and the bailiff is the returning officer.

The pariſh of Reygate is divided into two capital precincts, which provide ſeparately for the maintenance of their reſpective poor, *viz.* the borough and the forenſec, or foreign, the latter including all that portion of the pariſh not comprehended in the former. Within the precinct of the borough ſtands the town itſelf, which is ſeated at the baſe of a ſteep hill of chalk. The buildings are principally diſpoſed in two long and ſpacious ſtreets, of which one, called the High-ſtreet, runs in a direction from weſt to eaſt; and the other, called Bell-ſtreet, in a direction from north to ſouth. The pariſh church, placed at a ſmall diſtance from the town, although not diſtinguiſhed for its antiquity or elegance of its architecture, is nevertheleſs one of the beſt eccleſiaſtical ſtructures in the county. It is divided into a nave, two ſide aiſles, and a chancel, with an embattled tower at the weſt end. The nave and chancel are ſeparated from the aiſles by ſeven pointed arches; five of which, on each ſide, are in the nave and two in the chancel; thoſe of the former being ſupported by pillars, alternately round and octagonal; and thoſe of the latter by cluſtered pillars of a more elegant form. Every portion of the interior is crowded with monuments and inſcriptions to the memory of the Thurlands, of Thurland Caſtle in Nottinghamſhire, the Jameſes of Reygate, the Skinners of the ſame place, and others of leſs note. In a vault under the chancel, conſtructed by William, firſt baron Howard of Effingham, are depoſited many leaden coffins, containing the remains of the founder, and of ſeveral of his deſcendants, earls of Nottingham, and their families. The moſt remarkable of theſe is that inſcribed to the memory of Charles Howard, earl of Nottingham, who commanded the Britiſh fleet in the memorable conteſt with the Spaniſh armada, A. D. 1588.

The old market-houſe ſtood at the weſt end of the town, but it having gone to decay, the preſent houſe was erected, by ſir Joſeph Jekyll, near the ſcite of the ancient priory, which formed one of the terminations of Bell-ſtreet. This religious eſtabliſhment was founded by William de Warren, earl of Surrey, and Iſabel his wife, about the year 1230. The inmates conſiſted of a prior, and a few canons regular, of the order of St. Auguſtine, whoſe clear annual revenue, at the time of the diſſolution, amounted to 68*l.* 16*s.* 8*d.* After that event the ſcite of the priory, with its appurtenances, was granted by king Henry VIII. to William, lord Howard, in exchange for the rectory of Tottenham in Middleſex. The other religious buildings here were, two chapels, dedicated to St. Lawrence, and to Thomas à Becket, and the hoſpital of the Holy Croſs, which ſeems to have been connected with the priory.

On a conſiderable eminence to the north of the town, ſtood the ancient caſtle of Reygate, the foundation and hiſtory of which are little known. Moſt of the very ſlender accounts of it which have reached our times, aſcribe its origin to ſome of the more ancient earls of Warren and Surrey, but others aſſert, that the original ſtructure was of much earlier date, and the work of our Saxon anceſtors. Indeed, if the inhabitants of this part of the country were ſo active and ſucceſsful in repelling the Daniſh invaders, as to give riſe to the proverb attributed to them by Camden, "The Vale of Holmeſdale,—never wonne, ne never ſhall," it ſeems not improbable, conſidering alſo the importance and advantage of the ſituation, that their leaders had a fortreſs here ſufficient for the purpoſes of rendezvous and ſecurity. It is certain that there was a fortreſs at Reygate, of conſiderable note, under the earls of Warren, and which ſeems to have been for many years one, at leaſt, of the capital ſeats of their barony. William, earl of Warren, who poſſeſſed it in king John's time, is the firſt of the family ſpoken of by Dugdale as the proprietor of it; and he acknowledges his title to be derived from his earlieſt anceſtors. This earl, in the conteſt between that king and his barons, was one of the neutral lords who joined in the confederacy againſt the king with reluctance, and who, at the great council at Runnymead, were inclined to favour him; and by whoſe advice the great charter was eventually ſigned by him. This dubious policy of the earl occaſioned the loſs of his caſtle at Reygate, which, ſoon after the landing of Louis the dauphin, was ſurrendered to him. When it was firſt diſmantled is uncertain, but it is mentioned as having been decayed and ruinous in the reign of James I. Even then, and for ſome time after, it muſt have been capable of defence, as in the time of the civil wars, A. D. 1648, the committee of the houſe of commons were ordered "to take care of it, and to put it into ſuch a condition, that no uſe might be made to the endangering the peace of the kingdom." What the immediate reſult of theſe orders was we are not informed, but it was probably demoliſhed ſoon afterwards, though a ſmall part of the walls was ſtanding within the laſt forty years. Now, however, every veſtige of theſe is gone; but the vallum and ditch are ſtill nearly entire on the ſouth and weſt ſides; and in the centre of the area is a deſcent, by a flight of ſteps, to a paſſage 235 feet long, which leads into a cave 123 long, 13 wide, and 11 high. This cave is conjectured to have ſerved the double purpoſe of a repoſitory for military ſtores, and a place of cuſtody for priſoners: it might alſo be a place of ſafety in times of public commotion.

The park at Reygate is ſituated to the ſouth of the town. It contains about 150 acres, and appears, by a ſurvey made in 1622, to have been then well ſtored with timber trees, and with veniſon. It was diſparked within twenty years from that period, and now retains few of its former characteriſtics, except the name. At Eaſt-Beechworth, to the weſtward of Reygate, is a ſeat of the late Hon. William Henry Bouverie, which was built by ſir Ralph Freeman in the reign of James I.; and near it is Wonham, a manſion belonging to viſcount Templetown: Gatton, to the northward, about two miles, affords an example of nominal borough repreſentation, ſcarcely a houſe being left ſtanding within its limits. In this pariſh, at a place called Battle-

Battle-bridge, tradition affirms that a great ſlaughter of the Danes took place. Aubrey ſtates that a caſtle exiſted here, but no traces of ſuch a building can now be diſcovered. See Gatton.

Merſtham, to the eaſt of Gatton, is noted for its ſtone quarries, which were anciently held in ſuch high repute that the crown deemed it expedient to keep them in its own poſſeſſion. A great part of Windſor caſtle, and the magnificent chapel of Henry VII. at Weſtminſter, were conſtructed with ſtone from theſe quarries. The quality which renders it peculiarly valuable, is its effectual reſiſtance againſt fire, whence it is denominated fire-ſtone. It is very ſoft when firſt raiſed from the quarry, but becomes indurated by expoſure to the atmoſphere. A rail-road has been formed here to facilitate the conveyance of ſtone and lime from the quarries to the metropolis. Merſtham-place is a ſpacious manſion belonging to Hylton Jolliffe, eſq. In the pariſh of Newdigate, about ſix miles ſouth-weſt from Reygate, is Ewood, a manſion lately erected by the preſent duke of Norfolk. The houſe ſtands on the brow of an eminence, and is ſurrounded by a park containing about 600 acres of ground, and ornamented with a fine lake, covering ſixty acres. At Nutfield, as well as at Reygate, are ſome fuller's-earth pits, which yield excellent earth. Hiſtory and Antiquities of the County of Surrey, by the Rev. Owen Manning; edited, with additions, by W. Bray, eſq. F.S.A.; vol. i. folio. Beauties of England and Wales, 8vo. vol. xiv. by I. Shorbel.

REYHER, Samuel, in *Biography*, an eminent German mathematician, was born at Schleuſingen, in Saxony, in the year 1635. He received the early part of his education under his father, and then purſued his mathematical ſtudies at the univerſity of Leipſic. He next went to Leyden, and ſtudied the algebra of Vieta under the celebrated James Golius, with whom he contracted an intimate friendſhip. On his return to Leipſic, he obtained ſo high a reputation in teaching the mathematics, that he was nominated preceptor to the young prince of Gotha, the eldeſt ſon of the duke of Saxe-Gotha. In 1665 he accepted an invitation to fill the mathematical chair at the univerſity of Kiel, and having firſt paid a viſit to Leyden, he was there admitted to the degree of doctor in civil law. In a few years afterwards he was appointed profeſſor extraordinary of civil law, in 1683 profeſſor in ordinary of the Inſtitutes, and in 1692 profeſſor of the code of Juſtinian. He died in 1714, in the 80th year of his age. He tranſlated the works of Euclid into the German language, illuſtrating the geometrical with algebraical demonſtrations, wherever they would admit of it; and he publiſhed, among many other works, a learned work entitled "Matheſis Biblica;" and a very curious "Diſſertation concerning the Inſcription on the Croſs of Jeſus Chriſt, and the Hour of his Crucifixion." Moreri.

REYN, Jan de, or Rheni, called alſo *Lang Jan*, was an artiſt of very conſiderable merit, a diſciple, and ſkilful imitator, of Vandyke; to whom he was ſo much attached that he followed him to London, and remained ſome time with him. He was born at Dunkirk in 1610; and he ſo effectually benefited by the inſtructions of Vandyke, that his pictures are frequently ſold for thoſe of that maſter. But as he, in general, painted hiſtory more than portrait, he has a freer line in compoſition, though not ſo correct a one as his maſter. His works are ſcarce, though he lived to the age of 68, but their apparent ſcarcity is poſſibly owing to ſo many of them being imputed to Vandyke. Among the works which are indiſputably his, are mentioned the Baptiſm of Totila, which is in a church at Dunkirk; and a grand altar-piece in the pariſh church of St. Martin, at Bergues, repreſenting Herodias bringing the head of St. John to Herod. He died in 1678.

REYNA, Cassiodorus de, celebrated for being the firſt tranſlator of the whole bible into the Spaniſh language, and on this account he is noticed, though we have no particulars concerning his life. To his tranſlation he introduced notes explanatory and critical. The place where this verſion was printed is not mentioned in the title-page, though, from ſome typographical marks, it may be aſcertained pretty correctly that it was at Baſil; and as the author was probably a Proteſtant, he thought proper to conceal his name, that it might not prevent his work from being received among the Spaniſh Catholics, and it has only his initials R. C. to a Latin preface, recommending it to the kings, princes, and nobles of Europe, and particularly of the Roman empire. The date is 1569, and it is entitled "La Biblia, Que Es, Los Sacros Libros Del Vieio y Nuevo Teſtamento. Tranſladada en Eſpagnol." The firſt edition of this verſion is now very ſcarce. Moreri.

REYNEAU, Charles René, an eminent French mathematician, was born at Briſſac, in the province of Anjou, in the year 1656. At the age of twenty, he took up his reſidence in the houſe belonging to the congregation of the Oratory at Paris, without any intention of entering into the community. His object was to enjoy the advantages in ſtudy which that celebrated order afforded for improvement in literature. In a ſhort time, however, a change took place in his mind, and he became a member of the houſe. He became ſtrongly attached to the ſcience of geometry, and in 1683 he was appointed to a mathematical profeſſorſhip at Angers: this poſt he retained 22 years with extraordinary reputation. In this ſituation he undertook to reduce into one body, for the uſe of his ſcholars, the principal theories ſcattered through the writings of Deſcartes, Leibnitz, Bernouilli, the Leipſic Acts, the Memoirs of the Paris Academy of Sciences, and other works. The fruit of this undertaking, entitled "The Analyſis demonſtrated, &c." he publiſhed at Paris in the year 1708, in two vols. 4to. He aſſumed this title for his work becauſe it contained demonſtrations of ſeveral methods of analyſis which had not been demonſtrated by the authors of them, or, at leaſt, not with ſufficient perſpicuity and exactneſs. By ſupplying what was left undone by other perſons, he rendered ſo ſignal a ſervice to mathematical ſtudents, that it became a maxim, at leaſt in France, that to follow father Reyneau was the beſt way to make much progreſs in mathematics. Hence he was eſteemed the Euclid of the ſublime geometry. His great work was reprinted in 1738. In the year 1714 he drew up an elementary work on the ſubject, under the title of "The Science of Calculation, &c." which was moſt favourably received. This came out in one volume, and he had prepared materials for a ſecond, which did not make its appearance till after the author's death. In 1716 the Royal Academy of Sciences at Paris admitted ſome new members, under the deſignation of "free aſſociates:" father Reyneau was of that number, and he frequently aſſiſted at their meetings. He died in 1723, at the age of 72, regretted as well for his many virtues, as for profound and extenſive learning. The firſt men in France for talents deemed it an honour to count Reyneau among their friends. In this number was father Malebranche, of whom Reyneau was a zealous diſciple. He left behind him a treatiſe on "Logic, or the Art of Reaſoning," which was publiſhed in 1745. Moreri.

REYNEL, in *Geography*, a town of France, in the department of the Upper Marne; 12 miles W. of Bourmont.

REYNESBURCH, a town of Holland; three miles N.W. of Leyden.

REYNOLDS, *Sir* JOSHUA, *Knt.*, in *Biography*, was the fon of the Rev. Samuel Reynolds, rector of Plympton, near Plymouth, in Devonfhire, and was born there, on July 16, 1723; the tenth of eleven children, five of whom died in their infancy. He was, for fome time, inftructed in the claffics by his father, and was intended for the practice of phyfic; but he began, at a very early age, to difplay an inclination for the art in which he fubfequently made fo diftinguifhed a figure. At eight years of age he made himfelf fo far mafter of perfpective, as to draw his father's bookcafe according to rule, and, encouraged by his affectionate parent, amufed himfelf by copying prints that he found in books, and particularly thofe in Jacob Kat's emblems. From thefe early labours the tranfition was eafy to the attempt at drawing likeneffes of his friends, and in thefe he obtained tolerable fuccefs. Richardfon's Treatife on Painting was then put into his hands, and, according to his own report, he was, by that work, ftimulated to the greateft degree of enthufiafm for the art of painting, and led to regard its profeffors, particularly Raphael, as among the greateft and moft illuftrious of men, either in ancient or modern time. After he had fpent fome time practifing in the neighbouring country, his parents were induced, by the advice of a Mr. Cranch, to fend him to London, as the place beft calculated to improve talents fuch as he had fo decidedly exhibited; and accordingly, in October 1741, he firft vifited the capital, and was immediately placed with Mr. Hudfon, the moft renowned portrait painter of that time, in order to acquire the firft rudiments of this art.

Whatever was the caufe, whether, as it is faid, Hudfon became jealous of the ability of his pupil, or, as is equally probable, the pupil became difgufted with the want of tafte exhibited by his mafter, in little more than two years they difagreed, and young Reynolds returned to his father, and again employed himfelf in painting his friends. Many of thefe early productions of his pencil are ftill to be feen in the town and neighbourhood of Plymouth, and fome of them poffefs very confiderable merit, and indicate his future prowefs. One of them, particularly, of a boy reading in reflected light, 30 years afterwards, excited furprize in his own mind, and an expreffion of regret that, in fo many years, he fhould have made fo little progrefs in his profeffion. He is faid to have lamented having paffed this period of his life in the way he had done; moft probably, however, that regret alludes to his abfence from London, where he would moft undoubtedly have feen more of the art, and learnt more of its practice, than elfewhere. But perhaps it was a fortunate occurrence that he was removed to a ftation where he had to rely upon his own emotions, unbiaffed by the grofs and barbarous tafte which then prevailed; fince, guided by thofe emotions, he attempted to follow the dictates of nature, untrammelled by the pedantry of amateurs, and the low ignorance of the greater part of the profeffors of the day.

Finding his practice increafing, he took a houfe at Plymouth Dock, and there became known to the family of Mount Edgecumbe, by whom he was warmly patronized, and recommended to captain (afterwards lord) Keppel, who carried him to Italy in 1749; and it would appear, from a letter of his to lord Mount Edgecumbe, written when he was in Rome, that that noble lord defrayed the expence of his refidence there. The courfe of his ftudies during the three years that he fpent there, is not precifely known. He made fome few copies of figures and heads from the works of Raphael, but that does not appear to have been a favourite mode of ftudy with him, for in one of his lectures he has faid, "the man of true genius, inftead of fpending all his hours, as many artifts do while they are at Rome, in meafuring ftatues, and copying pictures, foon begins to think for himfelf, and endeavours to do fomething like what he fees. I confider general copying as a delufive kind of induftry; the ftudent fatisfies himfelf with the appearance of doing fomething; he falls into the danger of imitating without felecting, and of labouring without any determinate object: as it requires no effort of the mind, he fleeps over his work; and thofe powers of invention and difpofition, which ought particularly to be called out and put in action, lie torpid, and lofe their energy for want of exercife. How incapable of producing any thing of their own, thofe are, who have fpent moft of their time in copying, is an obfervation well known to all who are converfant in our art." That he reflected deeply on the great works of the ancient and modern mafters is evident, both from his pictures and writings; though the tafte with which he fubfequently applied the knowledge he had acquired, proves the originality of his mind, and the extent of his genius.

Mr. Reynolds returned through Paris to England in October 1752, and after a fhort time fpent at his native place, to recruit his health, which had fomewhat fuffered by the journey, he fixed his fettled refidence in the metropolis; taking a houfe in St. Martin's-lane. He there painted, as his firft effay, a head, from an Italian youth he had brought over with him, (Giufeppe Marchi). He dreffed it in a rich turban, and its execution excited fo much attention, that his old mafter, Hudfon, was induced to go to fee it, and carefully watched its progrefs: when, upon feeing at length no trace of his own manner left, and unable, or unwilling, to find any other merit in it, he exclaimed, "why Reynolds, you don't paint fo well as you did when you left England!" Notwithftanding this augural declaration, the pupil became the fuperior favourite with the public; and Hudfon retiring, left him without a competitor.

In 1753, or 4, he took a large houfe in Newport-ftreet, where he refided for eight or nine years, and there he painted a whole length portrait of his friend commodore Keppel walking on the fea-fhore, which drew upon him univerfal admiration, and fixed him completely in the public efteem. At this time his price was ten guineas for a head; in 1755 he raifed it to twelve; and in 1758 to twenty guineas; and he afterwards, by degrees, advanced it to fifty; at which it remained till he declined practice; the price of a half length, during the latter period, being 100, and for a whole length 200 guineas.

To fay that he was univerfally regarded as being at the head of the profeffion of portrait painting at the time adverted to, cannot indeed be confidered as any great praife, fuch was its degraded condition; though Hudfon had certainly advanced above his immediate predeceffors. Reynolds however, deferved much more, for he united to a dignified characteriftic refemblance of the head, an endlefs variety of fpirited and graceful attitudes, picturefque back-grounds, novel and ftriking effects of light and fhade, with a voluptuous richnefs and harmony of colour, which certainly had never before been feen united to fo many other qualities in that branch of the art. It muft not, however, be underftood, that his performances at that time poffeffed thofe excellencies to the degree in which we find them in his latter works; for he was one of the few, whofe efforts ended but with his life; who has been heard to fay, that he never began a picture without a determination to make it his beft; and whofe unceafing progrefs almoft juftified the maxim he was fo fond of repeating continually, "that nothing is denied to well directed induftry." Befides his uncommon

affiduity,

affiduity, which was apparent to all, little information remains to us of the precife method of ftudy by which fuch extraordinary excellence was attained, except what may be collected from the following extract, made from fome papers left by him, and intended perhaps for infertion in another difcourfe; in which, as his biographer obferves, he fpeaks of his merits and defects with fingular modefty and candour. "Not having the advantage of an early academical education, I never had that facility of drawing the naked figure which an artift ought to have. It appeared to me too late when I went to Italy, and began to feel my deficiencies, to endeavour to acquire that readinefs of invention which I obferved others to poffefs. I confoled myfelf, however, by remarking, that thofe ready inventors are extremely apt to acquiefce in imperfection, and that if I had not their facility, I fhould, for this very reafon, be more likely to avoid the defect which too often accompanied it,—a trite and common-place invention. How difficult it is for the artift who poffeffes this facility to guard againft careleffnefs and common-place, is well known; and in a kindred art, Metaftafio is an eminent inftance, who always complained of the great difficulty he found in obtaining correctnefs, in confequence of his having been in his youth an *improvifatore*. Having this defect conftantly in my mind, I never was contented with common-place attitudes or inventions of any kind. I confidered myfelf as playing a great game; and inftead of faving money, I laid it out fafter than I got it, in purchafing the beft examples of the art that could be procured; for I even borrowed money for this purpofe. The poffeffing portraits by Titian, Vandyke, Rembrandt, &c. I confidered as the beft kind of wealth. By ftudying carefully the works of great mafters, this advantage is obtained: we find that certain niceties of expreffion are capable of being executed, which otherwife we might fuppofe beyond the reach of art. This gives us a confidence in ourfelves, and we are thus incited to endeavour at not only the fame happinefs of execution, but alfo at other congenial excellencies. Study, indeed, confifts in learning to fee nature, and may be called the art of ufing other men's minds. By this kind of contemplation and exercife, we are taught to think in their way, and fometimes to attain their excellence. Thus, for inftance, if I had never feen any of the works of Correggio, I fhould never, perhaps, have remarked in nature the expreffion which I find in one of his pieces: or if I had remarked it, I might have thought it too difficult, or perhaps impoffible, to be executed.

"My fuccefs and continual improvement in my art (if I may be allowed that expreffion), may be afcribed, in good meafure, to a principle which I will boldly recommend to imitation; I mean a principle of honefty, which in this, as in all other inftances, is, according to the vulgar proverb, certainly the beft policy. I always endeavoured to do my beft. Great or vulgar, good fubjects or bad, all had nature; by the exact reprefentation of which, or even by the endeavour to give fuch a reprefentation, the painter cannot but improve in his art.

"My principal labour was employed on the whole together, and I was never weary of changing and trying different modes and effects. I had always fome fcheme in my mind, and a perpetual defire to advance. By conftantly endeavouring to do my beft, I acquired a power of doing that with fpontaneous felicity, which at firft was the effort of my whole mind, and my reward was three-fold; the fatisfaction refulting from acting upon this juft principle, improvement in my art, and the pleafure derived from a conftant purfuit after excellence.

"I was always willing to believe that my uncertainty of proceeding in my works, that is, my never being fure of my hand, and my frequent alterations, arofe from a refined tafte, which could not acquiefce in any thing fhort of a high degree of excellence. I had not an opportunity of being early initiated in the principles of colouring; no man, indeed, could teach me. If I have never been fettled with refpect to colouring, let it at the fame time be remembered, that my unfteadinefs in this refpect proceeded from an inordinate defire to poffefs every kind of excellence that I faw in the works of others: without confidering that there are in colouring, as in ftyle, excellencies which are incompatible with each other: however, this purfuit, or any fimilar one, prevents the artift from being tired of his art. We all know how often thofe mafters who fought after colouring changed their manner, while others, merely from not feeing various modes, acquiefced all their lives in that in which they fet out. On the contrary, I tried every effect of colour; and by leaving out every colour in its turn, fhewed every colour that I could do without it. As I alternately left out every colour, I tried every new one; and often, as is well known, failed. The former practice, I am aware, may be compared by thofe whofe firft object is ridicule, to that of the poet mentioned in the Spectator, who in a poem of 24 books, contrived in each book to leave out a letter. But I was influenced by no fuch idle or foolifh affectation; my ficklenefs in the mode of colouring, arofe from an eager defire to attain the higheft excellence. This is the only merit I can affume to myfelf from my conduct in this refpect."

His affiduity and love of his profeffion left him little leifure for country excurfions. Occafionally, however, he fpent a few days at his villa on Richmond-hill, and vifited, at different times, the feats of fome of the noblemen and gentlemen of his acquaintance, from whence he was always glad to return to the practice of his profeffion, and the enjoyment of that intellectual fociety, of which, like his friend Johnfon, he juftly confidered London as the head-quarters. He, very foon after he became fettled, perceived the advantage which one confined to the laborious duties of an arduous profeffion might derive from the fociety of literary men. Finding how little time he could fpare from his profeffion, for the purpofe of acquiring general knowledge from books, he refolved to partake as much as poffible of the benefits which might be drawn from the converfation of the learned and ingenious men of his time. In confequence of this, and of his cheerful and convivial habits, his table, for above thirty years, exhibited an affemblage of all the talents of Great Britain and Ireland; there being, during that period, fcarcely a perfon in the three kingdoms diftinguifhed for his attainments in literature or the arts, or for his exertions at the bar, in the fenate, or the field, who was not occafionally found there.

Soon after the return of fir Jofhua from Italy, he became acquainted with Dr. Johnfon, to whofe fuperior talents he was always proud to acknowledge his obligations; and in the paper we have before-mentioned, had expreffed his fenfe of the benefit he had derived from his fociety. When fpeaking of the value of affociating either perfonally or by ftudy with the truly great, he adds, "May I prefume to introduce myfelf as an inftance of the truth of what I have remarked. Whatever merit the difcourfes which I have had the honour of delivering from this place may have, it may in great meafure be imputed to the education which I may be faid to have had under Dr. Johnfon. I do not mean to fay, though it certainly would be to the credit of thefe difcourfes, if I could fay it with truth, that he contributed

contributed even a ſingle ſentiment to them; but he qualified my mind to think juſtly. No man had, like him, the faculty of teaching inferior minds the art of thinking."—"The obſervations which he made on poetry, on life, and on every thing about us, I applied to one art; with what ſucceſs others muſt judge." The great leviathan of literature found in the mind of Reynolds a congenial purity and ſtrength, and became zealouſly attached to him; who, with ſuch a coadjutor, found but little difficulty in collecting around him a circle of the moſt able and uſeful members of ſociety. Many illuſtrious foreigners were perſonally intimate with him; and his friendſhip was ſought by individuals of the higheſt quality; who revered his genius as much as they reſpected the worth of his private character. From ſuch connections, his mind, rich in its own ſtores, received an acceſſion of moſt extenſive information, and an inexhauſtible treaſure for converſation. He had a mind ever open to acquire uſeful knowledge; a ſound and penetrating judgment to ſelect what he acquired, and great induſtry and application in rendering his acquirements uſeful.

The variety of talent he exhibited, and the conſequent eminence which he gained, qualified him to ſhare the honours of the firſt ſcientific inſtitutions. He was accordingly admitted to the Royal, the Antiquarian, and the Dilletanti Societies; and when the late lord North was inſtalled chancellor of the univerſity of Oxford, in July 1773, ſir Joſhua was admitted to the honorary degree of doctor in civil law. He had previouſly, in 1769, been elected to the preſidency of the Royal Academy, in the formation of which he had a principal ſhare, and had, upon the occaſion, been honoured by his majeſty with the rank of knighthood. To this inſtitution he was a moſt invaluable member, and repaid the honour and fame he acquired from his ſituation in it, by a zealous attention to its intereſts. Nor did the Academy derive leſs credit from the admirable works which he continued yearly to exhibit in it, conſiſting indeed chiefly of portraits, though he rarely ſuffered a ſeaſon to paſs in which he did not bring forwards one or more ſpecimens of his powers in hiſtory. From the year 1769, when, as we have ſaid, the academy was founded, till 1790, incluſive, it appears that he ſent no leſs than 244 pictures to the exhibition.

The taſk of reading lectures was no part of the preſcribed duty of his office: but impoſed voluntarily upon himſelf for the following reaſons, aſſigned by him in his fifteenth diſcourſe. "If prizes were to be given, it appeared not only proper, but almoſt indiſpenſably neceſſary, that ſomething ſhould be ſaid by the preſident on the delivery of thoſe prizes; and the preſident, for his own credit, would wiſh to ſay ſomething more than mere words of compliment: which, by being frequently repeated, would ſoon become flat and unintereſting; and by being uttered to many, would at laſt become a diſtinction to none. I thought, therefore, if I were to preface this compliment with ſome inſtructive obſervations on the art, when we crowned merit in the artiſts whom we rewarded, I might do ſomething to animate and guide them in their future attempts." To the exertions which this moſt judicious ſenſe of propriety ſtimulated him to make, he is indebted, principally, for his renown as an author. In the courſe of twenty-one years, *viz.* from 1769 to 1790, incluſive, he compoſed fifteen diſcourſes; replete with the ſoundeſt principles, and the moſt uſeful information concerning the art he practiſed, that ever have been given to the world. In which, though it muſt be acknowledged that there are ſome few points not ſufficiently explained, yet they are free from the affected rant of connoiſſeurſhip, and practically efficient to guide the young, whilſt it confirms the more advanced, in purſuit of the juſt objects of the art of painting, and the ſureſt means of obtaining ſucceſs. Beſides theſe, he wrote three papers for the Idler, in 1759; *viz.* Nos. 76, 79, and 82; in which is exhibited his original turn of thinking on the nature and properties of beauty and of art: and in 1783, his notes to Maſon's tranſlation of Du Freſnoy's poem on Painting, gave to the world many practical obſervations and explanations of the rules laid down in the text, which convey inſtruction of the moſt uſeful kind, and tend to ſhew how carefully, and how ſyſtematically, his mind was made up on the ſubject.

It has been conjectured, and widely diffuſed in opinion, that ſir Joſhua did not compoſe his lectures himſelf. In ſupport of what is due to him on that head, Mr. Northcote, who lived ſome years in his houſe, has ſaid in his memoirs, "At the period when it was expected he ſhould have compoſed them, I have heard him walking at intervals in his room till one or two o'clock in the morning, and I have on the following day, at an early hour, ſeen the papers on the ſubject of his art which had been written the preceding night. I have had the rude manuſcript from himſelf, in his own handwriting, in order to make a fair copy from it for him to read in public: I have ſeen the manuſcript alſo after it had been reviſed by Dr. Johnſon, who has ſometimes altered it to a wrong meaning, from his total ignorance of the ſubject and of art; but never, to my knowledge, ſaw the marks of Burke's pen in any of the manuſcripts.

"The biſhop of Rocheſter, alſo, who examined the writings of Mr. Burke ſince his death, and lately edited a part of them, informed a friend that he could diſcover no reaſon to think that Mr. Burke had the leaſt hand in the diſcourſes of Reynolds." And Burke himſelf, in a letter to Mr. Malone, after the publication of ſir Joſhua's life and works, ſays, "I have read over ſome part of the diſcourſes with an unuſual ſort of pleaſure, partly becauſe being faded a little in my memory, they have a ſort of appearance of novelty; partly by reviving recollections mixed with melancholy and ſatisfaction. The Flemiſh journal I had never ſeen before. You trace in that, every where, the ſpirit of the diſcourſes, ſupported by new examples. He is always the ſame man; the ſame philoſophical, the ſame artiſt-like critic, the ſame ſagacious obſerver, with the ſame minuteneſs, without the ſmalleſt degree of trifling." We may ſafely ſay, this is not the language of one who had himſelf contributed much to thoſe diſcourſes. And if neither Johnſon nor Burke wrote for Reynolds, to whom elſe among his contemporaries ſhall the praiſe due to thoſe invaluable compoſitions be given, if Reynolds is to be deprived of it!

It is much to be lamented, that the world was deprived of this great artiſt before he had put into execution a plan which his biographer, Mr. Malone, ſays appears, from ſome looſe papers, to have been revolved in his mind. "I have found," ſays that author, "among ſir Joſhua's papers, ſome detached and unconnected thoughts, written occaſionally, as hints for a diſcourſe, on a new and ſingular plan, which he ſeems to have intended as a hiſtory of his mind, ſo far as concerned his art; and of his progreſs, ſtudies, and practice; together with a view of the advantages he had enjoyed, and the diſadvantages he had laboured under, in the courſe that he had run: a ſcheme, from which, however liable it might be to the ridicule of wits and ſcoffers, (of which, he ſays, he was perfectly aware,) he conceived the ſtudents might derive ſome uſeful documents for the regulation of their own conduct and practice." Such a compoſition, from ſuch a man, written after he had ſpent a long life in ſucceſsful practice, with none to guide him; who had choſen a line of art for himſelf, ſtamped with originality; and in which he had to develope principles, and elucidate them by practice; and competent as he was to explain the operations of his own mind; could not fail of being interesting and useful in the highest degree. One of these detached ideas we have quoted above, and lament that any of them should be withheld from publication.

In 1781, during the summer, he made a tour through Holland and the Netherlands, with a view of examining critically the works of the celebrated masters of the Dutch and Flemish schools. An account of this journey, written by himself, containing much excellent criticism on the works of Rubens, Vandyke, Rembrandt, &c. in the churches and different collections at Antwerp, Brussels, Ghent, the Dusseldorf gallery, and at Amsterdam, was published after his death; it concludes with a masterly drawn character of Rubens.

In 1783, in consequence of the emperor's suppression of some religious houses, he again visited Flanders, purchased some pictures by Rubens, and devoted several more days to the contemplation and further investigation of the performances of that great man. On his return, he remarked that his own pictures wanted force and brilliancy, and appeared, by his subsequent practice, to have benefited by the observations he had made. This year, on the death of Ramsay, he was made principal painter in ordinary to his majesty, and continued so till his death.

For a very long period he had enjoyed an almost uninterrupted state of good health, except that in the year 1782 he was for a short time afflicted with a paralytic stroke. A few weeks, however, perfectly restored him, and he suffered no inconvenience from it afterwards. But in July 1789, whilst he was painting the portrait of lady Beauchamp, he found his sight so much affected, that it was with difficulty he could proceed with his work; and notwithstanding every assistance that could be procured, he was in a few months totally deprived of the use of his left eye. After some struggles, he determined, lest his remaining eye should also suffer, to paint no more: and though he was thus deprived of a constant employment and amusement, he retained his usual spirits, and partook of the society of his friends with apparently the same pleasure to which he had been accustomed; and was amused by reading, or hearing others read to him. In October 1791, however, his spirits began to fail him, and he became dejected, from an apprehension that an inflamed tumour, which took place over the eye that had perished, might occasion the destruction of the other also. Meanwhile he laboured under a more dangerous disease, which deprived him both of his spirits and his appetite. During this period of great affliction to all his friends, his malady was by many supposed to be imaginary, and it was erroneously conceived, that by exertion he might shake it off; for he was wholly unable to explain to the physicians the nature or seat of his disorder. It was only about a fortnight before his death that it was found to be in the liver; the inordinate growth of which, as it afterwards appeared, had incommoded all the functions of life. Of this disease, which he bore with great fortitude and patience, he died, after a confinement of three months, at his house in Leicester-square, on Thursday evening, February 23, 1792, at the age of 69.

In stature, sir Joshua Reynolds was rather under the middle size, of a florid complexion, roundish, blunt features, and a lively pleasing aspect; not corpulent, though somewhat inclined to it; and extremely active. With manners uncommonly polished and agreeable, he possessed a constant flow of spirits, which rendered him at all times a most desirable companion; always ready to be amused, and to contribute to the amusement of others, and anxious to receive information on every subject that presented itself: and though he had been deaf almost from the time of his return from Italy; yet, by the aid of an ear trumpet, he was enabled to partake of the conversation of his friends with great facility and convenience. On the 3d of March his remains were interred in the crypt of St. Paul's, near the tomb of sir Christopher Wren, with every honour that could be shewn to worth and genius by an enlightened nation; a great number of the most distinguished persons attending the funeral ceremony, and his pall being supported by three dukes, two marquisses, and five other noblemen.

In many respects, both as a man and a painter, sir Joshua Reynolds cannot be too much studied, praised, and imitated by every one who wishes to attain the like eminence. His incessant industry was never wearied into despondency by miscarriage, nor elated into neglect by success. Either in his painting-room, or wherever else he passed his time, his mind was devoted to the charms of his profession. All nature, and all art, was his academy, and his reflection was ever on the wing, comprehensive, vigorous, discriminating, and retentive. With taste to perceive all the varieties of the picturesque, judgment to select, and skill to combine what would serve his purpose, few have ever been empowered by nature to do more from the fund of his own genius: and none ever endeavoured more to take advantage of the labours of others. He made a splendid and useful collection, in which no expence was spared. His house was filled, to the remotest corners, with casts from the antique statues, pictures, drawings, and prints, by various masters of all the different schools. Those he looked upon as his library, at once objects of amusement, of study, and competition. After his death they were sold by auction, with his unclaimed and unfinished works, and, together, produced the sum of 16,947*l.* 7*s.* 6*d.* The substance of his whole property, accumulated entirely by his pencil, and left behind after a life in which he freely parted with his wealth, amounted to about 80,000*l.*

It remains to speak of his style as an artist, which is precisely that, denominated in his lectures the ornamental style; but which, beautiful and seducing as it undoubtedly is, cannot be recommended in so unreserved a degree as his industry both in study and practice: that which he characteristically terms his own uncertainty, both in design and in execution, operates too frequently and too powerfully against its entire adoption. In the higher attainments of the art, colouring and chiaro-scuro were undoubtedly elements which he favoured, and in which he moved uncontrolled. Drawing, as he himself candidly confessed, was the part of the art in which he was most defective; and from a desire perhaps to hide this defect, with an over-solicitude to produce a superabundant richness of effect, he was sometimes tempted to fritter his lights, and break up his composition, particularly if it happened to be large, into too many parts: yet, in general, his taste in lines and forms was at the same time grand and graceful; and the taste and skill with which he drew and set together the features of the human face, has never been surpassed by any artist. We would be understood to speak of his finest productions; of the ordinary class among them, we must allow, that the marking favours of manner, and the substance is not always characteristic of flesh.

In execution, though he wanted the firmness and breadth which appertain to the highest style of art, yet the spirit and sweetness of his touch were admirable, and would have been more remarkable, had he been more a master of drawing: but not being able readily to determine his forms, he was obliged to go over and over the same part, till some of the vivacity of his handling was frequently lost; his labour,

bour, however, was never wholly so, for he added to the force and harmony of his pictures by these repetitions; and frequently attained graces by them which would otherwise perhaps have remained unknown.

The numberless instances in which he is known to have borrowed thoughts, both in actions of figures, and effect of colour, seem to impeach his power of invention. But surely it could not proceed from want of a sufficient portion of that high and necessary quality, that he, who produced so many novel combinations, adopted that short-hand path to composition. We see it exemplified in a superior degree in most of his principal productions; and particularly in his whole length and half length portraits; the arrangements of which are no less beautiful and interesting, than new, and entirely his own. These are composed in a taste far surpassing all that had ever been done by his predecessors; uniting the grandeur, simplicity, and fulness of Titian, and the grace and nature of Vandyke, with the artful and attractive effects of Rembrandt.

Most probably he adopted that line of conduct from necessity; driven to it by the immense source of employment which his talents for portraiture showered upon him. He had scarcely time to invent new actions or effects in all cases, or to bestow that study upon them which would have been requisite, and therefore he satisfied himself by endeavouring to infuse into those he borrowed more elegance, more feeling, or more sentiment. How effectually he did this, needs not here be mentioned. One quality he had, which no other painter that ever breathed shares with him in an equal degree, fascination. The effect of his best pictures acts like a charm, and arrests the tasteful beholder with irresistible power. On the works of others we look with approbation, and sometimes with feelings of admiration and delight, or even with a sensation of awe; but in those of Reynolds there is generally an indescribable unity and amenity, which act upon us with most fascinating power, and rivet the attention with superior gratification. No real connoisseur can deny the existence of this quality in his pictures, but wherein it specifically dwells, it is not easy to discover or define. They are not laboured to perfect imitation, indeed they stop very far short of that; yet they present a full image, with a degree of life and animation, that has rarely been displayed upon canvas. It is a dangerous doctrine to advance, and may be abused; but, perhaps, this power may be in great measure owing to his having painted less upon system, than from feeling; and the latter governing the exercise of his pencil, not to the neglect of, but in a superior degree to the influence of the former, necessarily imbued his works with a glow of nature; which, it will be allowed, attracts beyond the power of art. Whencesoever this fascination, of which we speak, proceeds, it must be acknowledged, that no painter ever possessed it like Reynolds.

His historical works are but few. Those, however, exhibit a power, of which it is fair to say, that if it had been early cultivated, and kept in employment, he would most probably have rivalled the great names of antiquity. His poetic and fancy subjects are treated with originality, variety, taste, and sentiment.

The sense of his extraordinary talents was revived and strengthened to its proper medium, by a most just and pleasing tribute paid to his memory in the course of the year 1813: *viz.* a public exhibition of a selection of his works at the gallery of the British Institution, Pall Mall. About 150 pictures, productions of his easel, collected from various possessors, were arranged for the inspection of the public; and presented an assemblage of taste and genius, such as we conceive no other country in the world could boast. At least in an equal number of any other artist's productions, so pleasing a combination of the beauties of the art of painting could no where be found: and these were but a small proportion, indeed, of the number of pictures which he painted. There are engravings from upwards of 700 of his works, and a vast number of others have evidently never been under the engraver's hands. The idea of this token of respect to our great artist originated in conversation at the annual dinner of the Royal Academy, in 1812; when, upon its being proposed to his royal highness the prince of Wales, who was present, he entered most cordially into it, and professed his readiness to lend his own pictures for the purpose. The exhibition being prepared, it was opened on Saturday, the 11th of May, when the members of the institution gave a grand dinner to a large portion of the nobility and the members of the Royal Academy, which was honoured by the presence of the prince regent. After the dinner the rooms were illuminated by lamps, and the company increased and adorned by the admission of ladies, many of whom had been the happy subjects of his ingenious pencil: for he is said to have preserved to posterity the features of three generations of the beauty and fashion of the country.

The pleasure afforded to the country at large by this exhibition was testified by the immense concourse of people that flocked to behold and admire, during the whole time of its remaining open. So that the funds of this excellent institution were well replenished, its object of exalting the honour of the artist and his profession most amply effected, and the country itself exalted in the estimation of the world, by this effective display of native power in an art, the neglect of which had been the source of obloquy upon our climate, as it continues, notwithstanding and more justly, still to be upon our government.

We shall conclude our account of this great and valuable man, by quoting part of an eulogium written by his friend Mr. E. Burke a few hours after the melancholy event, which it commemorates, had taken place. "He possessed," said that clear investigator of character, "the theory, as perfectly as the practice, of his art. To be such a painter, he was a profound and penetrating philosopher.

"In full affluence of foreign and domestic fame, admired by the expert in art, and by the learned in science, courted by the great, caressed by sovereign powers, and celebrated by distinguished poets, his native humility, modesty, and candour, never forsook him, even on surprize or provocation; nor was the least degree of arrogance or assumption visible to the most scrutinizing eye, in any part of his conduct or discourse.

"His talents of every kind, powerful from nature, and not meanly cultivated by letters, his social virtues in all the relations and all the habitudes of life, rendered him the centre of a very great and unparalleled variety of agreeable societies, which will be dissipated by his death. He had too much merit, not to excite some jealousy; too much innocence, to provoke any enmity. The loss of no man of his time can be felt with more sincere, general, and unmixed sorrow.

"Hail! and Farewell!"

REYNOLDS' *Island*, in *Geography*, a small island in the Florida Stream. N. lat. 24°. W. long. 81° 30′.

REYNOSA, a town of Spain, in Old Castile; 35 miles N.W. of Frias.

REYOOR, a town of Hindoostan, in the circar of Condapilly; 15 miles S.E. of Condapilly.

REZ, a river of Ruffia, which runs into the Irbit. N. lat. 57° 50′. E. long. 62° 34′.

REZEMICO, a town of Italy, in the department of the Lario; 20 miles N. of Como.

REZITZA, a town of Ruffia, in the government of Polotfk; 72 miles N.N.W. of Polotfk. N. lat. 56° 25′. E. long. 27° 4′.

REZZATO, a town of Italy, in the department of the Mela; 4 miles E. of Brefcia.

REZZLE, a term provincially fignifying the weezle.

RHA, in *Botany*, ῥα, or ῥᾶ, of Diofcorides, "which fome," fays he, "call ῥῆον," is defcribed by that ancient writer as the produce of the countries above the Bofphorus, from whence it was brought to Greece. "The root is black externally, like the Greater Centaury, but fmaller, and internally of a more reddifh hue, deftitute of odour, loofe, fungous, and rather light." He proceeds to defcribe its flavour and virtues. The plant of Diofcorides has generally been fuppofed one of the rhubarbs of the fhops, which acquired, fubfequently to his time, the name of *Rha-barbarum*, becaufe it was procured from countries deemed barbarous by the Greeks and Romans. What precife fpecies of RHEUM (fee that article) it might be, we prefume not to determine. Sometimes it has been termed *Rhaponticum;* though the latter appellation has alfo been beftowed on a fpecies of *Centaurea*, which Dodonæus and others have thought to be the true ancient *Rha*, or *Rheum*, and which Linnæus, therefore, names *Centaurea Rhapontica*.

RHAAD, in *Ornithology*, a fpecies of *Otis*; which fee.

RHABARBARUM, in *Botany*. See RHA.

RHABDOIDES, Ῥαβδοειδής, formed from ῥάβδος, *rod*, or *ftaff*, and εἶδος, *form*, in *Anatomy*, a name given the fecond true future of the fkull, called alfo the *fagittal future*.

RHABDOLOGY, or RABDOLOGY, in *Arithmetic*, a name fometimes given to the method of performing the two moft difficult and operofe rules, *viz.* multiplication and divifion, by the two eafieft, *viz.* addition and fubtraction, by means of two little rods or laminæ, on which are infcribed the fimple numbers, and which are to be fhifted according to certain rules.

Thefe rods are what we popularly call *Nieper's bones*, from their inventor, a Scottifh baron, who likewife invented logarithms. For their defcription and ufe, fee NIEPER'*s Bones*.

RHABDOMANCY, an ancient method of divination, performed by means of rods or ftaves.

Whence its name, from the Greek ῥάβδος, *rod*, and μαντεια, *divination*.

St. Jerom makes mention of this kind of divination, in his commentary on Hofea, ch. iv. 12. The fame he finds again in Ezekiel, xxi. 21, 22.

If it be the fame kind of divination that is mentioned in the two paffages, rhabdomancy muft have been alfo the fame fuperftition with belomancy.

In effect, the two are ordinarily confounded. The Seventy themfelves tranflate the חצים of Ezekiel, by ῥάβδος, *a rod;* though in ftrictnefs it fignifies an *arrow*.

This however is certain; the inftruments of divination mentioned by Hofea are different from thofe of Ezekiel. In the former it is עצו, *etfo*, מקלו, *maklo*, his *wood*, his *ftaff;* in the latter, חצים, *hhitfim*, *arrows*. Though it is poffible they might ufe rods or arrows indifferently; or the military men might ufe arrows, and the reft rods. It appears by the laws of the Frifones, that the ancient inhabitants of Germany practifed rhabdomancy The Scythians were likewife acquainted with the ufe of it; and Herodotus obferves (lib. iv.) that the women among the Alani fought and gathered together fine ftraight rods or wands, and ufed them in the like fuperftition.

RHABDONALEPSIS, Ῥαβδον Αναληψις, among the Greeks, the Reception or Elevation of the Rod, a feftival kept every year in the ifland of Cos, at which the priefts carried a cyprefs-tree.

RHABDOPHORI, Ῥαβδοφοροι, among the Greeks, officers appointed to preferve peace and good order, and to correct the unruly at their public games.

RHABDUS, Ῥαβδος, among the *Ancients*, the iron rod with which the boys rolled the trochus.

RHACHITIS, in *Surgery*. See RACHITIS and RICKETS.

RHACOMA, in *Botany*, a name adopted by Linnæus from Pliny, and applied to the genus called by Browne *Croffopetalum*, but which proves not diftinct from MYGINDA; fee that article. The real *Rhacoma* of Pliny appears, by his copious account of its characters and qualities, to be fome kind of rhubarb (fee RHA and RHEUM); nor do we pretend to account for the Linnæan application of the name.

RHACOSIS, from ῥακος, *a rag*, in *Surgery*, a ragged, excoriated, and relaxed ftate of the fcrotum.

RHADAMANTHUS, in *Mythology*, one of the three judges or fovereigns of Hades, or the invifible world, to whom was affigned Tartarus, as Erebus was to Minos, and Elyfium to Æacus. He was the brother of Minos, and the fon of Jupiter and Europa; and is faid to have been preferred to the honour of prefiding over Tartarus, on account of the diftinguifhed wifdom and juftice of his adminiftration.

According to Plato, Æacus judged the Europeans; and Rhadamanthus, who had left Crete, and fixed his refidence in Afia, had the Afiatics for his lot, among whom were alfo comprehended the Africans. The ftern Rhadamanthus fuperintends in Tartarus the execution of the fentences which his brother Minos pronounces, after fhaking the fatal urn in which are contained the deftinies of all mortals. The office of Rhadamanthus is defcribed by Virgil, Æneid, lib. iv.

> "Gnoffius hæc Rhadamanthus habet duriffima regna
> Caftigatque auditque dolos, fubigitque fateri,
> Quæ quifque apud fuperos, furto lætatus inani
> Diftulit in feram commiffa piacula mortem."

RHADAMISTUS, in *Entomology*, a fpecies of *Scarabæus;* which fee. It inhabits Tranquebar.

RHADEN, in *Geography*, a town of Weftphalia, in the principality of Minden; 15 miles N.W. of Minden.

RHADES, a town of Africa, in the kingdom of Tunis, anciently called "Ades;" fix miles S.E. of Tunis.

RHÆTEUM, or RHETEUM, in *Ancient Geography*, a promontory in the vicinity of Troy, on which was erected a tomb to Ajax, mentioned by Strabo (l. 13.) and other ancient writers. Horace indeed fays (Sat. l. 2.) that this hero remained without burial; but he deviates from the truth, in allufion to that incident in the tragedy of Ajax, where Sophocles feigns that Agamemnon was unwilling to allow the honours of burial to be conferred upon him, but that he yielded at length to the importunate intreaties of Teucer.

RHÆTIA, a country of Europe, which occupied part of the Alps, and was fituated to the north of Italy, and to the eaft of Helvetia. It is not eafy to afcertain its limits to the north, but we may fay that it was bounded in that quarter by Vindelicia; and, in general, that it correfponded to the country

country of the Grisons, and to the cantons of Uri, Glaris, &c. as far as the "Brigantinus lacus," or lake of Constance: it extended also over the Tyrol. This country was called Western Illyricum, and was divided into Rhætia Prima or Propria, and Secunda, extending towards Swabia, Bavaria, and Austria. This district was subjected to the Romans by Drusus, under the reign of Augustus. Soon afterwards Vindelicia took up arms in their favour, and Tiberius was sent against them, and reduced their country, so that the possessions of the Romans extended as far as the Danube. The whole of this extensive territory had borne the name of Rhætia; but under Dioclesian it was divided, as we have said, into Rhætia Prima and Secunda, the latter of which divisions was Vindelicia. Rhætia, Noricum, and some other territories, became a Roman province, and belonged to the kingdom of the Ostrogoths in Italy; but upon the declension of it, they fell under the dominion of the Franks, about which time the name of Bavarians first became celebrated in history. The principal rivers of Rhætia were the Rhenus or Rhine, the Athesis or Adige, the Oenus or Inn, the Ticinus or Tosin, and Addua. The most considerable places were Curia or Coira, at a small distance east of the Rhenus, and Tridentum or Trent, on the Athesis. Ptolemy, in his geography of Rhætia, reckons upon the Danube the following towns, *viz.* Bragodurum, Dracuina, Viana, and Phæniana; and towards the source of the Rhine, Tagahum, Brigantium, Ebodunum, Drusomagus, and Ectodurum.

RHAGADES, Ῥαγαδες, in *Surgery*, a Greek term used for the chaps or clefts in the lips, hands, anus, and other soft parts of the body.

Rhagades are a sort of fissures, and little chapped ulcers of the œdematous kind; formed of a sharp saline humour, and occasioning a great contraction and straightening of the part, which is by this means shrivelled up like a wet parchment, when held to the fire.

They are chiefly found on the fundament, the neck of the womb, the præputium, lips, &c. sometimes even in the mouth; in which case the patient is not able to speak, chew, or the like.

They are sometimes moist, and of a cancerous nature, eating deep, and difficult of cure; but they are more commonly of a less malignant tendency, being often in the anus the consequence of a diarrhœa, dysentery, or the like.

RHAGADIOLUS, in *Botany*, see LAPSANA; under the fourth species of which its etymology is given.

RHAGAURA, in *Ancient Geography*, a town of Asia, in Aria, between Siphara and Zamuchana. Ptolemy.

RHAGE, a word used by medical writers for a fissure or chap in any part. The stones of grapes are also by some called *rhages*; and by others the same word is made to express the extremities of the fingers or toes.

RHAGEA, in *Ancient Geography*, a town of Asia, in Parthia, near Appha, according to Ptolemy.

RHAGES, a town of Macedonia, on the banks of the river Peneus, about ten miles from Larissa, according to Livy.

RHAGIA, a town of Asia, in Babylonia, towards Arabia Felix, between Jamba and Chiriphe, according to Ptolemy.

RHAGIANA, a town of Gedrosia, near the "Portus Mulierum;" so called in the translation of Ptolemy; but in the text of Ptolemy it is called "Rapava."

RHAGODIA, in *Botany*, from ῥαξ, *a berry*, because its little pulpy fruit affords a principal mark of distinction between this genus and several others, to which it is nearly related.—Brown Prodr. Nov. Holl. v. 1. 408. Ait. Hort. Kew. v. 5. 440.—Class and order, *Polygamia Monoecia*, Brown; but we should rather say *Pentandria Digynia*, though some of the flowers are defective as to the stamens or the pistil. Nat. Ord. *Holeraceæ*, Linn. *Atriplices*, Juss. *Chenopodeæ*, Decandolle and Brown.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, concave, permanent, in five deep ovate segments. *Cor.* none. *Stam.* Filaments five, awl-shaped, opposite to the segments of the calyx, and about as long; anthers roundish, two-lobed. *Pist.* Germen orbicular, depressed; styles two, divaricated, short; stigmas simple. *Peric.* Berry orbicular, depressed, encompassed underneath by the calyx. *Seed* solitary, the shape of the berry, "furnished with albumen, and a double coat." *Brown.*

Obs. Labillardiere and Brown describe some flowers as wanting the stamens, others the pistil, though the rest have both. In this polygamous character, but especially in the nature of the fruit, which is a true *bacca*, this genus differs from CHENOPODIUM, as well as from KOCHIA, and other neighbouring genera, of Mr. Brown; see those articles. The stamens are sometims fewer than five. *Brown.*

Eff. Ch. Calyx inferior, in five deep segments. Corolla none. Berry depressed, encompassed with the permanent calyx. Seed solitary, orbicular, depressed. Some male or female flowers are interspersed.

The species, all natives of New Holland, are generally shrubby, rarely herbaceous. *Leaves* almost always alternate, simple, often clothed with mealy powder. *Flowers* either spiked or conglomerated, destitute of *bracteas*.

1. R. *Billardieri.* (Chenopodium baccatum; Labill. Nov. Holl. v. 1. 71. t. 96.)—Shrubby, erect, without thorns. Leaves entire, linear-oblong or lanceolate, flat; powdery beneath. Spikes branched. Native of New South Wales, as well as of the southern coast of New Holland. *Stem* shrubby, branched, five feet or more in height, with round, leafy branches, striated when dry. *Leaves* stalked, spreading, an inch and a half, or two inches, long, and one-third of an inch broad, sharpish; tapering at the base. *Flowers* small, greenish, in terminal, much compounded, or panicled, spikes. *Berries* red, about the size of mustard-seed.

2. R. *crassifolia.*—Shrubby, erect, without thorns. Leaves entire, oval, or linear-oblong, fleshy, convex and powdery beneath. Spikes branched.—Gathered by Mr. Brown, on the south coast of New Holland.

3. R. *linifolia.*—Somewhat shrubby, decumbent. Leaves entire, linear-lanceolate, flat, stamens one or two. Found by the same botanist, in the tropical part of New Holland.

4. R. *hastata.* Ait. n. 1.—Somewhat shrubby, erect. Branches diffuse. Leaves nearly opposite, hastate, somewhat rhomboid, entire, very smooth. Spikes terminal, leafless.—Native of New South Wales, from whence it was sent to Kew by Mr. Peter Good, in 1803. This is a hardy shrub, flowering with us in June and July, and appears to be the only species of the genus before us, that has, as yet, been cultivated in England.

5. R. *parabolica.*—Shrubby, erect, without spines. Leaves triangular, obtuse, powdery. Spike branched.—Observed by Mr. Brown, on the south coast of New Holland, but without fruit.

6. R. *spinescens.*—Shrubby, erect; the young branches becoming spines. Leaves partly opposite, hastate, somewhat rhomboid, entire; powdery and hoary on both sides. Spikes simple.—From the south coast.

7. R. *nutans.*—Herbaceous, prostrate. Branches ascending when in fruit, drooping at the extremity. Leaves opposite, lanceolate-hastate, acute.—Gathered by Mr. Brown,

on

on the south coast of New Holland, as well as in Van Diemen's island.

RHAGOIDES, Ῥαγοειδης, in *Anatomy*, the second coat or tunic of the eye; more usually called uvea.

It has its name rhagoides, as resembling a grape-stone.

In the tunica rhagoides is the hole called the pupil.

RHAHAANS, in *History*, a name given to the priests of the Birman empire, to whom are assigned kiouns, or convents; which are different in their structure from common houses, and much resemble the architecture of the Chinese. These buildings are constructed of wood; the roof is composed of different stages, supported by strong pillars; the inside comprehends one large hall; the whole house is open at the sides; some are curiously carved with various symbolic representations of the divinity. There are no apartments for the private recreation of the Rhahaans; publicity being the prevailing system of conduct among the Birmans, who admit of no secrets either in church or state. From the number of convents in the neighbourhood of Rangoon, the Rhahaans and Phonghis, who are an inferior order of priests called Tallapoins, are presumed by colonel Symes to exceed 1500; including in this estimate those in their novitiate. The age of induction into these convents, is generally from eight to twelve years, and young persons are introduced into them with great formality and ceremony. Parents vie with each other in obtaining this honour for their children, and spare no cost on the occasion of their admission; the principal charge consisting in entertainments, and the customary presents to the Rhahaans. When a boy is to be introduced into a convent, either as a temporary resident, or with a view to future consecration, his friends prepare their offerings of cloth, rice, preserves, fruit, fans, cushions, mats, and houshold utensils. On an appointed day he parades the streets, dressed in yellow, and mounted on a horse richly caparisoned, led by two servants: a band of music goes before, and a party of Rhahaans encircle him: his male friends follow in a troop, and the females of their families bring up the rear, the latter carrying on their heads the offerings meant for the Rhahaans. Thus they proceed to the convent of which the novice is to become a member, where he is presented in form to the senior of the brotherhood. This ceremony is repeated three times, and at each perambulation, fresh presents are to be provided.

The Rhahaans, like the Carmelites, go barefooted, and have their heads close shaven, on which they never wear any covering. Yellow is the only colour worn by the priesthood: they have a long loose cloak, which they wrap round them, so as to cover most part of the body; they profess celibacy, and to abstain from every sensual indulgence. The prescribed punishment for a Rhahaan detected in an act of incontinence is, expulsion and public disgrace; the delinquent is seated on an ass, and his face daubed with black paint interspersed with spots of white; he is thus led through the streets, with a drum beating before him, and afterwards turned out of the city: but such instances of degradation are very rare. The juniors are restricted from wandering about licentiously, either by day or night. There is a prior in every convent, who has a discretionary power to grant permission to go abroad.

The Rhahaans never dress their own victuals, holding it an abuse of time to perform any of the common functions of life, which, so long as they occupy, must divert them from the abstract contemplation of the divine essence. They receive the contributions of the laity ready cooked, and prefer cold food to hot. At the dawn of the morning they begin to perambulate the town, to collect supplies for the day: each convent sends forth a certain number of its members, who walk at a quick pace through the streets, supporting with the right arm a blue lackered box, in which the donations are deposited; these usually consist of boiled rice mixed with oil, dried and pickled fish, sweetmeats, fruit, &c. During their walk, they never cast their eyes to the right nor to the left, but keep them fixed on the ground; they do not stop to solicit, and seldom even look at the donors, who appear more desirous to bestow, than the others to receive. The Rhahaans eat but once a day, at the hour of noon. A much larger quantity of provision being commonly procured than suffices for the members of the convent, the surplus is disposed of, as charitably as it was given, to the needy stranger, or the poor scholars who daily attend them to be instructed in letters, and taught their moral and religious duties.

In the various commotions of the empire, colonel Symes says, that the Rhahaans take no active share, nor do they publicly interfere in politics, or engage in war: by this prudent conduct they excite no resentment: the Birmans and Peguers professing the same religion, the conquerors, to whichsoever party they belonged, equally respected the ministers of their faith. The head of the Rhahaans at Rangoon, called Seredaw, is treated with great veneration. He lives in a very handsome monastery half a mile from the town, on the road leading to Shoedagon, or temple. He is in no respect distinguished, as to his outward appearance, from the common Rhahaans. He goes every day, at the same hour, to the temple, to offer his devotions, and performs the journey, which is about four miles, on foot. In his conversation with Symes he betrayed a worldly pride inconsistent with his years (being about seventy-five) and sacred function: he announced, with much pomp, that he was the head of the church at Rangoon, and ostentatiously displayed, engraven on iron plates, his sacerdotal titles, which had been conferred on him by the present and the late king. Formerly there were nunneries of virgin priestesses, who, like the Rhahaans, wore yellow garments, cut off their hair, and devoted themselves to chastity and religion; but these were not long ago abolished, as being injurious to the population of the state. At present there are a few old women, who shave their heads, wear a white dress, follow funerals, and carry water to the convents; and these venerable dames are treated with some portion of respect. Symes's Ava, vol. ii.

RHAIADAR, or RHAYADER, in *Geography*, a borough and market-town in the cwmwd of Glynn-Jeithon, cantref of Maelienydd (now called the hundred of Rhayader), county of Radnor, South Wales, is situated on the banks of the river Wye, at the distance of 20 miles N.W. from New Radnor, and 176 W.N.W. from London. This place is a borough by prescription, and lays claim to a very high antiquity. It is governed by a bailiff, who is annually elected at a court-leet, held in the town-hall, at which also the burgesses are chosen by a town jury. Rhayader is one of the five contributary boroughs to return a representative to serve in parliament for the town of New Radnor. This place was formerly of much greater consequence and extent than at present. On Cefn-Ceido, about half a mile to the north-east, is a tract of land, called Pant-yr-Eglwys, where, according to tradition, a church anciently stood, which was included within the precincts of the borough. The great sessions for the county were at one time held here; and the county-court alternately met at New Radnor and Rhayader, till removed from the latter place to the town of Presteigne, in the reign of Henry VIII. The gaol for the security of criminals then stood on a spot of ground now occupied by a Presbyterian meeting-house; and the place of execution was

at

at the north end of the town, near a houſe known by the appellation of Pen-y-Maes. At preſent Rhayader conſiſts of four ſtreets which interſect each other at right angles, and lie nearly parallel to the four cardinal points. In the wide ſpace formed by the interſection of theſe ſtreets ſtands the town-hall, which is a handſome building, rebuilt by ſubſcription in 1762. The church is a plain ſtructure, ornamented with a tower at one end; beſides which there is a place of worſhip for Preſbyterians and another for Methodiſts. The grammar-ſchool was erected A.D. 1793, and has an endowment for the education of a limited number of poor children. The borough of Rhayader is a diſtinct pariſh of itſelf, and is exempt from the payment of county rates. The market-day here is Wedneſday, weekly; and there are fairs on the 6th and 27th of Auguſt, 26th September, 14th October, and 3d December, for horſes, ſheep, and cattle; beſides three great markets in May. The chief ſupport of this town ariſes from the manufacture of woollens, principally flannel. According to the population returns of 1811, the pariſh contained 97 houſes and 446 inhabitants.

On an eminence to the N.W. of the town ſtood the ancient caſtle of Rhayader, which was erected, in the year 1178, by Rhys-ap-Gruffydd, prince of South Wales, in order to check the incurſions of the Normans, who, at that period, made great irruptions in the marches of Wales. In 1194, prince Rhys having been ſurprized and taken priſoner by his own ſons, this caſtle was beſieged and compelled to ſurrender to the ſons of Cadwalhon-ap-Madawe of Maelienydd, by whom it was fortified for their own uſe. In the year 1231, after Llywelyn, prince of North Wales, had taken and deſtroyed the caſtle of Montgomery, he marched hither, and viſited the caſtle of Rhayader with a ſimilar fate. It was rebuilt, however, and continued to be a place of defence till the civil wars in the ſeventeenth century, when it was diſmantled and totally deſtroyed; the foſſe by which it was furrounded being the only veſtige of it remaining at the preſent day. The tower, or citadel, ſtood in a direct line between the caſtle and the gaol, overlooking the river. The mount adjacent is ſtill denominated Tower-hill. Near this place a ſtone bridge is thrown over the Wye, which the Welſh call Rhaiadr-Gwy, in alluſion to the rumbling noiſe its impetuous waters make amidſt the rocks. The only religious houſe, recorded to have been ſituated at Rhayader, was a convent of Dominican, or Black friars, founded ſoon after their firſt arrival in England, A. D. 1221. This houſe was ſuppreſſed in the 31ſt year of king Henry VIII.

In the immediate vicinity of Rhayader, the ſcenery of the Wye is peculiarly grand. Raging in its rocky bed, this river is ſeen through the light foliage of impendent trees, ſometimes precipitating its waters over a bold ledge of rock, and ſometimes ſearching its way among protruding crags, in a contracted ſheet of gliſtening foam. The mountains by which the vale of Rhayader is environed, diſplay a wild and rugged character, and are noted, according to local tradition, as being the place of ſhelter in which king Vortigern eluded the ſearch of Hengiſt, after his alleged murder of the Britiſh nobles at Stonehenge. Theſe hills abound with various kinds of minerals, particularly lead and copper. There are ſeveral cairns in this neighbourhood, the moſt remarkable of which is that of Tommen Sant Ffraid, on the S.W. ſide of the town, in the pariſh of Cwm-y-dan-Ddwr, ſuppoſed to be the cemetery of Saint Fraid, the Popiſh tutelary ſaint of that pariſh. Carliſle's Topographical Dictionary of Wales, 4to. 1811. A Tour throughout South Wales and Monmouthſhire, by J. T. Barber, F.S.A. 8vo. 1803.

RHAIDR, a river which riſes in the E. part of Merionethſhire, North Wales, and runs into the Severn on the borders of Shropſhire.

RHAIR, a conſiderable river of Hindooſtan, which runs by the ſouth ſide of Shawpour. The ſtream, which is about 100 yards wide and four feet in depth, daſhes with great rapidity over a bed of rock; which prevents its being navigable for large boats. This river riſes in the hills and foreſts of Surgooja, and after being joined by the Bijool and Gutauin, falls into the Soane near Agowry.

RHAMNÆ, or Rhannæ, in *Ancient Geography*, a people of India, in the mountains near the river Namadus. Ptolemy.

RHAMNI, in *Botany*, a natural order of plants in Juſſieu, being the 95th in his ſeries, or the 13th of his 14th claſs, and owing its name to the principal genus. See Rhamnus.

See the character of the claſs under Ficoideæ. The order is thus defined.

Calyx inferior, of one leaf, with a definite number of ſegments in the limb. *Petals* five, rarely four or ſix, and very rarely wanting, inſerted into the upper part of the calyx, or into its diſk, either oppoſite to, or alternate with, its ſegments, and equal to them in number; ſometimes reſembling little ſcales, and furniſhed with claws; ſometimes united by their broad baſes. *Stamens* of the ſame number as the petals, and inſerted into the ſame part, either alternate with them, or oppoſite to them. *Germen* ſuperior, encompaſſed below with the diſk of the calyx. *Styles* either ſolitary, or of ſome definite number. *Stigmas* one or more. *Fruit* ſuperior; in ſome inſtances pulpy, either with many cells, or many nuts, the cells, or nuts, ſingle-ſeeded; in other caſes capſular, of many cells and many valves, the partitions from the middle of each valve, and the cells containing either one or two ſeeds. *Corculum* flat and ſtraight, ſurrounded with a fleſhy albumen. *Stem* arboreous or ſhrubby. *Leaves* either alternate or oppoſite, accompanied by *ſtipulas*, that are often very minute.

Section 1. *Stamens alternate with the petals. Fruit capſular. Staphylea; Euonymus;* and *Celaſtrus* of Linnæus; with *Polycardia* of Lamarck.

Sect. 2. *Stamens alternate with the petals. Fruit a drupa or berry.* Some genera of this ſection have the petals connected by their broad baſe.

Myginda; Goupia of Aublet, which is *Gloſſopetalum* of Schreber; *Rubentia* of Commerſon, certainly the ſame genus with Jacquin's *Elæodendrum*, as Juſſieu indeed ſuſpected; *Caſſine; Schrebera* of Linnæus, a genus founded altogether in error, as we ſhall explain in its proper place; *Ilex;* and *Prinos.*

Sect. 3. *Stamens oppoſite to the petals. Fruit drupaceous.*

Mayepea of Aublet, erroneouſly placed here, as belonging really to the *Jaſmineæ* (ſee Mayepea); *Samara; Rhamnus; Ziziphus; Paliurus;* the two laſt ſeparated from the Linnæan *Rhamnus*, by Juſſieu. See Paliurus.

Sect. 4. *Stamens oppoſite to the petals. Fruit three-lobed.*

Colletia of Commerſon, Lamarck Illuſtr. t. 129; *Ceanothus; Hovenia;* and *Phylica;* to which is to be added Lasiopetalum; ſee that article.

Sect. 5. *Genera akin to Rhamni, their germen moſtly ſuperior.*

Brunia of Linnæus, ſome of whoſe reputed ſpecies have the germen ſuperior, others inferior; and *Bumalda* of Thunberg.

Sect. 6. *Genera akin to Rhamni, but differing in having an inferior germen.*

Gouania; Plectronia, dubiouſly admiſſible here, as we have obſerved in its proper place; *Carpodetus* of Forſter;

Aucuba

Aucuba of Thunberg; and *Glossoma* of Schreber, which is Aublet's *Votomita*.

RHAMNOATZ, in *Geography*, a town of Sweden, in Westmannland; 20 miles N. of Stroemsholm.

RHAMNOIDES, in *Botany*, a name given by Tournefort, and others, to a genus of plants, called by Linnæus *hippophae*; which see.

RHAMNUS, in *Ancient Geography*, a borough of Attica, belonging to the Ajantide tribe, 60 stadia from Marathon, in a northerly direction from the Ægean sea, in a place where the land formed a small peninsula or Chersonesus. The houses were on the sea-coast; and upon an eminence was the temple of Nemesis, in which was a fine statue of the goddess, made by Phidias, of marble, which the Persians had brought from Paros for the purpose of forming a trophy, and which had been found in their camp after the battle of Marathon: the pedestal was adorned with four basso relievos, representing different subjects of Grecian history. Leda is also exhibited presenting Helena to her mother Nemesis. See NEMESIS.

RHAMNUS, in *Botany*, so called by the ancient Romans, and by the Greeks ῥαμνος; words derived, according to De Theis, from the Celtic *Ram*, a head or tuft of branches, which is the origin of the Latin *ramus*, &c. and of the French *Rame*, *ramier*, &c.—Linn. Gen. 105. Schreb. 142. addend. 823. Willd. Sp. Pl. v. 1. 1092. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 261. Prodr. Fl. Græc. Sibth. v. 1. 157. Ait. Hort. Kew. v. 2. 14. Juss. 380. Lamarck Illustr. t. 128. Gærtn. t. 106.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Dumosæ*, Linn. *Rhamni*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, urceolate; its limb in five spreading, acute, equal, coloured segments; the base permanent. *Cor.* Petals five, minute, between the segments of the calyx, opposite to the stamens, converging. *Stam.* Filaments as many as the petals, awl-shaped; anthers small. *Pist.* Germen roundish; style thread-shaped, equal to the stamens; stigma in various divisions. *Peric.* Berry roundish, naked, divided into fewer cells than there are segments of the calyx. Seeds solitary, roundish, gibbous on one side, compressed on the other.

Obs. We follow Jussieu and Schreber (in his addenda) in our denomination of the different parts of the flower, instead of taking the calyx for a corolla, with Linnæus. The genera of PALIURUS and ZIZIPHUS, separated from the original Linnæan *Rhamnus*, will be found in their proper places. *Frangula* and *Alaternus* of Tournefort have no just pretensions to be removed from the present genus.

Ess. Ch. Calyx urceolate. Petals five, opposite to the stamens. Berry superior.

We shall briefly define the species which authors have retained in *Rhamnus*, adding some new ones. The whole are shrubby, sometimes climbing. *Leaves* simple, undivided, stalked, veiny; mostly alternate. *Flowers* lateral, small, green or yellowish; sometimes with only four segments, petals and stamens, and in that case often dioecious, or polygamous, as in the first section.

Section 1. *Branches armed with terminal thorns.*

1. R. *catharticus*. Purging Buckthorn. Linn. Sp. Pl. 279. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 1629. Woodv. Med. Bot. t. 114. Fl. Dan. t. 850. (R. solutivus; Ger. Em. 1337, with Clusius's figure of the following species. Spina infectoria; Matth. Valgr. v. 1. 143.)—Flowers four-cleft, polygamous. Leaves ovate. Stem erect. Berry with four seeds.—Native of woods and hedges throughout Europe, especially in moist situations. This is the white-thorn of the modern Greeks. A rigid bushy *shrub*, nearly smooth in every part; its branches terminating in strong thorns. *Leaves* serrated, with several lateral ribs. *Flowers* from the same buds as the leaves, yellowish-green, mostly, but not altogether, dioecious. *Stigma* four-cleft. *Berry* round, black, very purgative, when unripe affording a yellow dye.

2. R. *infectorius*. Turkey-berry Buckthorn, or Graine d'Avignon. Linn. Mant. 49. Willd. n. 2. Ait. n. 2. (R. catharticus minor; Arduin. Mem. 78. t. 14. R. solutivus minor; Ger. Em. 1337. Spina infectoria pumila prima; Clus. Hist. v. 1. 111.)—Flowers four-cleft, dioecious. Stem procumbent.—Native of the south of Europe. Frequent in rough stony places in Greece, and rightly considered by Dr. Sibthorp as the Λυκιον, *Lycium*, of Dioscorides. The unripe berries are much used for dyeing, and imported in great quantities into England. They are what give the yellow colour to Turkey leather, or yellow morocco. This shrub is very nearly related to the first species, but grows procumbent, not erect, and the *leaves* are smaller and narrower. Gerard observes, that the segments of the *calyx* are but the length of the tube; not longer, as in *catharticus*; and that the *stigmas* are two, reflexed. *Fl. Gallopr.* 462. The *stipulas* are linear; not awl-shaped, as in the former; but we dare not rely on that circumstance, without further examination.

3. R. *lycioides*. Box-thorn Rhamnus. Linn. Sp. Pl. 279. Willd. n. 3. Ait. n. 3. Cavan. Ic. v. 2. 66. t. 182. (R. tertius, fortè niger Theophrasti; Clus. Hist. v. 1. 110. R. tertius Clusii; Ger. Em. 1334.)—Leaves nearly linear, obtuse, entire.—Native of Spain; frequent on the limestone hills of Valentia. *Cavan.* Differs widely from both the former in the narrow and entire *leaves*, tapering down into their slender *footstalks*.

4. R. *Erythroxylon*. Red-wood Buckthorn. Pall. Ross. v. 1. p. 2. 26. t. 62, and t. 100. f. 8. Willd. n. 4.—Leaves linear-lanceolate, serrated, rather acute.—Native of dry rocky places in Siberia.—The strongly serrated and acute *leaves* distinguish this from the last. A variety with smaller, more finely serrated, *leaves*, is Pallas's *R. lycioides*, t. 63.

5. R. *oleoides*. Olive-leaved Buckthorn. Linn. Sp. Pl. 279. Willd. n. 5. Ait. n. 4. (R. secundus; Clus. Hist. v. 1. 110. Ger. Em. 1334.)—Leaves obovate, entire; reticulated with veins beneath.—Native of Spain, *Alstroemer*; of Barbary, *Desfontaines*; of the southern part of Greece, and the island of Milo, *Sibthorp*. The shorter obovate *leaves*, copiously reticulated with veins, especially at the back, differ materially from those of *lycioides*. The *fruit* moreover has a much shorter stalk, though it is not so perfectly sessile as in Clusius's figure, which nevertheless we cannot hesitate to refer to this species.

6. R. *prunifolius*. Plum-leaved Buckthorn. Sm. Prodr. Fl. Græc. Sibth. n. 549. (R. creticus, amygdali folio minori; Tourn. Cor. 41.)—Stem procumbent. Flowers flattish, four-cleft, dioecious. Leaves obovate, obtuse, crenate, naked.—Found on the higher mountains of Crete.—Like the last in habit, but distinguished by its crenate, or somewhat serrated, *leaves*. *Stem* depressed, or procumbent, with many entangled branches. The female *flowers* have occasional rudiments of *stamens*. *Style* cloven half way down. We find no figures referrible to this or the following.

7. R. *crenulatus*. Teneriffe Buckthorn. Ait. n. 5. Willd. n. 6.—Stem erect. Flowers three or four-cleft, dioecious. Leaves elliptic-oblong, bluntly serrated, permanent.—Native of the Canary islands; *Masson*. Brought in 1778 to Kew, where it blossoms in the greenhouse in March. A stout, erect, much-branched *shrub*. The *leaves* are finely reticulated beneath.

8. R. *saxatilis*. Rock Buckthorn. Jacq. Austr. t. 53. Linn. Sp. Pl. 1671. Willd. n. 7. Ait. n. 6. (R. solutivus

tivus pumilus; Ger. Em. 1337. Spina infectoria pumila secunda; Cluf. Hift. v. 1. 112.)—Stem fpreading. Flowers four-cleft, dioecious. Leaves obovate, acute, ferrated, deciduous.—Native of Auftria, Switzerland, Italy, and Greece. The rigid branched *ftems* are more fpreading or diffufe than thofe of *R. crenulatus;* the *leaves* deciduous, much lefs evidently reticulated. The *flowers* are pale yellow. *Stigma* in two deep acute divifions. *Berries* black.

9. R. *theezans.* Tea Buckthorn. Linn. Mant. 207. Willd. n. 8. (R. Thea; Ofbeck's Travels, v. 1. 375.)—Leaves ovate, finely ferrated; paler beneath. Flowers in terminal fpikes, five-cleft.—Native of China.—A *fhrub* fix feet high, with long, roundifh, downy, fpreading *branches;* the lateral ones bearing hairy terminal fpikes of *flowers,* and fubfequently becoming fpinous. *Leaves* an inch long, fomewhat heart-fhaped, befet with fine fharp ferratures; fhining and reticulated above; paler, opaque, and more even beneath. The poor people in China are faid to ufe the leaves as a fubftitute for tea.

Sect. 2. *Without thorns, or prickles.*

10. R. *Sarcomphalus.* Timber Buckthorn. Linn. Sp. Pl. 280. Willd. n. 9. (Sarcomphalus; Browne Jam. 179.)—Leaves oval, coriaceous, emarginate, entire. Flowers in denfe, corymbofe, filky tufts.—Native of Jamaica. Browne fays it is one of the beft timber-woods in the ifland, and rifes generally to a very confiderable height. The *trunk* is often above two feet and a half in diameter, covered with a thick fcaly *bark.* *Wood* hard, dark-coloured, clofe-grained. *Leaves* about three inches long, and two broad, fmooth, with a ftrong mid-rib, and many interbranching veins. Browne's generic name applies to the thick, flefhy, umbilicated *nectary,* or receptacle of the flower. He defcribes no *petals.* The *ftyle* is cloven, with two acute *ftigmas.* *Berry* of two cells.

11. R. *ferreus.* Iron-wood Buckthorn. Vahl. Symb. v. 3. 41. t. 58. Willd. n. 10. Mart. n. 10.—"Leaves oblong-ovate, emarginate, membranous, fmooth, entire. Flowers in axillary umbels."—Native of the ifland of Santa Cruz; *Von Rohr* and *Weft.* *Branches* round, fmooth, afh-coloured. *Leaves* an inch or more in length, very finely ribbed and veined. *Umbels* on fhort ftalks. *Vahl.*

12. R. *lævigatus.* Polifhed Buckthorn. Vahl. ibid. Willd. n. 11. Mart. n. 11.—"Leaves oblong, entire, coriaceous, fmooth. Flowers axillary, about two together."—Found in the fame ifland. *Weft.* *Branches* round, fmooth, afh-coloured. *Leaves* an inch and half long, paler and yellowifh at the edges, efpecially the younger ones; fcarcely veiny on the upper fide; not at all fo underneath. *Flowers* two or three together, on very fhort, fimple, fmooth ftalks. *Calyx* fmooth. *Stigmas* two. *Vahl.*

13. R. *tetragonus.* Square-branched Cape Buckthorn. Linn. Suppl. 153. Willd. n. 12. Thunb. Prodr. 44.—"Leaves ovate, entire, fmooth, feffile. Branches fquare."—Gathered by Thunberg, at the Cape of Good Hope. We have feen no fpecimen, nor is there any figure of this fpecies.

14. R. *polifolius.* Poley-leaved Buckthorn. Vahl. Symb. v. 3. 41. Willd. n. 13.—Leaves lanceolate, entire; fnow-white and downy beneath. Flowers axillary, nearly feffile, moftly folitary.—Suppofed to be a native of New Zeeland. *Branches* flender, hoary; downy when young. *Leaves* hardly an inch long, pointed; fmooth and fomewhat wrinkled above. *Footftalks* very fhort, downy.

15. R. *valentinus.* Valentia Buckthorn. Willd. n. 14. (R. pumilus; Cavan. Ic. v. 2. 65. t. 181.)—Leaves roundifh-elliptical, minutely crenate, nearly feffile. Flowers four-cleft. Style deeply three-cleft. Berry dry.—Gathered by Cavanilles, on the mountains of Meca and Palomera, in the kingdom of Valentia, flowering in May. If he be correct as to the nature of the *fruit,* this is a very diftinct fpecies; otherwife its habit is very like *pumilus* hereafter defcribed. The *ftems* are fhort and depreffed. *Leaves* on very fhort ftalks, and obfcurely crenate. *Flowers* hermaphrodite, four-cleft. *Style* divided to the bafe into three parts. *Capfule,* or dry *berry,* of three cells.

16. R. *cubenfis.* Cuba Buckthorn. Linn. Sp. Pl. 281. Willd. n. 15. Jacq. Hort. Vind. v. 3. 28. t. 49.—"Leaves rugofe, entire, downy. Flowers hermaphrodite. Capfule of three cells."—Native of bufhy places near the fea, in the ifland of Cuba. We have not examined any fpecimen, but by Jacquin's account, this appears rather to have the fruit of a *Ceanothus.* The *petals* indeed are oppofite to the *ftamens,* which is an important character of *Rhamnus.* The *fruit* however is not a dry *berry,* but a true *capfule,* with elaftic valves.

17. R. *colubrinus.* Bahama Red-wood Buckthorn. Linn. Sp. Pl. 280. Willd. n. 16. Ait. n. 7. Jacq. Hort. Vind. v. 3. 28. t. 50. (Arbor baccifera indica, foliis majoribus fplendentibus, flore pentapetalo; Comm. Hort. v. 1. 175. t. 90.)—Leaves ovate, entire, with rufty footftalks. Flowers monogynous, erect. Capfules three-lobed.—Native of the Bahama iflands; introduced into our ftoves by Catefby, in 1726. This has alfo the *fruit* of *Ceanothus,* to which genus Miller refers it.

18. R. *dauricus.* Daurian Buckthorn. Pall. Rofs. v. 1. p. 2. 25. t. 61, catharticus. Willd. n. 17. (Cornus foliis citri anguftioribus; Amman. Ruth. 200. t. 33.)—Leaves ovate, ferrated, veiny; tapering at the bafe. Flowers four-cleft, dioecious.—Found by Gmelin and Pallas on the banks of the river Argunus in Dauria. The *wood* is red, and called Sandal-wood by the Ruffians. The afpect of the *fhrub* is much like *R. catharticus,* but there are no thorns. Pallas's names, pages, and references are wonderfully confufed in this, and too many other, parts of his pompous book.

19. R. *alpinus.* Alpine Buckthorn. Linn. Sp. Pl. 280. Willd. n. 18. Ait. n. 8. (R. n. 823; Hall. Hift. v. 1. 366. t. 40. Frangula ora folii ferrata; Hall. Enum. 164. Alnus nigra baccifera, rugofiore folio, feu major; Bauh. Hift. v. 1. 562. Creutzbeer; Lonic. Kreuterb. 59?)—Stem erect. Leaves elliptic-oblong, with glandular crenatures; fomewhat heart-fhaped at the bafe; veins hairy at the back. Flowers dioecious. Stigma four-cleft.—Native of the alps of Switzerland, Dauphiny, Auftria, Carniola, &c. Gathered probably by Dr. Sibthorp on mount Parnaffus; fee n. 21. A *fhrub,* eight or ten feet high, erect, with a fmooth grey bark. *Leaves* two inches or more in length, broadly elliptical, occafionally obtufe or acute; more or lefs heart-fhaped at the bafe: finely and regularly crenate throughout, with rounded glandular teeth; fmooth, except that the numerous ftraight parallel veins are hairy beneath, efpecially at their origin. *Flowers* copious, axillary, ftalked, four-cleft, dioecious. *Stigma* in four narrow deep fegments. *Berry* black, of three cells, with moftly a feed in each. The female *flowers* have the rudiment of a ftyle, according to Wulfen in Jacq. Coll. v. 3. 16, but the fhrub is neverthelefs perfectly dioecious.

20. R. *pumilus.* Dwarf Rock Buckthorn. Linn. Mant. 49. Willd. n. 19. Ait. n. 9. Jacq. Coll. v. 2. 141. t. 11. (R. rupeftris; Scop. Carn. v. 1. 164. t. 5, bad. Villars Dauph. v. 2. 538.)—Stem proftrate. Leaves fomewhat obovate, crenate, fmooth on both fides. Stigma three-cleft.—Native of mount Baldus, and the alps of Dauphiny and Carniola. We have gathered it on mount Cenis. This is a fmall depreffed *fhrub,* creeping clofe to the rocks. The

leaves

leaves are ſmaller than the laſt, with broader leſs numerous crenatures, and we find them alſo tapering conſtantly at the baſe, not inclined to be heart-ſhaped, as Scopoli and Wulfen (in Jacquin), both repreſent them. The latter erroneouſly deſcribes and delineates a ſimple capitate *ſtigma;* in our ſpecimens, and thoſe of Villars, that part is deeply three-cleft. We ſee no reaſon to believe the *pumilus* of this laſt author diſtinct from his *rupeſtris*. The *flowers* of our *pumilus* are deſcribed, by moſt writers, as having all perfect *ſtamens* and *piſtils*, but Villars ſays they appeared to him dioecious.

21. R. *pubeſcens*. Downy Mountain Buckthorn. Sm. Prodr. Fl. Græc. Sibth. n. 552. Fl. Græc. t. 239, unpubliſhed.—Leaves obovate-rhomboid, villous, nearly entire. Flowers dioecious. Style deeply divided.—Gathered by Dr. Sibthorp on mount Parnaſſus. This is a knotty, zigzag, ſpreading, not very upright, *ſhrub*, vyeing in magnitude with *R. alpinus*, for which poſſibly Dr. Sibthorp might at one time have taken it, when he made a memorandum of *alpinus* being found on Parnaſſus; as we obſerve no ſpecimen in his collection to confirm ſuch memorandum. It is, nevertheleſs, extremely probable that both ſpecies may grow there. The preſent is very diſtinct from *alpinus* in having downy, and nearly entire *leaves*. The *flower-ſtalks* and *calyx* are alſo downy. *Petals* roundiſh, concave, found in the *male flowers* only. *Female flowers* on a ſeparate plant. *Style* divided nearly to the baſe, with only two *ſtigmas*. This ſpecies is more akin to the following than to any of the foregoing.

22. R. *Frangula*. Alder Buckthorn, or Berry-bearing Alder. Linn. Sp. Pl. 280. Willd. n. 20. Fl. Brit. n. 2. Engl. Bot. t. 250. Fl. Dan. t. 278. (Frangula; Camer. Epit. 978. Matth. Valgr. v. 2. 609. Alnus nigra, five Frangula; Ger. Em. 1470.)—Leaves obovate, entire, ſmooth. Style ſimple, very ſhort. Stigma cloven.—Native of buſhy places in the north of Europe more eſpecially, though Dr. Sibthorp obſerved it about Conſtantinople. It flowers, like moſt of the ſpecies of *Rhamnus*, in the ſpring. The *ſtem* is ſhrubby, about four feet high. *Leaves* two or three inches long and about one broad, ſomewhat pointed. *Flowers* whitiſh, with very minute *petals* and *ſtamens*, in the ſame individuals with the *piſtils*. *Style* very ſhort, with two ſmall ſegments to the *ſtigma*. *Berry* black, roundiſh, with ſeldom more than two *ſeeds*, though we have ſeen three, in which caſe, we preſume, there muſt have been a three-cleft *ſtigma*. Theſe *berries* are ſometimes mixed, by herb gatherers, with thoſe of the true Buckthorn, n. 1, or ſubſtituted for thoſe berries; but the ſmaller number of ſeeds betrays the deception. Their qualities perhaps differ very little.

23. R. *latifolius*. Broad-leaved Azorian Buckthorn. L'Herit. Sert. Angl. 5. t. 8. Willd. n. 21. Ait. n. 11.—Leaves elliptical, pointed, entire. Calyx hairy. Style ſimple.—Gathered by Mr. Maſſon in the Azores. He ſent it to Kew in 1778, and it bloſſoms there in July, being kept in winter under cover. This is a tall upright *ſhrub*, with round, ſtraight, ſmooth *branches*. *Leaves* four or five inches long, and two broad; ſmooth above; paler with hairy ribs, beneath. *Flowers* hairy, axillary, many together, on hairy ruſty *ſtalks*. *Petals* broad at the baſe. *Stigma* ſlightly three-cleft.

24. R. *glandulofus*. Madeira Buckthorn. Ait. n. 12. Willd. n. 22. Venten. Malmaiſ. t. 34.—Leaves ovate, bluntly ſerrated, ſmooth; glandular at the baſe. Stem erect. Flowers racemoſe. Style in three deep ſegments.—Native of Madeira, and the Canary iſlands. Introduced at Kew, by Mr. Maſſon, in 1785. This has the habit of an *Ilex* or *Phillyrea*. The *leaves* are dark green, ſmooth, two inches long, more or leſs, ovate, pointed, rather diſtantly ſerrated, marked on the upper ſide, near the baſe, with two or three glandular ſpots. *Flowers* yellowiſh, numerous, on ſmooth, racemoſe axillary *ſtalks*. *Stamens* twice as long as the *petals*. *Style* deeply three-cleft. *Stigmas* ſimple. We know nothing of the *fruit*.

25. R. *ellipticus*. Oval-leaved Jamaica Buckthorn. Ait. n. 13. Willd. n. 23. Swartz Ind. Occ. v. 1. 497. (R. n. 1; Browne Jam. 172. t. 29. f. 2. Ceanothus reclinatus; L'Herit. Sert. Angl. 6.)—Leaves elliptical, acute, entire; rather villous beneath. Flowers axillary, ſomewhat umbellate. Style in three deep ſegments. Berry dry.—Native of buſhy places on the mountains of Jamaica. Miller cultivated it in the ſtove at Chelſea in 1758. *Aiton*. *Stem* forming a ſmall tree, with ſpreading or dependent *branches*. *Leaves* two or three inches long, thin, downy on the veins beneath. *Flowers* greeniſh-white. The *fruit* ſeems, by Swartz's deſcription, a dry berry, like that of ſome other ſpecies of *Rhamnus*, and not the valvular capſule of a *Ceanothus*, though, when quite ripe and dried, it ſplits into ſix parts, as we find it in Browne's ſpecimen. The *petals* however are oppoſite to the *ſtamens*.

26. R. *prinoides*. Winter-berry-leaved Buckthorn. L'Herit. Sert. Angl. 6. t. 9. Willd. n. 24. Ait. n. 14. (R. celtifolius; Thunb. Prodr. 44. Celtis foliis ſubrotundis dentatis, flore viridi, fructu luteo; Burm. Afr. 242. t. 88.)—Leaves ovate, ſerrated, ſmooth. Stem erect. Flower-ſtalks ſimple. Style ſlightly three-cleft. Flowers polygamous.—Native of woods at the Cape of Good Hope, where it bloſſoms in September; as is the caſe in England, where this ſhrub was firſt cultivated by Robert Edward, lord Petre. Its habit is that of a *Prinos*, or *Phillyrea*. The *leaves* are from one to two inches long, pointed; ſhining above; paler beneath; ſmooth, except occaſional hairineſs at the origin of each vein. *Flowers* on ſimple, ſlender, axillary *ſtalks*, ſeveral together. *Petals* narrow. This ſpecies, except in its *infloreſcence*, and the want of glands on the *leaves*, bears a conſiderable reſemblance to the *glandulofus*.

27. R. *myſtacinus*. Wiry Buckthorn. Ait. n. 15. Willd. n. 25.—Leaves heart-ſhaped, entire. Stem climbing with tendrils. Flowers in axillary umbels. Stigma three-cleft.—Said to be a native of Abyſſinia; at leaſt it was brought to Kew, in 1775, by the celebrated traveller Mr. Bruce. It is kept in the ſtove, and blooms in November. The *ſtem* is weak, climbing to a conſiderable extent, by means of ſimple ſolitary axillary *tendrils* from the upper part of the branches. *Leaves* an inch long, rather downy beneath, obtuſe with a ſmall point, on very ſhort *footſtalks*. *Flowers* greeniſh-white. *Germen* immerſed in a ſnow-white glandular *receptacle*, filling the tube of the *calyx*. As nothing is known of the *fruit*, this plant may poſſibly prove of the genus *Zizyphus*, to which it ſeems moſt akin in habit.

28. R. *alnifolius*. Alder-leaved American Buckthorn. L'Herit. Sert. Angl. 5. Willd. n. 26. Ait. n. 16.—Leaves obovate, pointed, ſerrated, ſmoothiſh, opaque; reticulated beneath. Flowers hermaphrodite. Stem erect.—Native of Pennſylvania, from whence we have a ſpecimen, communicated by the Rev. Dr. Muhlenberg. It has much the aſpect of *R. alpinus*, but the *leaves*, as l'Heritier obſerves, are leſs ſhining, and more reticulated; they ſeem to us more tapering at the baſe, and not at all heart-ſhaped.

29. R. *ſphæroſpermus*. Clear-berried Buckthorn. Swartz Ind. Occ. v. 1. 499. Willd. n. 27.—Leaves oblong, ſerrated, ſmooth. Stem erect. Flowers in axillary cluſters. Style three-cleft. Berry nearly globular, pellucid.—Native of buſhy hills in the more temperate parts of Jamaica, flowering in Auguſt.—A ſmall tree, ten to fifteen feet high, with

 ſpread-

ſpreading *branches*. *Leaves* pointed, finely veined. *Cluſters* many-flowered, the length of the *footſtalks*. *Flowers* ſmall, yellowiſh-green. *Style* very ſhort. *Berry* the ſize of a ſmall pepper-corn, either quite globular, or obſcurely three-lobed, pellucid, pale green, with one or three ſeeds. It ripens in October.

30. R. *hybridus*. Mule Buckthorn. L'Herit. Sert. Angl. 5. Willd. n. 28.—"Leaves oblong, pointed, ſerrated, ſcarcely perennial. Stem erect. Flowers male and female on the ſame tree."—L'Heritier deſcribes this as having ſprung up in a garden, from ſeeds of *R. alpinus* impregnated by *R. Alaternus*, and partaking of the nature of both parents.

31. R. *Alaternus*. Common Alaternus. Linn. Sp. Pl. 281. Willd. n. 29. Ait. n. 17. (Alaternus 1 et 2; Clu. Hiſt. v. 1. 50. Ger. Em. 1398.)—Leaves ovate, ſerrated, coriaceous, ſmooth. Stem erect. Flowers dioecious, in axillary, ſomewhat compound, bracteated cluſters. Stigma in three deep ſegments.—Native of the ſouth of Europe. A hardy evergreen *ſhrub* in our gardens, flowering in the ſpring. The *leaves* are about an inch long, of a ſhining yellowiſh-green, and of a thick rigid texture. *Flowers* copious, yellowiſh. *Berries* dark purple, with two or three *ſeeds*.

The 30th ſpecies of Willdenow, *R. carpinifolius*, adopted from Pallas's Fl. Roſſ. t. 60, is, we believe, the ſame tree with *Ulmus nemoralis*, Willd. Sp. Pl. v. 1. 1326, or at leaſt of the ſame genus. See Ulmus.

Sect. 3. *Branches armed with prickles.*

32. R. *capenſis*. Prickly Cape Buckthorn. Thunb. Prodr. 44. Willd. n. 31.—"Prickles ſolitary. Leaves ovate, notched or entire, ſmooth. Umbels axillary."—Found by Thunberg, at the Cape.

33. R. *circumſciſſus*. Prickly Eaſt-Indian Buckthorn. Linn. Suppl. 152. Willd. n. 32.—Prickles ſolitary, hooked. Leaves obovate, abrupt, emarginate, entire, ſmooth. Umbels axillary.—Found by Koenig, in the Eaſt Indies. *Branches* angular. *Prickles* numerous, ſtrong. *Leaves* almoſt an inch long, and nearly as broad. *Umbels* many-flowered. *Style* ſimple, ſhort, permanent. Baſe of the *calyx* cup-like after the limb is fallen.

Rhamnus, in *Gardening*, furniſhes plants of the tree and ſhrub kinds, of which the ſpecies cultivated are; the purging buckthorn (R. catharticus); the pubeſcent rhamnus, or buckthorn redwood (R. colubrinus); the alder buckthorn, or berry-bearing alder (R. frangula); the common Chriſt's-thorn (R. paliurus); the common alaternus (R. alaternus); the blunt-leaved buckthorn (R. jujuba); the pointed-leaved buckthorn (R. œnoplia); the ſhining-leaved buckthorn, or common jujube (R. zizyphus); and the Syrian Chriſt's-thorn (R. ſpina Chriſti).

It is found that the juice of the unripe berries, in the firſt ſort, has the colour of ſaffron, and is uſed for ſtaining maps or paper, being ſold under the name of French berries: the juice of the ripe berries, mixed with alum, is the ſap-green of the painters; but if the berries be gathered late in the autumn, the juice is purple. The bark affords a beautiful yellow dye.

In the third ſort, the berries gathered before they are ripe, dye wool green and yellow; when ripe, blue-grey, blue, and green. The bark dyes yellow, and with preparations of iron, black.

There are two varieties of this ſort, the broad-leaved, which has larger and rougher leaves; it grows naturally on the Alps: and the dwarf or round-leaved, which is of humble growth, ſeldom riſing above two feet high; it grows on the Pyrenees.

The fifth is a native of the ſouth of Europe, and of Barbary. The freſh branches or young ſhoots, with the leaves, will dye wool a fine yellow. It flowers about April. And there are varieties with variegated leaves, commonly called bloatched phillyrea by the nurſerymen; and with the leaves ſtriped with white and with yellow, called ſilver and gold-ſtriped alaternus. The latter has the leaves much longer and narrower, and the ſerratures on the edges much deeper: this ſhoots its branches more erect, forms a handſomer buſh, and is equally hardy. It is likewiſe obſerved, that the phillyrea is ſometimes different; and according to ſome, there are alſo the large-growing, the ſmall-growing, the broad-leaved, the narrow-jagged-leaved, the yellow-ſtriped jagged-leaved, the white-ſtriped jagged-leaved: all which are confounded with the alaternus, by ſuch perſons as are not botaniſts; but they may eaſily be diſtinguiſhed by the poſition of their leaves, which are alternate in this, but placed oppoſite by pairs in that. And it is ſuppoſed, that the alaternus was much more in requeſt formerly than at preſent, having been planted againſt walls in court-yards to cover them, as alſo to form evergreen hedges in gardens; for which purpoſe it is very improper, as the branches ſhoot very vigorouſly, and being pliant, are frequently diſplaced by the wind; in winter, when much ſnow falls in ſtill weather, the weight of it often breaks the branches; theſe hedges muſt alſo be clipped three times in a ſeaſon to keep them in order, which is both expenſive and occaſions a great litter in a garden.

The fruit, in the eighth ſort, is ſold in the market at Canton during the autumn. In Italy and Spain it is ſerved up at the table in deſerts during the winter ſeaſon, as a dry ſweetmeat.

And the common or cultivated jujube, according to Miller, has a woody ſtalk, dividing into many crooked irregular branches, armed with ſtrong ſtraight thorns, ſet by pairs at each joint; the leaves are two inches long and one broad, ſlightly ſerrate, on ſhort footſtalks; the flowers are produced on the ſide of the branches, two or three from the ſame place, ſeſſile, ſmall and yellow: the fruit oval, the ſize of a middling plum, ſweetiſh and clammy, including a hard oblong ſtone, pointed at both ends.

The wild jujube has ſlender woody ſtalks, which ſend out many weak branches, covered with a greyiſh bark, and armed with ſpines in pairs, one longer and ſtraight, the other ſhort and recurved; the leaves ſmall, oval, veined, half an inch in length and breadth, and ſeſſile. It is found about Tunis in Africa.

Method of Culture.—The firſt, third, and fourth ſorts may be increaſed by ſeeds, layers, and ſometimes by cuttings; the ſeeds ſhould be ſown in autumn as ſoon as ripe, on a bed of light earth, and ſlightly raked in: the plants moſtly appear in the following ſpring, and when they have had a year or two's growth, they ſhould be planted out in nurſery-rows, to have two or three years more growth, when they may be finally ſet out where they are to ſtand.

It may be noticed that the layers ſhould always be made from the young ſhoots, and be laid down in the autumn, in the uſual way, giving a little twiſt or nick at the time in the bark, at a joint. They moſtly become well rooted in twelve months afterwards.

Cuttings of the firſt and third ſorts may be made from the young twigs, and be planted in rows in the autumn, in a bed of good earth, when moſt of them will ſucceed and grow well.

And all the evergreen or alaternus kinds may be raiſed from ſeeds and by layers. The plain ſorts ſucceed in both methods, but the variegated ſorts only with certainty by layers, well laid down.

And

And the feeds fhould be put into the ground in the early autumn in the fame manner as above; and the layers laid down in the autumn as in the other kinds of plants.

All the other fpecies may be raifed by fowing the ftones of the fruit in pots in fpring, plunging them in a moderate hot-bed. When the plants have attained fome growth they fhould be removed into feparate pots, and be managed as other tender plants. They alfo fucceed by fuckers from the roots and layers, as in the above forts. And the fixth and eighth forts may be placed in the greenhoufe, and the others in the ftove.

Thefe are all ornamental plants; the hardy forts for the pleafure-ground, and the more tender forts for the greenhoufe and ftove, among other potted plants of thefe departments.

RHAMNUS *catharticus*, or *fpina cervina, purging buckthorn*, in the *Materia Medica*. The fruit or berries of this fhrub, which have been long received into the materia medica, are about the fize of a fmall pea, and, when ripe, of a fhining black colour; they contain a pulpy deep green juice, called by the French "verd de veffie," or SAP-*green* (which fee), which has a faint unpleafant fmell, and a bitterifh, acrid, naufeous tafte; they operate brifkly by ftool, and hence the plant derives the trivial name "catharticus:" their purgative effects are conftantly accompanied with confiderable thirft, and drynefs of the mouth and throat, and frequently with fevere griping of the bowels, efpecially unlefs fome diluting liquor be plentifully drunk immediately after taking them. The dofe is faid to be about 20 of the frefh berries in fubftance; twice or thrice that number in decoction; a drachm or a drachm and a half of the dried berries; an ounce of the expreffed juice; or half an ounce of the rob or extract, obtained by infpiffating the juice. The juice made into a fyrup is the officinal preparation, and in this ftate it has been generally preferred by phyficians, who found that in dofes of one ounce or two it proved a very powerful purgative; and was therefore much employed as a hydragogue. Few patients, however, are able to bear a frequent repetition of this medicine; and even Sydenham, who was partial to the purgative treatment of hydropical difeafes, found that other cathartics more effectually anfwered this purpofe. At prefent it is rarely prefcribed, except in conjunction with other medicines of this clafs. Lewis's Mat. Med. Woodville's Med. Bot.

RHAMNUSIA, in *Mythology*, an appellation given to Nemefis, on account of her celebrated ftatue at Rhamnus, in Attica, which has been generally afcribed to Phidias. Pliny, however, gives the honour of it to Agoracritus, a fcholar of Phidias, who, as he fays, had defigned it for a Venus; but feeing one preferred to it, which was executed by Alcamenes, another fcholar of the fame mafter, fold his to the Rhamnufians, on condition that they would only take it for a ftatue of Nemefis, whence fhe gained the name of Rhamnufia. See NEMESIS and RHAMNUS.

RHANDÆ, in *Ancient Geography*, a people of Afia, in Drangiana, on the confines of Afia. Ptolemy.

RHANTERIUM, in *Botany*, fo named by Desfontaines, from ῥαντήριον, *a kind of brufh for fprinkling water*, like that ufed in Catholic churches; the down, or crown, of the feed having a fimilar form.—Desfont. Atlant. v. 2. 291. Willd. Sp. Pl. v. 3. 2105.—Clafs and order, *Syngenefia Polygamia-fuperflua*. Nat. Ord. *Compofitæ difcoideæ*, Linn. *Corymbiferæ*, Juff.

Gen. Ch. *Common Calyx* imbricated, nearly cylindrical; fcales lax, recurved. *Cor.* compound, radiated; florets of the difk numerous, equal, funnel-fhaped, five-cleft, erect, all perfect; thofe of the radius few, ligulate, three-toothed, recurved, female. *Stam.* in the perfect florets five, awl-fhaped, fhort; anthers fimple, united into a five-toothed cylinder. *Pifl.* Germen in all the florets inverfely conical, furrowed; ftyle thread-fhaped, the length of the ftamens; ftigmas two, club-fhaped. *Peric.* none, except the permanent calyx. *Seeds* of all the florets the fhape of the germen; thofe of the difk crowned with from four to fix briftles, thickened and feathery at the top; thofe of the radius naked. *Recept.* flat, chaffy; fcales acute, hollowed on one fide.

Eff. Ch. Receptacle chaffy. Seed-down of about five briftles, feathery at the top. Calyx cylindrical, imbricated. Seeds of the radius naked.

1. R. *fuaveolens*. Desfont. Atlant. v. 2. 291. t. 240.—Found by Desfontaines on the fandy fea-coaft, near Sfax, in the kingdom of Tunis. *Root* perennial. *Stem* erect, much branched, round, leafy, one or two feet high. *Branches* flender, downy, ftriated, often entangled together. *Leaves* fcattered, feffile, three quarters of an inch long, lanceolate, acute, ftrongly ferrated, either fmooth or downy; the upper ones fmaller, linear and entire. *Flowers* terminal, folitary, refembling thofe of feveral of the fmaller-flowered American Afters, except in being entirely yellow. This plant flowers in fummer. The bruifed leaves have a fragrant fmell.

RHAPHANEÆ, in *Ancient Geography*, a town of Afia, in Syria, placed by Ptolemy between Epiphania and Anteradus.

RHAPHIS, in *Botany*, fo called from ῥαφίς, *a needle*, or *awl*, becaufe of the long needle-like awn of the female flowers.—Lour. Cochinch. 552.—Clafs and order, *Monœcia Triandria*. Nat. Ord. *Gramina*.

Gen. Ch. Male flowers two, ftalked, in one common involucrum. *Cal.* Glume fingle-flowered, of two awl-fhaped, coloured, beardlefs, nearly equal valves. *Cor.* Glume of two lanceolate, membranous, fringed, beardlefs valves, fhorter than the calyx. *Stam.* Filaments three, fhort; anthers oblong.

Female flower folitary, in the fame fhort, one-leaved, hairy involucrum, feffile, below the male flowers. *Cal.* as in the male, but fhorter. *Cor.* Glume of two valves, nearly equal to the calyx; one of them furnifhed with a longifh, very fharp awn. *Pifl.* Germen ovate; ftyles two, fhort; ftigmas feathery. *Peric.* none, except the permanent glumes. *Seed* folitary, oblong, compreffed.

Eff. Ch. Involucrum of one leaf, three-flowered. Male, Calyx of two valves, coloured. Corolla of two fringed valves.

Female, Calyx like the male. Corolla of two valves: one of them awned. Styles two. Seed one, oblong.

1. R. *trivialis*. (Gramen aciculatum, Cuffu Cuffu; Rumph. Amboin. v. 6. book 10. chap. 8. t. 5. f. 1. Co may of the Cochinchinefe.)—A very common grafs in China and Cochinchina, growing by road fides, and proving very troublefome on account of its feeds, which ftick into the clothes of paffengers, and cannot be fhaken out. Rumphius fpeaks of it as equally common in the iflands of the Eaft Indies. The *root* is annual, creeping. *Stem* a foot high, erect, round, flender, fmooth, fcarcely branched, almoft leaflefs, except at the bafe. *Leaves* nearly all radical, feffile, fhort, lanceolate, clafping the lower part of the ftem. *Panicle* fimple, folitary, terminal, conical, lax; its branches long, ftraight, afcending. Linnæus erroneoufly cites the above fynonym of Rumphius, under his *Panicum colonum*, a widely different plant.

Mr. Brown, in Prodr. Nov. Holl. v. 1. 199, fuggefts that the above plant of Loureiro and Rumphius ought to be referred

referred to the genus *Holcus*, along with all the panicled ſpecies of *Andropogon;* and he remarks, on the authority of a ſpecimen from the author, in ſir J. Banks's collection, that it ſeems ſcarcely diſtinct from *Andropogon acicularis* of Retzius, Willd. Sp. Pl. v. 4. 906, for which indeed the ſame ſynonym of Rumphius is quoted.

RHAPIS, ſo called by the younger Linnæus, from ῥαπις, *a rod*, probably in alluſion to the name it has obtained from Europeans in China, of Ground Ratan; but we know not preciſely how that name applies to the plant.—Ait. Hort. Kew. ed. 1. v. 3. 473. ed. 2. v. 5. 473. Schreb. 772. Willd. Sp. Pl. v. 4. 1093. Mart. Mill Dict. v. 4.—Claſs and order, *Polygamia Monoecia;* rather *Hexandria Monogynia*. Nat. Ord. *Palmæ*.

Gen. Ch. *Cal.* Perianth inferior, minute, rigid, of one leaf, in three deep, broad, concave, permanent ſegments. *Cor.* of one petal, larger than the calyx, in three deep, erect, concave, equal ſegments, deciduous. *Stam.* Filaments ſix, awl-ſhaped, nearly as long as the corolla; anthers roundiſh, two-lobed. *Piſt.* Germen ſuperior, three-lobed; ſtyle ſhort, awl-ſhaped; ſtigma obtuſe. *Peric.* Berry roundiſh-ovate. *Seed* ſolitary, roundiſh, bony.

Obſ. The flowers are often polygamous or dioecious.

Eſſ. Ch. Calyx three-cleft. Corolla of one petal, three-cleft. Berry with one large, roundiſh, bony ſeed.

1. R. *flabelliformis*. Creeping-rooted Palmetto, or Ground Ratan. Ait. n. 1. Willd. n. 1. Sm. Tour, v. 1. 12. and 279. Jacq. Hort. Schoenbr. v. 3. 36. t. 316. Curt. Mag. t. 1371. (Chamærops excelſa; Thunb. Jap. 130.)—Leaves palmate, plaited; their plaits and margins ſharply toothed.—Native of China and Japan. *Root* creeping, with numerous long ſtraight fibres. *Stem* riſing to a great height in its native country; in our ſtoves it has not yet reached above ſix or eight feet; it is clothed with a looſe network, formed of the baſes of the decayed leaf-ſtalks. *Leaves* ſtalked, divided almoſt to the baſe into many plaited oblong lobes, a ſpan long, rough at the ribs and edges with prickly teeth. *Flowers* moſtly dioecious, yellow, in panicled cylindrical ſpikes. *Berry* ſmall, dark purple, ſweet with a bitteriſh flavour, barely eatable.

2. R. *acaulis*. Swamp Palmetto. Willd. n. 2. Ait. n. 2. (Corypha minor; Jacq. Hort. Vind. v. 3. 8. t. 8. Sabal Adanſoni; Gawl. in Curt. Mag. t. 1434. Purſh v. 1. 239.)—Leaves palmate, ſtriated, entire, ſmooth.—Native of the ſea-coaſt of Carolina and Georgia, flowering in Auguſt. Of humble growth, having no leafy *ſtem*. The *leaves* are longer and narrower than in the foregoing, quite ſmooth and entire. *Flowers* numerous, greeniſh-white, in numerous, cylindrical, lax, panicled ſpikes, ſupported by a ſtraight, round common ſtalk, taller than the foliage. *Berry* the ſize of a ſmall pea, black, ſweetiſh. *Jacq.*

3. R. *arundinacea*. Simple-leaved Palmetto. Ait. n. 3. Willd. n. 3.—Leaves in two deep, acute, plaited lobes; roughiſh at the edges.—Native of Carolina. A greenhouſe plant at Kew, flowering in September.

The orthography of the generic name in Curt. Mag. 1434, is remarkably confuſed, and ſeems to have miſled Mr. Purſh to print it *Raphis*, citing Willdenow without examination.

RHAPONTICUM. See RHA.

RHAPONTICUM, a medicinal root, in form reſembling rhubarb, and nearly of the ſame virtues.

It was called *rhaponticum*, q. d. *root of Pontus;* becauſe chiefly produced in the country of Pontus in Aſia.

It is the root of a plant, which is a ſpecies of the *rheum*, with ſmooth roundiſh leaves, and ſomewhat channelled pedicles. It grows wild on the mountain Rhodope in Thrace, from whence it was brought into Europe by Alpinus about the year 1610; it bears the hardeſt winters of this climate. The root of this plant, ſays Dr. Lewis, which appears to have been the true rhubarb of the ancients, is confounded by ſome with the modern rhubarb, though conſiderably different from that root in appearance, as well as in quality. The rhapontic is of a duſky colour on the ſurface, and of a looſe ſpongy texture; more aſtringent than rhubarb, and leſs purgative: in this laſt intention, two or three drachms are required for a doſe. Lewis's Mat. Med.

It has, however, been much controverted, whether the rhaponticum of the ancients, and the rhubarb of the moderns, be one and the ſame plant: the reaſoning on both ſides may be ſeen in the appendix to the ſecond volume of John Bauhin's Hiſtory of Plants. See RHUBARB.

RHAPPHA, in *Ancient Geography*, a town of India, on the other ſide of the Ganges, among the people called Gangani. Ptolemy.

RHAPSA, a town of Aſia, in the interior of Media.

RHAPSODI, Ῥαψῳδοι, RHAPSODISTS, in *Antiquity*, perſons who made a buſineſs of ſinging or reciting pieces of Homer's poems.

Cuper informs us, that the rhapſodi were clothed in red, when they ſung the Iliad; and in blue, when they ſung the Odyſſey.

They performed on the theatres; and ſometimes ſtrove for prizes, in conteſts of poetry, ſinging, &c.

After the two antagoniſts had finiſhed their parts, the two pieces, or papers they were written in, were joined together again; whence the name, *viz.* from ῥαπτω, *ſuo, I join together*, and ῳδη, *ode, ſong.*

But there ſeem to have been other rhapſodi of higher antiquity than theſe; people who compoſed heroic poems, or ſongs in praiſe of heroes and great men, and ſung their own compoſitions from town to town, for a livelihood; of which profeſſion, it is ſaid, was Homer himſelf.

Hence, ſome critics, inſtead of the former origin, derive the word rhapſodiſt from ῥαβδῳ αδειν, *to ſing with a laurel-rod in the hand*, which, it ſeems, was the badge of the primitive rhapſodi.

Philochorus, again, derives the word from ῥαπτειν τας ῳδας, *q. d.* συντιθεναι, *to compoſe ſongs or poems;* as if they were the authors of the poems they ſung. This opinion, to which Scaliger inclines, reduces theſe rhapſodi to the ſecond kind.

In effect, it is probable, that they were all of the ſame claſs, whatever diſtinction ſome authors may imagine among them; and that their buſineſs was to ſing or rehearſe poems, either of their own, or other people's compoſition, as might beſt ſerve their purpoſe, which was gaining a pecuniary advantage by them. So that we do not apprehend it any injury to them, to ſet them on the foot of our ballad-ſingers; ſome of whom may probably pen their own ditties. After Homer's time, it is no wonder they confined themſelves altogether to his pieces, for which the people had the utmoſt veneration; nor is it ſurpriſing, that they ſhould erect ſtages, &c. and diſpute the point of recitation in fairs and markets.

The import of the word rhapſodiſt underwent ſeveral changes in antiquity: it was firſt appropriated to bards, who ſung their own verſes from town to town, or at the tables of the great; in this ſenſe Homer was called a rhapſodiſt. It was next beſtowed on thoſe who ſung the verſes of Homer on the ſtage, uſually for a prize, allotted to the beſt performer of them; and, laſtly, to ſuch ſingers of centos, as have been juſt deſcribed. A rhapſody, in modern language, conveys no other meaning than that of an incoherent jumble of ideas. This ſenſe of the word undoubtedly took its riſe from the notorious folly and abſurdity of the rhapſodiſts, in their rapturous comments upon their favourite poets; for they undertook to explain, as well as to recite. Hence it is that in Suidas, the word ῥαψῳδία is defined by φλυαρία, *nonſenſe.*

RHAPSODOMANCY, ῥαψῳδομαντεία, an ancient kind of divination performed by fixing on a paſſage of a poet at hazard, and reckoning on it as a prediction of what was to come to paſs.

There were various methods of practiſing this rhapſodomancy. Sometimes they wrote ſeveral verſes or ſentences of a poet on ſo many pieces of wood, paper, or the like; ſhook them together in an urn; and drew out one, which was accounted the lot.

Sometimes they caſt dice on a table, on which verſes were written; and that on which the die lodged, contained the prediction.

A third manner was by opening a book, and pitching on ſome verſe, at firſt ſight. This method they particularly called the *ſortes Præneſtinæ*, and afterwards, according to the poet thus made uſe of, *ſortes Homericæ, ſortes Virgilianæ*, &c.

RHAPSODY, ῥαψῳδία, in *Antiquity*, a diſcourſe in verſe, ſung or rehearſed by a rhapſodiſt.

Others will have rhapſody properly to ſignify a collection of verſes, eſpecially thoſe of Homer; which, having been a long time diſperſed in pieces and fragments, were at length, by Piſiſtratus's order, digeſted into books, called rhapſodies; from the Greek ῥάπτω, *ſuo, I ſew*, and ᾠδὴ, *ſong.*

Hence, among the moderns, rhapſody is alſo uſed for an aſſemblage of paſſages, thoughts, and authorities, raked together from divers authors, to compoſe ſome new piece. Lipſius's Politics make ſuch a rhapſody, in which there is nothing of the author's own but conjunction and particles.

RHAPTE, in *Ancient Geography*, the metropolis of the Ethiopians, near the river Raptus. Steph. Byz.

RHATOSTATHIBIUS, or, as Baxter thinks it was originally written, *Retoſtaubius*, a river of the iſle of Albion, (England,) on the weſtern ſide, the mouth of which is placed by Ptolemy between that of the Tobius and the eſtuary of Sabrina. This is the river Wye, and its ancient name is derived from "Rot in Tav," the courſe of a river.

RHATTA, a town of Aſia, in Babylonia, in the vicinity of Chiriphe. Ptolemy.

RHAUCUS, a town of the iſland of Crete. Steph. Byz.

RHAVENA, a prefecture of Aſia, along the Euphrates. Ptolemy places in it ſix towns on the banks of the Euphrates, and four in the interior of the country.

RHAVIUM, a river of Hibernia, the mouth of which is placed by Ptolemy between the promontory "Boreum" and the town "Magnata."

RHAUNEM, in *Geography*, a town of France, in the department of the Seine, and chief place of a canton, in the diſtrict of Birkenfeld. The place contains 547, and the canton 5886 inhabitants, in 35 communes.

RHAUNETI, in *Ancient Geography*, a town of Arabia Felix, on the Arabian gulf, between the town "Phœnicum" and the extremity of this Cherſoneſus. Ptolemy.

RHAURARIS, a river of Gallia Narbonenſis, according to Strabo. This river is called "Araurius" by Ptolemy, and "Arauraris" by Pomponius Mela.

RHAUZIUM, the metropolis of Dalmatia, according to Cedrenus and Curopalata.

RHAW, George, in *Biography*, a learned bookſeller and muſician of Wittemberg, born in 1494. In 1531 appeared an "Enchiridion utriuſque Muſicæ Practicæ, ex variis Muſicorum Libris congeſtum," in 8vo. And in 1538 he not only publiſhed "Select Harmony for four Voices," conſiſting of two Latin Paſſiones, the one by John Galliculus, and the other by Jacob Otrecht, with maſſes, lamentations of Jeremiah, and motets by John Walther, Lewis Senfels, Simon Cellarius, Benedict Dux, Eckel, Lemlin, Stoel, and Henry Iſaac, to which Melancthon furniſhed him with a Latin preface; but in 1544 publiſhed, in oblong quarto, 123 German ſacred ſongs, of four and five parts, for the uſe of ſchools. Prefixed to the ſecond part of this publication, containing eccleſiaſtical hymns, ſet by ſixteen different German compoſers, there is a print of the editor, Geo. Rhaw, Typographus, Wittemb. anno ætatis ſuæ LIV.

RHAZES, one of the oldeſt and moſt diſtinguiſhed of the Arabian phyſicians, was born at Rei, in the province of Choraſan, about the year 852. There was a ſchool in his native town, at which he received his early education; but he is ſaid not to have commenced the ſtudy of medicine till ſomewhat late in life, having given up his time much to the cultivation of muſic. After he was thirty years of age, he removed to Bagdad, and then he turned his attention to philoſophy, and afterwards to phyſic. He became, however, indefatigable in his application, and was continually occupied in obſerving, reading, and writing, until he obtained the higheſt reputation; and he was ſelected out of a hundred eminent phyſicians, who were then reſident at Bagdad, to ſuperintend the celebrated hoſpital of that city. The hiſtorians conſidered him as the Galen of the Arabians; and from his long life and conſtant practice, during which he paid the moſt aſſiduous attention to the varieties of diſeaſe, he obtained the appellation of the experimenter, or the experienced. He was ſaid alſo to be profoundly ſkilled in all the ſciences, eſpecially in philoſophy, aſtronomy, and muſic. He travelled much in purſuit of knowledge, and made frequent journies into Perſia, his native country, and was much conſulted by ſeveral princes, particularly by Almanzor, the chief of Choraſan, with whom he frequently correſponded, and to whom he dedicated ſeveral of his writings. Abi Oſbaia enumerated two hundred and twenty-ſix treatiſes compoſed by Rhazes, among which the *ten* books, addreſſed to his patron Almanzor, are mentioned, and therefore are doubtleſs genuine, although Haly Abbas, who has given an account of him and his works, has not noticed them. This work Rhazes deſigned as a complete body of phyſic, and it may be deemed the great magazine of all the Arabian medicine; the ninth book, indeed, which treats of the cure of diſeaſes, was in ſuch general eſtimation for ſeveral centuries, that it was the text-book of the public ſchools, and was commented upon by the moſt learned profeſſors. Nevertheleſs, like the reſt of the Arabian writings, it contains very little more than the ſubſtance of the works of the Greeks, from whom the Arabians borrowed almoſt all their medical knowledge. They have, indeed, and Rhazes in particular, given the firſt diſtinct account of *the ſmall-pox*, a peſtilential malady which the Greeks have no where accurately deſcribed, and which is, therefore, generally inferred to have been unknown among that people. This is queſtionable; but, at all events, the firſt ſpecific account of the ſmall-pox is to be found in the works of Rhazes. He was the author, alſo, of the firſt treatiſe ever compoſed reſpecting the diſeaſes of children. His book on the affections of the joints is intereſting, and contains an account of ſome remarkable cures, effected chiefly by copious blood-letting. He deſcribes the ſymptoms of hydrophobia very well; and alfo fome difeafes peculiar to eaftern countries, as the ignis perficus, vena medinenfis, &c.; and he firft noticed the difeafe called fpina ventofa. Rhazes had the reputation of being a fkilful alchemift; the art of chemiftry, in fact, originated with the Arabians, and Rhazes is the firft, as Dr. Freind has fhewn, who mentions the ufe of chemical preparations in medicine. He has a chapter on the qualifications of a phyfician; and a fingular tract on quacks and impoftors, in which he has pourtrayed that clafs of pretenders to the life; and his detail of their pretenfions fhews that they were at leaft as numerous, and ingenious in their contrivances of cheatery, as in more recent times.

Rhazes lived to the age of eighty, and loft his fight: he died in the year 932. His works that have come down to us, through the medium of tranflations in Latin, are, 1. A fort of common-place book, entitled "Continens," or "Libri Continentes." 2. A much more perfect work, the "Libri Decem, ad Almanforem," publifhed at Venice, 1510. 3. Six books of aphorifms, publifhed under the title of "Liber de Secretis, qui Aphorifmorum appellatur," Bononiæ, 1489. 4. A tract on the fmall-pox, often tranflated, and printed with the title of "De Peftilentia;" the beft tranflation is by Channing, London, 1766. Freind's Hift. of Phyfic. Eloy Dict. Hift. de la Med.

RHAZUNDA, in *Ancient Geography*, a town of Afia, in the interior of Media, between "Sanais" and "Veneca," according to Ptolemy.

RHEA, a town of Afia, in Margiana, according to Ptolemy.

Rhea, in *Mythology*, one of the titles of Cybele, derived from ῥέω, *I flow*, on account of that abundance of benefits which fhe difpenfes.

Rhea was, according to Diodorus Siculus, one of the eight great divinities of Egypt; the other feven being the Sun, Saturn or Chronos, Jupiter, Juno, Vulcan, Vefta, and Mercury. Chronos, fays this hiftorian, having married Rhea, became, according to fome, the father of Ofiris and Ifis, and, according to others, of Jupiter and Juno. The children of Rhea, by Saturn, were, according to fabulous hiftory, Vefta, Ceres, Juno, Pluto, Neptune, and Jupiter, the father of gods and men; but that god learning from an oracle delivered by Cœlus and Terra, that one of his children fhould dethrone him, devoured them as Rhea brought them forth, which threw her into extreme diftrefs. So that when fhe was near her time of being delivered of Jupiter, fhe confulted her parents to know in what manner fhe might refcue him from the cruelty of his father, and by their advice fhe fecretly withdrew into Crete, where fhe was delivered, and prefented Saturn with a ftone wrapped about with fwaddling clothes, which he fwallowed. Jupiter being grown up, refcued Cœlus from the chains with which Saturn had loaded him; and Cœlus, in return for his fervice, gave him thunder, by which he became the fovereign of gods and men. Rhea was one of the names under which the earth was worfhipped.

Rhea-*Sylvia*, was the mother of Remus and Romulus; and in order to give dignity to their origin, the fable reports that her uncle Amulius got into her cell, and her father Numitor propagated the ftory that the twins fhe brought forth had been begotten by the god of war.

Rhea, in *Ornithology*, a fpecies of the ftruthio or oftrich, the fame bird with the *nhan-duguacu* of the Brafils. See Struthio.

RHEBAN, in *Ancient Geography*, a river of Afia, in Bithynia. According to Arrian, the fource of this river was on mount Olympus, and its mouth in the Euxine fea, near that of Pfillis.

RHECHIUS, a river of Greece, which difcharged itfelf into the fea near Theffalonica. At the mouth of this river Juftinian erected a fort called "Artemifa."

RHEDA, in *Geography*, a town of Germany, the capital of a lordfhip, in the county of Lingen; 10 miles N. of Lipperftadt. N. lat. 51° 47′. E. long. 7° 50′.

Rheda, a town of Holland, in Guelderland, on the Iffel; feven miles N. of Arnheim.

RHEDONES, in *Ancient Geography*, a people of Gaul, in Armorica, according to Cæfar and Ptolemy.

RHEEDIA, in *Botany*, called Vanrheedia by Plumier, in honour of a moft illuftrious promoter of the ftudy of Eaft Indian plants, Henry Van-Rheede Van-Draakenftein, to whofe judgment and munificence, while governor of Malabar towards the latter part of the 17th century, the publication of that fplendid work the *Hortus Malabaricus*, in 12 folio volumes, is owing.—Linn. Gen. 260. Schreb. 348. Mart. Mill. Dict. v. 4. Juff. 258. Lamarck Illuftr. t. 457. (Vanrheedia; Plum. Gen. 45. t. 18.) Clafs and order, *Polyandria Monogynia*. Nat. Ord. *Guttiferæ*, Juff.

Gen. Ch. *Cal.* none. *Cor.* Petals four, feffile, obovate, concave, fpreading. *Stam.* Filaments numerous, thread-fhaped, longer than the corolla; anthers oblong. *Pift.* Germen fuperior, ovate; ftyle cylindrical, the length of the ftamens; ftigma funnel-fhaped. *Peric.* Berry ovate, thin, of one cell. *Seeds* three, very large, ovate-oblong, marked with fimple or branched lines.

Eff. Ch. Petals four. Calyx none. Berry fuperior, with three feeds.

1. R. *lateriflora*. Linn. Sp. Pl. 719. (Vanrheedia folio fubrotundo, fructu luteo; Plum. Ic. 255. t. 257.)—Native of South America. A *tree* known only to Plumier, whofe figure reprefents it with large, oppofite, ftalked, ovate, entire *leaves;* axillary tufts of numerous, rather fmall, *flowers;* and ovate pendulous *fruit*, about two inches long. Juffieu doubts whether the *calyx* be really wanting.

Linnæus does not appear to have ever had a fpecimen of this plant; nor can we account for his ftriking out (in Mant. 401.) the obfervation in his Sp. Pl. for which he has fubftituted, in Syft. Veg., the following defcription, taken from fome Eaft Indian fpecimen, as his original manufcript fhews, and certainly foreign to the true *Rheedia*. "A *tree*, with jointed, compreffed, even, downy *branches*. *Leaves* oppofite, ftalked, lanceolate, entire, fmooth. *Footftalks* fhort, downy. *Flower-ftalks* axillary, about three together, three cleft, three-flowered."

Willdenow has omitted this genus, in its proper place, nor have we difcovered what he has done with it.

RHEGADORA, in *Ancient Geography*, a town of Afia, in Cappadocia.

RHEGIANUM, a town of Lower Mœfia, on the bank of the Danube. Ptolemy.

RHEGIAS, a town of Afia, in Syria: according to Ptolemy it was in Cyrrheftica, between Ariferia and Ruba.

RHEGIUM, or Regium, (*Reggio*), a town of Italy, at the extremity of Brutium, in the ftrait of Sicily. In the time of Dionyfius the tyrant, the inhabitants of Rhegium formed a league againft him, which terminated in a treaty in the year 354. A difference afterwards occurring between them, he befieged the town and took it, after about eleven months, in 365. The conduct of Dionyfius during this fiege was in the higheft degree favage and brutal. Rhegium afterwards became fubject to the Romans; but a legion, encouraged by the example of the Mamertins of Meffina, revolted in 472, and took poffeffion of the city. After ten years' poffeffion, it was befieged by the Romans, and thofe who efcaped the deftruction of the fiege, to the amount of about 300, were carried to Rome, where they were fcourged and beheaded. This city fuffered much from the earthquake that ravaged Calabria; and even in the time of the Romans it was abandoned by its inhabitants, on account of the calamities which it had fuffered; but Cæfar rebuilt it, after having driven Pompey from Sicily. Virgil (l. iii. v. 414, &c.) thus defcribes it:

"Hæc loca vi quondam, et vaftâ convulfa ruinâ
(Tantum Ævi longinqua valet mutare vetuftas)
Diffiluiffe ferant, quam protenus utraque tellus
Una foret; venit medio vi pontus, et undis
Hefperium Siculo latus abfcidit arvaque et urbes
Littore diductas augufto interluit æftu."

RHEGMA, a place of Afia, in Cilicia, at the mouth of the river Cydnus. Strabo.—Alfo, a town of Arabia Felix, on the coaft of the Perfian gulf, in the country of the Anarites. Ptolemy.

Rhegma, formed of ῥήγνυμι, *I break*, a word ufed by the ancients to exprefs any breaking or burfting of a foft part without a wound, but moft frequently for abfceffes breaking inwardly.

RHEID, in *Geography*, a town of France, in the department of the Roer; 2 miles E. of Gladbeck.

RHEIMS. See Reims.

RHEIN, a town of Pruffia, in the province of Natangen, on a lake which communicates with Spirding lake. It has a large fortified caftle, and an inferior court of juftice; 68 miles S.E. of Königfberg. N. lat. 53° 48'. E. long. 21° 42'.

RHEINAU, a town of France, in the department of the Lower Rhine, fituated on the Rhine, and very much reduced by the inundations of the river; 5 miles S. of Strafburg.—Alfo, a town of Switzerland, in the Thurgau, fituated on an ifland formed by the Rhine, with a convent; 5 miles S.S.W. of Schaffhaufen.

RHEINBACH, a river of Saxony, which joins the Loderbach, near Bitterfeld.

Rheinbach, a town of France, in the department of the Rhine and Mofelle, and chief place of a canton, in the diftrict of Bonn. The place contains 1119, and the canton 16,478 inhabitants, in 37 communes.

RHEINBECK, a town of the duchy of Holftein; 10 miles E. of Hamburg.

RHEINBERG, a town of France, in the department of the Roer, and chief place of a canton, in the diftrict of Creveldt; 44 miles N.W. of Cologne. The place contains 1705, and the canton 7166 inhabitants, in 17 communes.

RHEINE, or Reinen, a town of Germany, in the bifhopric of Munfter, on the Embs, near which are fome falt fprings; 22 miles N. of Munfter. N. lat. 52° 21'. E. long. 7° 25'.

RHEINECK, or Rheinegg, a town of Switzerland, and capital of the Rheinthal, fituated on the Rhine, near its confluence with the lake of Conftance, inhabited chiefly by Proteftants; 26 miles S.E. of Conftance.

RHEINFELDEN, a town of Germany, and lately one of the four foreft towns of Auftrian Swabia, on the S. fide of the Rhine, on the oppofite bank of which is a covered way, built like a horn-work, and communicating with the town by means of a bridge; 9 miles E. of Bâle. N. lat. 47° 35'. E. long. 7° 50'.

RHEINFELS. See Rhenfels.

RHEINHAUSEN, a town of Baden, in the circle of the Upper Rhine, on the E. fide of the Rhine; 3 miles S.E. of Spire.

RHEINMAGEN. See Remagen.

RHEINSDORF. See Ronsdorf.

RHEINTHAL, a bailiwic of Switzerland, between the canton of Appenzel and the Rhine, belonging to the nine cantons, about 30 miles long, and from three to eight broad. The country is fertile, and produces excellent wine. The number of inhabitants is about 13,000, who are partly Proteftants and partly Roman Catholics.

RHEINWALD, a valley in the country of the Grifons, about 20 miles long, which takes its name from a branch of the Rhine that paffes through it.

RHEMAN, or Reman, in *Ancient Geography*, a fortified place of Afia, in Mefopotamia, which belonged to the Romans, according to Ammianus Marcellinus.

RHEMBA, in *Hindoo Mythology*, is a character correfponding in many parts to the popular Venus of the Greeks. Like her fhe fprang from the foam of the ocean, when churned by the gods and demons for the purpofe of obtaining the amrita, or beverage of immortality, as noticed under the articles Kurmavatara and Lakshmi. She is fometimes faid to be an incarnation of Lakfhmi, confort of Vifhnu. More correctly, however, fhe is ftationed in the court of Indra, as the chief of his bands of celeftial chorifters, named Apfara, Devangana, Gandharva, &c. The Apfaras, or Upfaras, are the Nereids of the Hindoo Pantheon: having fprung from water, they are called water nymphs, and affift Indra, the Jupiter Pluvius of India, in his regency over aqueous phenomena. (See Upsara.) In the churning procefs above adverted to, thefe fair damfels were produced in extravagant numbers, according to the Ramayana, *viz.* 600 millions! "of refplendent and celeftial form; adorned with glorious ornaments, and endowed with beauty, youth, fweetnefs, and every grace." Thefe interefting offspring of poetical imagination are proverbially elegant and graceful. The three wives of the mortal father of Ramachandra are faid, in the work juft quoted, to be queens, who, "in elegance of form, rivalled the Apfaras." As the chief of thefe damfels of Paradife, the fubject of this article is fometimes ftiled Rhemba-devi, or the goddefs Rhemba.

In Hindoo writings, efpecially in amatory poetics, allufions frequently occur to the Upfaras, who correfpond alfo with the fairies of the Perfians. Many are mentioned by name, Rhemba the ofteneft, Urvafi, Tilotamma, Menaka, &c. (See thofe articles.) Under the name of the laft we have given an inftance of the ufe made by Indra of thefe obfequious fulfillers of his will; for, as well as in the line of finging, dancing, &c. condefcenfions to the Indra-dikas, or the demi-gods, the Apfaras are the fafcinating difturbers of holy men, when engaged in fuch fervent aufterities as threaten the fafety of Indra in his firmamental throne. In explanation of which, it requires to be noticed that Indra was originally a mere mortal; but learning that the throne of heaven was the reward of the man who fhould, with the prefcribed ceremonies, perform one hundred afwamedhas, or facrifices of a horfe, he did fo, and obtained his dominion, and the name of Shatkratu, or he who performs a hundred facrifices. (See Indra.) His throne he retains until another mortal fhall equal or exceed him in this potent ftile of propitiation. He is, therefore, always on the watch; and being all eyes, never fails to difcover aufterc faints while performing their rigid duties; when he either fteals or defiles the horfe intended and fanctified for the next facrifice, or detaches Rhemba or Menaka, or fome other of his damfels of "fafcinating fymmetry of form," who always fucceed in exciting emotions incompatible with the required purity of fuch as afpire to oust Indra from his ethereal throne. See Menaka.

The

The name Apfara is fometimes written *Upfara*, under which latter word fomething farther concerning thefe damfels will be found.

RHENA, in *Geography*, a town of Germany, in the duchy of Mecklenburg; 22 miles W.S.W. of Wifmar. N. lat. 53° 50'. E. long. 11° 10'.

RHENANUS, BEATUS, in *Biography*, a learned German, was born at Rheinac in 1485, and died at Strafburgh in 1547. He was corrector of the prefs for Frobenius, and by that means formed an intimacy with Erafmus. He wrote "A Hiftory of Germany," 4to.; "Illyrici Provinciarum utrique Imperiorum Romano, tam Conftantinopolitano Servientis, Defcriptio," 8vo. He was alfo the editor of Velleius Paterculus, and other works.

RHENEA, in *Ancient Geography*, an ifland of the Ægean fea, in the neighbourhood of that of Delos. Strabo fays that it was deferted, but that it was the place of burial for the inhabitants of Delos; which being deemed facred, it was forbidden to bury the dead in it. The two ifles of Delos and Rhenea are called "Dili or Ifdiles."

Rhenea retains its name, and is denominated alfo Great Delos; it is feparated from the famous ifland of Delos by a ftrait of about 500 toifes. In the middle of this narrow channel are two fhoals, called the Great and the Little Ramateari: the ancient Greeks had confecrated the larger to Hecate or Diana, and called it the ifland of Hecate, or Pfammite. Ships, even men of war, find good anchorage near this ifland. N. lat. 37° 10'. E. long. 25° 15'. See DELOS.

RHENEN, in *Geography*, a town of Holland, in the department of Utrecht, feated on the river Leck; 20 miles N.N.E. of Bois-le-Duc. N. lat. 51° 59'. E. long. 5° 30'.

RHENFERD, JAMES, in *Biography*, a celebrated oriental fcholar, was born at Mulheim, in Weftphalia, in the year 1654. He went through a courfe of academical ftudies at the college of Meurs, a city in the duchy of Cleves, and afterwards travelled for improvement into foreign countries. In 1678, when he was 24 years of age, he accepted an invitation to become rector of the Latin college in the city of Franeker; but upon the condition that, while he held that poft, he fhould be at liberty to deliver lectures on the Oriental languages. He refigned his rectorfhip and removed to Amfterdam, where fome of the moft wealthy families in that city employed him in the capacity of tutor, and he enjoyed, at the fame time, a favourable opportunity for converfing with learned Jews, and improving his knowledge of rabbinical learning. In the year 1683, a vacancy having taken place in the profefforfhip of the Oriental languages and facred philofophy at the univerfity of Franeker, by the removal of the famous Vitringa to the theological chair, M. Rhenferd received an invitation to fill it; which he accepted. M. Rhenferd held this poft nearly thirty years, during which he had the honour of being thrice chofen rector of the univerfity. He died in 1712, when he was in the 59th year of his age. His learning was general and extenfive; but he chiefly excelled in an acquaintance with the Hebrew, including the Rabbinical, the Chaldee, and Syriac. He was author of feveral learned works, among which the following may be mentioned; "De Antiquitate Characteris hodierni Judaici," 1696, 4to.; in which he endeavoured to eftablifh the claim of the prefent Hebrew characters to the higheft antiquity, and to prove that the Samaritan characters were borrowed from the Hebrews; "Comparatio Expiationis anniverfariæ Pontificis maximi in Vet. Teft. cum unica atque æterna Expiationis Chrifti Domini;" "Inveftigatio Præfectorum et Miniftrorum Synagogæ," 1700, 4to.; "Differtationum Theologico-philologicarum de Stylo Novi Teftamenti Syntagma, quo continentur Olearii, Cocceii, &c. de hoc genere Libelli," &c. 1701, 4to.; "Arabarcha, feu, Ethnarcha Judæorum," 1702, 4to.; "De Statuis et Aris, falfis verifque Dei et Hominum Internunciis," in illuftration of Exod. xx. 23, 24, 1705, 4to.; "Obfervationum felectarum ad Loca Hebræa Nov. Teft. partes five Difput. Tres," 1705, 4to. &c. In 1706 he commenced the publication of a work, entitled "Rudimenta Grammaticæ Harmonicæ Linguarum Orientalium, Hebrææ, Chaldaicæ, Syriacæ, et Arabicæ," which he did not live to finifh.

RHENONES, among the ancient Germans, a kind of garment covering the fhoulders and breaft down to the middle. It was either entirely made of fkins, or covered over with them; the long hair of which being outward, proved a good defence againft rain.

RHENUS, in *Geography*. See RHINE.

RHEO-STATICS, is ufed by fome for the ftatics, or the fcience of the equilibrium of fluids.

RHERIGONEUS SINUS, in *Ancient Geography*. See RERIGONIAN *Bay*.

RHESAPHA, a town of Syria, in the Palmyrene, near Cholle. Ptol.

RHESCIPA, or RESCHIPHA, a town of Afia, in Mefopotamia, upon the banks of the Euphrates, between Bethauna and Agamana. Ptol.

RHESINA, a town of Afia, near Mefopotamia, on the river Aboras. Steph. Byz.

RHETICUS, GEORGE JOACHIM, in *Biography*, an excellent German aftronomer and mathematician in the 16th century, and a native of Feldkirk, the chief town of one of the weftern counties of the Tyrolefe, was born in the year 1514. Difcovering early an inclination towards the ftudy of the mathematics, he was initiated in the elements of that fcience at Zurich; whence he removed to the univerfity of Wittemberg: here he took the degree of mafter of philofophy in 1535, and two years afterwards he was made joint profeffor of the mathematics and aftronomy with the famous REINHOLD. (See his article.) While he was daily rifing into reputation by his lectures, he was informed of the hypothefis of Copernicus concerning the revolution of the heavenly bodies; which appeared to him to be fo reafonable, that he determined to refign his profefforfhip, and ftudy the doctrine under the inftructions of its author. Accordingly, in 1539, he left Wittemberg, and went into Pruffia, where he became a difciple of that great man. To the fyftem of Copernicus he foon became an entire convert; and he afterwards affifted his mafter for fome years in his aftronomical labours. In vain did he for a long time urge Copernicus, in common with the other friends of that aftronomer, to favour the world with his grand work, "De Revolutionibus Orbium Cœleftium." At length, the perfuafions of his friends having prevailed upon Copernicus to permit the appearance of his work, the care of editing it was confided to Rheticus, who caufed it to be printed at Nuremberg in 1543, in folio. He now began his very elaborate "Canon Doctrinæ Triangulorum," or canon of fines, tangents, and fecants, to fifteen places of figures, and to every ten feconds of the quadrant: a defign which he did not live to complete. The canon of fines, however, to the fame radius, for every ten feconds, and for every fingle fecond in the firft and laft degree of the quadrant computed by him, was publifhed at Francfort in 1613, folio. Upon the death of Copernicus, who lived only a few hours after he received a copy of his printed work, Rheticus returned to Wittemberg, and was again admitted to his poft of mathematical and aftronomical profeffor. For fome time after

after this he taught the mathematics at Leipsic; and he afterwards left Saxony a second time, and went into Poland. In the year 1576, upon the invitation of a Hungarian nobleman, he went to Cassavia in Hungary, where, in consequence of sleeping in a room recently plaistered, he caught a disorder on his lungs, which proved fatal to him in the 63d year of his age. He composed and published "Ephemerides," according to the doctrine of Copernicus, till the year 1551; "Orationes de Astronomia, Geometria, et Physica," &c.

RHETORIANS, Rhetorii, a sect, in the fourth century, in Egypt, so nominated from their leader Rhetorius.

His distinguishing doctrine, as represented by Philastrius, was, that he approved of all the heresies before him, and taught that they were all in the right. But what Philastrius mentions of him appears so absurd and ridiculous, that St. Augustine, Hæres. 7, could not persuade himself it was true.

RHETORIC, Rhetorica, formed from ῥητορικη, of ῥεω, *I speak*, whence ῥητωρ, *speaker*, *orator*, *&c.* the art of speaking copiously on any subject, with all the advantages of beauty and force.

Rhetoric is generally considered as the art of persuasion. It attempts to produce conviction concerning some particular object, that it may influence the will to a corresponding determination. It seeks either to arouse the mind to action, or to dissuade it from acting upon the resolutions already taken, or such as are in contemplation. Its immediate employment is not to search after truth, but to render acknowledged or supposed truths influential. It leaves to logic the province of cool investigation, and of drawing legitimate conclusions from admitted premises, without any regard to motives. The rhetorician is solicitous to effect some particular purpose, and calls in the art of reason merely as an auxiliary. He attempts to influence the will by reasoning with the affections; knowing that if they be gained over to the party espoused, the will is ready to follow. He, therefore, artfully conceals, or slightly passes over, every circumstance which is not favourable to his views, and brings forwards and largely expatiates upon those which are. He suggests motives of pleasure, utility, safety, honour, pity, &c. as the subject admits. He not only pre-supposes the object in view of the first importance, but he employs every method to implant this conviction in the minds of those whom he endeavours to persuade. These attempts become most successful by a close imitation of that train of ideas, and those modes of expression, which any particular passion or affection is prone to suggest. If the design be to excite *anger* and *resentment*, rhetoric imitates the language of anger. It places the supposed offence in the strongest point of view, and describes it in the most vivid colours. It assiduously collects and expatiates upon every circumstance which contributes to the aggravation of the crime. It is indignant against that spiritless tranquillity which can patiently endure such insults, and attributes reluctance to revenge to mean and cowardly motives. If its object be to excite *horror*, it assembles together every circumstance which has a tendency to alarm with a sense of danger. It stigmatises courage with the epithet of rashness, and flight is dignified with the title of prudence, &c. If *compassion* be the object, it expatiates upon the wretched state of the sufferer; his fears, his apprehensions, his penitence. It palliates his faults, extols his good qualities, and thus collects, in one point of view, all his claims on commiseration. The species of argument, which persons under the influence of passions and strong affections perpetually adopt, is rendered more efficacious by appropriate language. The rhetorician, therefore, studies and imitates the particular language of each passion, either in its energy, vivacity, or diffuseness. Hence he liberally employs all those tropes and figures of speech which nature suggests, and art has classified.

Oratory adds to rhetorical composition the advantages of *elocution*. It adapts the manner of delivery to the nature of the subject and the appropriate language. It takes the characteristic signs of each emotion for its model, as far as it dares to imitate, without the imputation of mimickry; it enters into the attitudes, gestures, tones of voice, accents, emphasis, expressions of countenance, inspired by the particular emotion, in such a manner, that not an idea is suffered to lose its proper effect, by any deficiency in kind or degree of energy communicated to it; and thus it enjoys every advantage to be derived from the power of sympathy.

Eloquence, according to the modern ideas of it, appears to be the medium between the impetuosity which oratory admits, and which was highly characteristic of ancient oratory, and the studied artifice of the professed rhetorician. The term is sometimes applied to *composition*, and sometimes to *delivery*. When applied to both, it comprehends a certain degree of elegance, both of diction and of manner. The want of that energy which approaches to violence, is compensated by pertinency of language, fluency of utterance, and guarded chastity of address. In a word, its excellency consists in a pleasing adaptation of language to the subject, and of manner to both. It refuses too close an imitation of the turbid emotions, but it delights in animated description. It seems rather partial to the pathetic; the elegance and graces which it loves, harmonize most easily and successfully with the softest and finest feelings of our nature. (Cogan on the Passions.) See Elocution, Eloquence, and Oratory.

Rhetoric, *Characters in*. See Character.

RHETORICAL Numbers. See Numbers.

Rhetorical *Accent*, among *Hebrew Grammarians*. See Accent.

RHETORICIAN. See Oratory.

RHEU, La, in *Geography*, a town of France, in the department of the Ille and Vilaine; five miles W.S.W. of Rennes.

RHEUM, in *Botany*, a name derived, as Linnæus supposes, from ῥεω, *to flow*, on account of its active medicinal properties. The Ῥηον, or Ῥα, of Dioscorides is probably of this genus, and the origin of the name.—Linn. Gen. 201. Schreb. 271. Willd. Sp. Pl. v. 2. 488. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 430. Juss. 82. Gærtn. t. 119. Lamarck Dict. v. 6. 192. Illustr. t. 324. (Rhabarbarum; Tournef. t. 18.) Rhubarb.—Class and order, *Enneandria Monogynia*. Nat. Ord. *Holeraceæ*, Linn. *Polygoneæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, narrowed at the base, withering, but permanent, cloven into six obtuse segments, alternately smaller. *Cor.* none, except the three inner segments of the calyx be considered such, as in *Rumex*. *Stam.* Filaments nine, capillary, equal in length with the calyx, and inserted into it; anthers twin, oblong, obtuse. *Pist.* Germen superior, short, triangular; styles scarcely any; stigmas three, reflexed, feathery. *Peric.* none. *Seed* solitary, large, triangular, acute, with membranaceous margins.

Eff. Ch. Calyx six-cleft, permanent. Seed one, triangular.

1. R. *Rhaponticum*. Rhapontic Rhubarb. Linn. Sp. Pl. 531. Alpin. Rhapont. 1. t. 1.—"Leaves obtuse, smooth;

ſmooth ; veins ſomewhat hairy beneath ; the ſinus dilated at the baſe : ſtalks furrowed on the upper ſide, rounded at the edge."—Native of Aſia, and cultivated, like all the other ſpecies (except *Leucorrhizum*), at Kew, where they moſtly flower in May and June.—*Root* large and thick, much divided, reddiſh-brown on the outſide, yellow within. *Stems* from two to three feet high, jointed, purple. *Leaves* not expanded at firſt, but folded, ſmooth, roundiſh heart-ſhaped, on thick, reddiſh, channelled ſtalks, which have an acid flavour, and are uſed for making tarts. *Flowers* white, forming a thick, obtuſe, denſe tuft, which becomes a panicle of large, triangular, brown *ſeeds*.

2. R. *undulatum*. Waved-leaved or Chineſe Rhubarb. Linn. Sp. Pl. 531. Amœn. Acad. v. 3. 230. t. 4.—"Leaves rather hairy, undulated ; the ſinus dilated at the baſe : ſtalks flat above, ſharp at the edges."—Native of China and Siberia.—*Root* compoſed of numerous thick fibres, running further into the ground, and of a deeper yellow than the foregoing. *Stem* upright, three or four feet in height, of a pale browniſh colour. *Leaves* ſomewhat tapering, much waved at their edges, ſtrongly veined beneath. *Flowers* white, in looſe panicles or bunches. *Seeds* of a ruſty brown.

3. R. *palmatum*. Officinal or Turkey Rhubarb. Linn. Sp. Pl. 531. Mill. Illuſtr. t. 30. Woodv. Med. Bot. 127. t. 46.—"Leaves palmate, pointed, roughiſh ; the ſinus dilated at the baſe : ſtalks obſoletely furrowed above, rounded at the edge."—Native of China and Tartary.—*Root* perennial, thick, oval, ſending forth numerous tapering branches, externally brown, internally yellow. *Stem* erect, ſix or eight feet high, round, hollow, jointed, ſheathed, ſlightly furrowed, branched towards the top. *Radical-leaves* numerous, large, rough, roundiſh, deeply lobed ; *ſtem-leaves* one at each joint, from a membranous ſheath, ſmaller upwards. *Flowers* of a greeniſh-white colour, ſurrounding the branches in numerous cluſters, forming a kind of ſpike.

The roots of this and the laſt ſpecies conſtitute the drugs which in our ſhops are known by the names of Chineſe and Turkey Rhubarb, although other ſpecies of *Rheum*, eſpecially *compactum*, poſſeſs like medicinal properties, and their roots are of courſe ſometimes ſubſtituted for the true ones. Profeſſor Martyn and Dr. Woodville have taken great pains to illuſtrate this genus, ſo juſtly celebrated for its purgative qualities. Dr. Pulteney remarks, that if *R. undulatum* and *R. palmatum* are planted near each other, they produce a hybrid variety, more excellent in kind than the parent plants.

4. R. *compactum*. Thick-leaved Rhubarb. Linn. Sp. Pl. 531. Mill. Ic. v. 2. 145. t. 218.—Leaves ſomewhat lobed, very obtuſe, lucid, ſharply toothed, quite ſmooth.—Native of Tartary.—*Roots* large, much divided, yellow within. *Stems* five or ſix feet high, green, branched at the upper part. *Leaves* long, broad at the baſe, coriaceous and compact, rather waved, and having a ſharp acid flavour. *Flowers* white, forming an erect panicle or ſpike. This is frequently ſubſtituted for the real rhubarb.

5. R. *tartaricum*. Tartarian Rhubarb. Linn. Suppl. 229. Willd. n. 5.—Leaves ovate, heart-ſhaped, undivided, flat, ſmooth, on roundiſh, angulated ſtalks. Panicle furrowed.—Native of Leſſer Tartary. We know of neither ſpecimen nor figure of this ſpecies. Linnæus deſcribed it from the Upſal garden as having large *leaves*, the radical ones procumbent, with dilated veins, on red ſtalks, which are convex beneath. *Infloreſcence* ſcarcely higher than the leaves.

6. R. *Ribes*. Warted-leaved Rhubarb. Linn. Sp. Pl. 532. Desfont. in Ann. du Muſ. v. 2. 261. t. 49. (Lapathum orientale, aſpero et verrucoſo folio, Ribes Arabibus dictum ; Dill. Elth. v. 1. 191. t. 158. f. 192.)—Leaves very obtuſe, verrucoſe, with ſpinous veins beneath ; ſtalks flat above, rounded at the margin.—Native of the Levant ; on mount Libanus, and other mountainous parts of Syria.—*Root* thick and fleſhy. *Stems* two feet high, hairy, green, tinged with purple towards the bottom. *Leaves* large, curled at the edges, veined, of a purpliſh-green colour, paler beneath, ſtudded with warts. Linnæus, who had never ſeen the flower, referred this plant to *Rheum* from its habit.

7. R. *hybridum*. Baſtard Rhubarb. Willd. n. 7. Murray in Comment. Gott. 1779, 7. t. 1.—Leaves ſmooth above, rather hairy beneath, ſlightly lobed, acute ; the ſinus narrowed at the baſe ; ſtalks obſcurely furrowed above, rounded at the margin.—Native of the north of Aſia.—Very ſimilar in habit and appearance to *R. palmatum*, and we are much diſpoſed to conſider it, with profeſſor Murray, as a hybrid plant produced between that and ſome other ſpecies. The *leaves* of this are not ſo much nor ſo deeply cut as thoſe of *palmatum*.

8. R. *leucorrhizum*. White-rooted Rhubarb. Willd. n. 8. Pallas Nov. Act. Petrop. 1792, 381.—Leaves tranſverſely oval, depreſſed. Panicle divaricated when in ſeed. Two ſegments of the calyx many times larger than the reſt.—Native of deſart places, on the mountains of Siberia.—Adopted by Willdenow, on the authority of Pallas, who deſcribes it thus. "*Radical-leaves* uſually three, procumbent, four or five inches wide, three-nerved, much veined, ſmooth, coriaceous, lengthened out at the baſe ; rough at the edges, with very minute, cartilaginous, acute crowded teeth. *Stalks* compreſſed, ſmooth, ſolid, ſucculent. *Flowering-ſtem* a ſpan high, furrowed, panicled."

Rheum, in *Gardening*, contains plants of the herbaceous, perennial, luxuriant kind, of which the ſpecies chiefly cultivated are ; the rhapontic or common rhubarb (R. rhaponticum) ; the palmated-leaved (R. palmatum) ; the compact thick-leaved rhubarb (R. compactum) ; the waved-leaved Chineſe rhubarb (R. undulatum) ; the warted-leaved Perſian rhubarb (R. ribes) ; and the Tartarian or heart-leaved rhubarb (R. tartaricum.)

It is ſtated, on the authority of ſeveral cultivators of the firſt ſpecies of this plant, by the editor of Miller's Dictionary, that by proper attention in the growth and preparation of the root, it may be obtained here nearly in equal goodneſs to the foreign.

Method of Culture.—Theſe plants are all increaſed by ſeeds, which ſhould be ſown in autumn ſoon after they are ripe, where the plants are deſigned to remain, as their roots being large and fleſhy when they are removed, they do not recover it ſoon ; nor do the roots of ſuch removed plants ever grow ſo large and fair as thoſe which remain where they were ſown. When the plants appear in the ſpring the ground ſhould be well hoed over, to cut up the weeds ; and where they are too cloſe, ſome ſhould be cut up, leaving them at the firſt hoeing ſix or eight inches aſunder ; but at the ſecond, they may be ſeparated to a foot and a half diſtance, and more. When any weeds appear, the ground ſhould be ſcuffled over with a Dutch hoe in dry weather ; but after the plants cover the ground with their broad leaves, they keep down the weeds without any further trouble. The ground ſhould be cleaned in autumn when the leaves decay, and in the ſpring, before the plants begin to put up their new leaves, be dug well between them. In the ſecond year, many of the ſtrongeſt plants will produce flowers and ſeeds, and in the third year moſt of them. It is adviſed, that the ſeeds be carefully gathered when ripe, and not permitted to fcatter, left they grow and injure the old plants.

The roots continue many years without decaying, and it is faid that the old roots of the true rhubarb are much preferable to the young ones. The roots may be generally taken up after four years, but if they remain longer, it is fo much the better.

Thefe plants delight in a rich foil, which is not too dry nor over moift: and where there is a depth in fuch land for their roots to run down, they attain a great fize, both in the leaves and roots.

Some cultivators think that the fowing is beft performed in the later fpring months; but in this way, as the feeds are flow in vegetating, there is much time loft. And a hot-bed has been fometimes employed, though it is not much advifed.

The rhubarb plants may be alfo increafed from offsets, feparating fome of the eyes or buds which fhoot out on the upper parts of the root, together with a fmall part of the root itfelf, having fome of the fibres to it. Thefe offsets may be taken from roots of three or four years old, without any injury to the plant. By this method a year is faved, and the plants are not in fuch danger of being devoured by vermin as thefe from feed, nor fo uncertain in growing; they are not fo tender, and only require keeping clear of weeds. There is no difference in the fize of the roots thus raifed, from thofe which grow from feeds. This method was practifed by Mr. Hays, and in Mr. Hayward's practice feveral offsets were flipped from the heads of large plants in the fpring, and fet with a dibble about a foot apart. Four years after, he took up the roots, and found them very large, and of excellent quality. On further experience, when he took up his roots, either in fpring or autumn, he divided the head into many parts; thefe he planted directly, at two feet diftance, if intended for future removal; but if to remain for a crop, at four feet and a half.

And in the culture of this root for medicinal ufes, the nature of the afpect is faid not to be very material, provided it be not fhaded too much on the fouth or weft. The indifpenfable points are the depth and good quality of the foil, which fhould be light, loamy, and rich, but not too much fo, left the roots be too fibrous: it can fcarcely be too dry, for more evil is to be expected from a fuperabundancy of moifture than from any actual want of it. If, with thefe advantages, the plantation can be placed on a gentle declivity, fuch a fituation may be faid to be the moft defirable. Where a plantation does not poffefs the natural advantage of being on a declivity, narrower beds and deepened trenches are among the artificial means that fhould be adopted; but moft fituations will require fome care to prevent the ill effects of water remaining on the crowns of the plants: therefore, when the feed-ftalks are cut off, which ought always to be done immediately upon the withering of the radical leaves, they fhould be covered with mould, in form of a hillock. This procefs will anfwer two good purpofes; that of throwing off the rain, and keeping open the trenches by taking the earth from them. And it is obferved, that the injuries to which the young plants are moft liable, are from flugs and other vermin, from inattention to the feafon and manner of planting, and from too great an expofure to froft. Little damage is to be feared from heat; and, in general, they are hardy and eafy of cultivation when arrived beyond a certain term. It is advifed to take great care of the nurfery bed, as the pains beftowed by conftant waterings, and protecting the young plants from the ravages of infects, will amply repay the planter. Roots that thrive well here, will in three years arrive at an equal fize with others, that have not fucceeded fo well at the end of five. When a plantation is to be formed, or a vacancy filled up, felect the fineft and moft thrifty plants. No plant will come to any thing when it has loft its principal bud.

It is alfo obferved, that there is a difference of opinion in refpect to the age at which the roots ought to be taken up for ufe; but it is probably beft done from four to eight years. They are the beft when taken up in autumn, in a dry time, and fhould be immediately dried and prepared by cutting into pieces and cleaning, hanging them on proper ftrings in a dry airy place.

And fome plants of each of the forts may alfo be introduced in the dry borders and clumps, for the ornamental effect of the leaves and flowers.

RHEUM, in *Medicine*, ῥευμα, *defluction*, a term which was in common ufe in the vocabulary of the humoral pathologifts, to denote the fluid difcharged from a part, as of mucus in coryza and catarrh, and alfo a fuppofed accumulation or congeftion of fluid in a part. In their doctrine, every inflammation and tumour was afcribed to a defluction of fome humour in the part affected; but modern obfervation has taught us, that the accumulation of fluid, in thefe cafes, is generally the effect, and not the caufe, of the difeafe; being the confequence of inflammatory action of the veffels, which produces an increafed difcharge and an altered condition of their fecreted fluids. Although the term and the doctrine are both exploded, they have left a popular appellation attached to a difeafe, which is univerfally called *rheumatifm*.

RHEUMATISM, from the preceding word, a painful difeafe ufually affecting the joints, and fometimes the mufcles. The appellation feems to have been firft limited to this diforder by a celebrated French writer, Baillou, or, as he calls himfelf in Latin, Ballonius; and has fince been adopted both by the erudite and the vulgar.

Rheumatifm affumes two or three forms, remarkably different from each other, independently of the varieties which difference of feat occafions; a difference, indeed, which is rather nominal than real. Of the latter diftinctions, we have *lumbago*, when the difeafe is feated in the loins (*lumbi*); *ifchias*, or *fciatica*, when it occurs in the hip; and *pleurodyne*, when it attacks the fides, which are lined with the membrane called *pleura*, &c. The more remarkable fpecies of the difeafe, however, to which we have alluded, are the *acute* and *chronic* forms which it exhibits. There is alfo a third form, partaking more of the acute than of the chronic fpecies, which has been called, with fome impropriety, *rheumatic gout*, or *arthritis rheumatica*. It will be neceffary to fpeak of the acute and chronic rheumatifm, as well as of the rheumatic gout, feparately; fince the treatment, which they refpectively require, is confiderably different.

RHEUMATISM, *Acute*, otherwife called *rheumatic fever*, begins, like moft other febrile difeafes, with fits of chillinefs, which are fucceeded by increafed heat, frequent pulfe, thirft, lofs of appetite, and proftration of ftrength. Not unfrequently, however, the peculiar fymptoms appear before any febrile fymptom is obferved; namely, pain and inflammation in the joints. The pain fometimes affects the joints alone, but often it affects alfo the mufcular parts, fhooting along the courfe of the mufcles from one joint to another; and it is always increafed by the action of the mufcles, that is, by any attempt to move the joints that are difeafed. Its ufual feat is in the larger joints, fuch as the hips, knees, fhoulders, and elbows: the ankles and wrifts are alfo frequently attacked; but the fmaller joints, fuch as thofe of the toes and fingers, fuffer confiderably lefs. Two, three, or more of thefe joints are commonly affected at the fame time:

time; but the pain is conftantly fhifting its place, leaving fome joint and going to another, and frequently returning again to each of them feveral times during the courfe of the difeafe; and in this manner the difeafe is often protracted for a confiderable length of time. Soon after, and fometimes at the fame moment with the commencement of the pain, the joint feized becomes fwelled and fomewhat red; and this fwelling is extremely painful to the touch. The pain is fometimes relieved by the occurrence of fwelling, but not always; neither is the joint thus rendered more fecure from a return of the attack. The patient, thus unable to move the joints affected, which are irritated and acutely pained by external contact, fometimes even by the weight of the bed-clothes, and in a ftate of fevere internal pain, unable to find any pofition of eafe, lies fleeplefs and reftlefs for feveral days and nights together. The fever accompanying the difeafe is moft confiderable during the night, at which time the pains alfo are moft violent. The pulfe is commonly from ninety to a hundred in a minute, and occafionally more frequent; often full, and fometimes hard and fharp, but moft frequently foft. The heat of the fkin is confiderable, and the difeafe is commonly attended with fweating, even from an early period, which is often profufe and conftant, but never either relieves the pains permanently, or proves a crifis to the fever. The urine, in acute rheumatifm, is remarkably high-coloured from the beginning, and afterwards depofits moft copioufly a brownifh-red fediment, like brick-duft. This fediment, however, is probably the refult rather of the profufe fweating, than of any peculiarity belonging to the difeafe; fince it is commonly feen after a dofe of fudorific medicine, or any other variety of perfpiration. Like the fweating, it does not occafion or betoken any favourable change in the fever. When blood is drawn in this difeafe, it always exhibits, and generally in a high degree, the buffy coat, as it is called, or a coriaceous covering of coagulable lymph, on its furface.

With the fymptoms above detailed, the rheumatic fever often continues for feveral weeks: it feldom, however, proves fatal, and perhaps never, while the joints alone are the feat of the difeafe; the fever, indeed, ufually becomes lefs violent after two or three weeks, and the pains lefs fevere, and lefs difpofed to change their place. But occafionally the inflammation of the joints has difappeared, and fome vital organ, as the brain, lungs, or ftomach, has been feized with inflammation, by which the patient has been carried off; or thefe organs have become fimultaneoufly affected, and the fame fatal event has enfued. We have had occafion to witnefs two inftances of this kind, out of feveral hundreds of cafes, in which a tranfition of the difeafe from the joints to the lungs took place, or, at leaft, in which, on the fpeedy ceffation of rheumatifm in the joints, a violent inflammation of the lungs fupervened, and terminated fatally. We have alfo feen fuch a metaftafis to the lungs, which was removed by vigorous treatment. The venerable Dr. Haygarth, however, has given a more unfavourable ftatement of this matter from his experience; for "out of 170 cafes," (fpeaking of acute rheumatifm,) he fays, "I have found twelve which had a fatal termination, either by a tranflation of the inflammation to the brain, lungs, kidnies, ftomach, or fome other vital part, or as being found in combination with other difeafes." (See Clinical Hift. of Acute Rheumatifm, p. 61.) Dr. Cullen has not mentioned any fuch refult of the difeafe. From the obfervations of our contemporaries, it has been found that the heart is peculiarly liable to be affected by a metaftafis of rheumatic inflammation, or to be attacked with a flow difeafe, by which its bulk becomes increafed, and its functions difturbed, after the ceffation of acute rheumatifm. This fact was firft mentioned by Dr. Baillie, on the authority of the late Dr. Pitcairn, and has fince been more fully eftablifhed by the records of feveral cafes. See efpecially a paper by Mr. ferjeant-furgeon Dundas, in the firft volume of the Medico-Chirurgical Tranfactions; alfo Dr. Baillie's Morbid Anatomy.

It has been remarked by Dr. Cullen, as indicative of the peculiar nature of rheumatic inflammation, that "the acute rheumatifm, though it has fo much of the nature of the other phlegmafiæ, differs from all thofe hitherto mentioned in this, that *it is not apt to terminate in fuppuration.* This almoft never happens in rheumatifm; but the difeafe fometimes produces effufions of a *tranfparent gelatinous fluid* into the fheaths of the tendons. If we may be allowed to fuppofe that fuch effufions are frequent, it muft alfo happen that the effufed fluid is commonly re-abforbed; for it has feldom happened, and never indeed to my obfervation, that confiderable or permanent tumours have been produced, or fuch as required to be opened, and to have the contained fluid evacuated. Such tumours, however, have occurred to others, and the opening made in them has produced ulcers difficult to heal." (See Cullen, Firft Lines, par. 448.) The non-occurrence of fuppuration in thefe violent rheumatic inflammations is of itfelf a ftriking characteriftic of the difeafe; and the circumftance, that it is not productive, on the other hand, of what are called *chalk-ftones*, or of that cretaceous-like fecretion which is the refult of the inflammation of gout, diftinguifhes it from the latter malady. In addition to this circumftance, however, there are other points of diftinction between the *gouty* and *rheumatic* inflammation; namely, that the latter ufually attacks the large joints; that it is not preceded by fymptoms of indigeftion; that it does not recur in regular paroxyfms; and that it attacks younger people, and thofe not liable to gout from their modes of life; and, as we fhall fee immediately, is ufually the effect of a fpecific caufe, cold.

Caufes of Acute Rheumatifm.—The circumftances which conftitute a predifpofition to the attacks of acute rheumatifm are various. Perfons of an irritable, plethoric, or fanguineous habit, are moft liable to be affected, when expofed to the action of the exciting caufes; and a certain period of life, in which there is a confiderable vigour in the fanguiferous fyftem, alfo predifpofes to it. It affects, indeed, perfons of all ages, from five to above fixty years; but is much the moft frequent between the time of puberty and the thirtieth year. Dr. Haygarth confiders it as moft common between fifteen and twenty. Some difference has been fuppofed to exift with refpect to *fex;* fince it is certain that males are much more fubject to the difeafe, in this country, than females; Dr. Haygarth fays, in the proportion of nearly four to three. But it is probable, as the fame writer fuggefts, that this arifes from the more conftant expofure of men to cold and rain, by the nature of their occupations, than women; whence, he was informed, that, in Holland, the rheumatifm is feldom found in women, though the air is very humid, becaufe they are more domefticated than in this country, and their drefs is warmer. Preceding attacks of the difeafe feem to afford a ftrong predifpofition to future recurrences of it.

When thefe predifpofitions exift, the acute rheumatifm is readily excited by the fudden application of cold or damp, when the body has been already much heated, and is perfpiring after fatigue; or when one part of the body is expofed to cold, while the other parts are kept warm; or, laftly, by any long continued application of cold and moifture, under any circumftances, as by wearing wet or damp

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clothes. Whence the disease is almost exclusively observed in cold and changeable climates; and is most frequent in the most variable seasons, as in the spring and autumn, very seldom occurring during the steady heat of summer.

Cure of Acute Rheumatism.—With respect to the treatment, which is most successful in the removal of this distressing and painful malady, considerable difference of opinion, and some fluctuations of opinion, have taken place among professional men. The acute pain, the great heat, the quickness and fulness of the pulse, and the buffy or inflammatory appearance of the blood, when drawn, have led the majority to look upon it as a highly inflammatory disease, and to be cured almost exclusively (like the other organic inflammations) by copious *blood-letting*. Boerhaave maintained this doctrine; and Cullen followed him to the full extent. "The blood ought to be drawn in *large quantity*," says the latter, "and the bleeding is to be *repeated* in proportion to the frequency, fulness, and hardness of the pulse, and to the violence of the pain. For the most part, *large and repeated* bleedings, during the first days of the disease, seem to be necessary, and accordingly have been very much employed; but to this some bounds are to be set: for very profuse bleedings occasion a slow recovery, and, if not absolutely effectual, are ready to produce a chronic rheumatism." (First Lines, parag. 463. See Boerhaave, app. 1493.) The Cullenian doctrine is, we believe, even now taught in the school of Edinburgh, with scarcely any of the cautionary bounds mentioned by that sagacious practitioner. Sir John Pringle trusted much to the same practice. Sydenham began his career by ordering four bleedings for the cure of rheumatism; but he appears to have gradually declined in his attachment to that practice, and says, that he found it better to purge after the second bleeding. And again, in the last piece which he ever wrote, he says, "If we obstinately persist in these evacuations, till the symptoms entirely go off, the disease will often terminate fatally." (Sched. Monitor.) He also says, in his Processus Integri, which he composed for the use of his son, that in young persons, who live temperately, "the rheumatism may be as successfully cured by a very cooling and moderately nourishing diet, as by repeated bleedings, which they cannot so well bear." Van Swieten, who has traced out this progress of Sydenham's experience, admits that he has cured many cases of acute rheumatism without bleeding, if they were mild in the beginning.

Now this has been the progress of the general experience in our own times; and at present, few English physicians deem blood-letting the leading remedy for acute rheumatism. On the contrary, the most experienced have fully decided, that, in the great majority of cases, evacuation is entirely unnecessary; and that, if it is frequently repeated, it does a material injury, by sinking the patient into a long and tedious chronic disease, as Dr. Cullen stated, from which there is sometimes no recovery; and always occasions a lingering convalescence. Perhaps the only cases in which it is requisite are in persons of highly vigorous and inflammatory habits, in whom a single bleeding may diminish that diathesis; and in those cases in which metastasis threatens, or actually takes place. Where this translation has indeed already occurred to any vital organ, as the lungs or brain, then the most vigorous venesection must be resorted to, as for the most dangerous forms of pleurisy or phrenitis.

But, we repeat it, experience has legitimately proved, that blood-letting may be superseded altogether, in a great majority of cases of acute rheumatism, by other remedies. These other remedies, to which different practitioners have resorted, have been chiefly *purgatives*, *sudorifics*, *opiates*, and the Peruvian *bark*, of each of which it will be necessary to take some notice; for they are all useful under certain conditions of the patient and the disease, and constitute the principal means of cure.

Purgatives, as they contribute, if properly selected, to reduce every species of febrile excitement, though they are alone incapable of effectually relieving this disease, are yet essentially beneficial as a part of the plan of cure. The saline purgatives, such as the sulphate of magnésia, are the best adapted to relieve the bowels and the system at large; or they may be assisted by moderate doses of calomel, which perhaps more effectually empties the upper bowels. They become also more particularly necessary, when the narcotic medicines, to be mentioned presently, are administered, with a view to obviate the constipation which the latter produce. But no practitioner would confide in cathartics alone for the cure of acute rheumatism.

With respect to *sudorifics*, there is a more general tendency to trust the cure to them; partly because the pains are often said to be easier, while perspiration is present; and partly with the view of assisting the apparent efforts of the constitution. It may be remarked, however, that although the most profuse sweats very frequently break out spontaneously, they seldom afford any essential relief; and they will continue day after day, without any apparent influence upon the disease. Accordingly, much direct benefit could not in reality be expected to arise from augmenting a discharge, already very profuse, and of considerable duration; and, in truth, we believe mere sweating is productive of no benefit. But the medicines given as sudorifics, especially antimonials and Dover's powder, operate beneficially perhaps by their other qualities. Thus the antimonials, and the ipecacuanha, and salt of this powder, are kindly and gentle laxatives, and thus produce an antiphlogistic effect as evacuants; but the principal operation of the powder of Dr. Dover is probably the result of the opium which it contains.

For *opiates* alone, that is, uncombined with antimony or ipecacuanha, have been relied upon by some practitioners, and with the most marked success. As opium, and other substances, possessing a similar narcotic power, have been known from ancient times to be highly stimulant, that is, to cause an increased activity and vigour in the circulation and nervous system, and therefore to be highly injurious in active inflammations; so all those physicians, who advocated venesection, shunned the use of opiates religiously: and even those, who found by experience that blood-letting was not required, questioned nevertheless the impunity with which opiates might be administered. Experience, however, has now fully determined this point also; that opium may be administered largely, not only with safety, but with most essential benefit, in the most severe cases of acute rheumatism. As far as our own observation has gone, indeed, (and we have had occasion to treat some hundreds of persons affected with this malady,) the combination of repeated doses of opium, with a daily saline laxative, with copious thin diluent drinks, and a light diet, in the beginning of the disease, constitutes the most successful management of the disease; a practice which, it is but justice to say, was introduced into St. George's hospital, many years ago, by the present senior physician, Dr. George Pearson. From half a grain to a grain, or more, of solid opium may be given three times a day, in the combination just mentioned, without affecting the head or the stomach, with great, speedy, and often permanent relief to the disease, and without leaving the tendency to a slow convalescence, or a chronic malady, like the violent depletory system.

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In favour of the treatment of this apparently acute inflammation by the ftill more oppofite means of a powerful tonic, the *cinchona*, or *Peruvian bark*, the recorded teftimony is ftill more confiderable. Dr. Cullen affirmed of the bark, that he had "feldom found it ufeful, and in fome cafes hurtful," when employed before the phlogiftic diathefis was abated, and fomething like remiffions occurred in the fever. Other practitioners, however, have confidered thefe previous changes unneceffary, except in a very partial degree, and contend, that the early ufe of the bark is the moft efficacious mode of curing acute rheumatifm. Dr. Haygarth is one of the moft ftrenuous advocates for this practice; indeed, a conviction of its advantages is the avowed motive for the publication of his "Clinical Hiftory" of the difeafe, to which we have already referred. He was led to the adoption of the remedy early, on the recommendation of the celebrated Dr. Fothergill, who received it from fir Edward Hulfe. Dr. Haygarth has recorded eighty-four cafes in which the cinchona was adminiftered, in general, very early in the difeafe, after a moderate evacuation of the ftomach and bowels, principally by means of antimonial medicines. On fome occafions, however, Dr. Haygarth alfo preceded the ufe of this remedy by a bleeding, where the fymptoms were very violent.

On the whole, the inference which we are difpofed to draw from thefe authorities, aided by perfonal obfervation, is, that the moft fuccefsful practice confifts in a free purgative evacuation, and an occafional bleeding in particular habits, in the very onfet of the difeafe, followed immediately by the free ufe of opiates, with copious drinks and faline laxatives, and this fucceeded, without delay, when the pains and tumours have fomewhat remitted, by a refort to the decoction of cinchona, or fome gentle tonic.

All external applications to the parts which are fwelled and painful, in acute rheumatifm, are of little or no fervice. The warm bath and fomentations, efpecially in the beginning of the difeafe, rather aggravate than relieve the pains. Bliftering, or the minor degree of fuperficial inflammation produced by rubefacients, if they diminifh the pain in one part, generally only occafion it to fhift to another, and do little towards the cure of the general affection. The fame obfervation is applicable to refrigerant remedies, fuch as to wafhing with cold water or other lotions the tumid joints; the difeafe but changes its ftation, without any tendency to ceafe altogether; and the change of fituation, though it is commonly from joint to joint, may neverthelefs occafionally take place from the joints to a more important organ.

Rheumatism, *Chronic.* In many inftances, this form of rheumatifm is the direct confequence of an attack of the acute form of the difeafe. The febrile fymptoms, the fwelling, and particularly the rednefs of the joints, have difappeared, and the general functions have refumed their healthy condition; but ftill certain joints continue to be affected with pains and ftiffnefs, which are particularly felt on motion, and are often accompanied by a fpontaneous coldnefs, and a torpor, fometimes almoft amounting to paralytic. Thefe affections are much influenced by the changes in the temperature and humidity of the atmofphere, and are diftinctly aggravated by external cold, and relieved by external warmth. The parts affected are not eafily made to perfpire, and when the other parts of the body are brought into a ftate of free and warm perfpiration, that on the pained joints is only cold and clammy. The pains are alfo, like thofe of acute rheumatifm, moft fevere in the night.

This chronic affection of the joints, however, is very often altogether independent of any previous inflammation and fwelling, and occurs in many perfons who have never been fubject to an attack of acute rheumatifm. It occurs, indeed, very frequently in perfons fomewhat advanced in life, and beyond the period when the acute form of the malady is ufually feen. In thefe cafes it is commonly afcribed to the action of cold; very often to partial expofures of the particular parts of the body in which it takes its feat; and it is apt to be produced again and again in thofe parts which have once fuffered from expofure of other parts of the body to cold. Thus, getting the feet wet will induce an attack of lumbago, fciatica, or a crick in the neck, according to the predifpofition induced in thefe refpective regions by former attacks. Many cafes of chronic rheumatifm are afcribed, however, to violent ftrains of the mufcles of particular parts, occurring on fudden and fomewhat violent exertions, and even to fatigue from long continued exertions of particular mufcles.

As the exact nature of the affection called chronic rheumatifm is not very clearly underftood, fo the method of cure, which is ufually purfued, is fomewhat empirical; *i. e.* the mere refult of the obfervation of the effects of different medicines which have been tried. Dr. Cullen, indeed, attempted to explain the nature of the difeafe, by faying, that it confifted in "an atony both of the blood-veffels and of the mufcular fibres of the part affected, together with a degree of rigidity and contraction in the latter, fuch as frequently attend them in a ftate of atony;" and therefore concluded, that fuch remedies were required, as were fuited "to reftore the activity and vigour of the vital principle in the part." The explanation of Dr. Bardfley, however, though not very different, is perhaps more confonant to the general opinion upon this fubject. He confiders the principle of cure as fimple and uniform; namely, that "it confifts in removing paffive inflammation, and reftoring the debilitated veffels and mufcular fibres to their due tone and action." (See Dr. Bardfley's Medical Reports, p. 4.) The remedies by which thefe objects are attained, may be included under two heads, internal and external.

The *internal* remedies which have been recommended for the cure of chronic rheumatifm, though very numerous, have, on the whole, been found to poffefs a very uncertain power over the fymptoms of that difeafe; and many which have been highly extolled, have been given up in total difappointment. Neverthelefs, in many inftances, thefe remedies are effentially beneficial, fometimes curing the difeafe alone, and generally aiding the operation of external applications. They may be defcribed under the denomination of fudorifics and ftimulants, or ftimulant-diaphoretics, to which may be added mercurials, and fome individual articles of peculiar operation.

Thefe fudorifics appear to poffefs very little remedial power over the chronic rheumatifm, and the lefs in proportion as the difeafe partakes lefs of the fwelling and inflammation of the acute fpecies, or as it is of longer ftanding. In the majority of cafes they are even worfe than ufelefs. Dr. Bardfley fays, "in fhort, I can fpeak decidedly of the injurious effects of fudorifics, when pufhed to any great extent, in every inftance of fevere local affection of the joints; and alfo in moft other cafes, where the difeafe has been long continued, and the patient's conftitution much debilitated. In chronic lumbago and fciatica, I have never experienced any lafting benefit to refult from this mode of practice." Dr. Bardfley, indeed, fpeaks very lightly of the effects of all the internal remedies, not only of this, but of the ftimulant

lant clafs. He admits that fmall dofes of antimonial powder, combined with calomel and opium, are certainly ufeful in allaying pain and irritation; but he believes that their efficacy confifts rather in palliating fymptoms, than in curing the difeafe, when it is confiderable in degree and obftinate in kind. "The fame obfervation," he fays, "will nearly apply to the ufe of ftimulant remedies, fuch as refin of guaiacum, the clafs of terebinthinates, and of effential oils. In the moft aggravated inftances of general chronic rheumatifm, where great torpor and debility prevailed, guaiacum, in fuch large dofes as the ftomach and bowels would bear, was found to be a powerful auxiliary; and certainly the moft generally efficacious of all the internal remedies that were employed. But I have feen no inftance of its complete fuccefs, when unaided by topical applications, in any fpecies of the difeafe where much local injury of the joints had taken place. It acted moft beneficially when exhibited in fubftance, well triturated with mucilage; to which was occafionally added gum kino, or tincture of opium, to prevent its effects on the bowels. In many obftinate cafes, the ammoniated tincture of guaiacum, incorporated with mucilage, and joined to a ftrong decoction of bark, proved of great fervice, where the conftitution was broken down by the violence and length of the difeafe. There were but few protracted cafes in which the Peruvian bark was not prefcribed with advantage as a tonic, efpecially at the clofe of the difeafe. It was, however, never adminiftered with any other defign than as an auxiliary." (Loc. cit. p. 16.) We have quoted this paragraph, as containing the refult of the deductions from a large number of cafes, treated in a public hofpital, by a careful and intelligent obferver; and, therefore, as affording a probable approximation to the general fact of the operation of thefe medicines. The fame obfervations, we believe, are applicable to fome of the other remedies, of a ftimulant and diaphoretic quality, which are often reforted to; fuch as the preparations of ammonia, infufion of horfe-radifh, decoctions of mezereon and rhododendron, muftard-feed, and all the terebinthinate fubftances and hot gums. The oil of turpentine itfelf has been much employed, and perhaps conftitutes a part of the celebrated noftrum called the effence of muftard; but our experience of its effects accords with that of Dr. Bardfley, who fays, that, in every form, turpentine was found to be an ungrateful medicine to the ftomach; often impairing the appetite, and not producing, when even duly perfifted in, effects as falutary as the guaiacum and other remedies already mentioned. Neverthelefs, we muft remark, that in different individual inftances, one of thefe remedies will fometimes fucceed when the others have failed, and that therefore none of them fhould be excluded from the catalogue of ufeful expedients.

Some other fubftances have been employed, with occafional fuccefs, in the cure of different cafes of chronic rheumatifm, which do not appear to poffefs any quality in common, and the operation of which, therefore, cannot be fatisfactorily explained. Among thefe we may mention *fulphur*, which has long poffeffed a fort of popular reputation for the cure of lumbago, and fome other varieties of the difeafe. Taken nightly in a confiderable dofe, fo as to act gently upon the bowels, it has fucceeded, in fome inftances, in affording a very fpeedy and marked alleviation of the fymptoms; but, on the other hand, it has very often failed to produce any effect whatever; and under what circumftances thefe refpective variations in its operation occur, we have not been able to afcertain. Another remedy has enjoyed a very high reputation in fome parts of the country, efpecially in Lancafhire; we mean the *cod-liver oil*, or *ling-liver oil;* for it appears that the oil obtained from the liver of either of thefe fifh is equally efficacious. Of this remedy many teftimonies might be adduced in proof of its occafional efficacy in the moft unyielding cafes of chronic rheumatifm. From long and repeated experience, Dr. Bardfley affirms that he is enabled to fpeak of it as a medicine of confiderable but limited powers: in fome inftances, where every other means had proved unfuccefsful, it has operated in a manner fo decidedly beneficial, as to excite aftonifhment; but, on the other hand, he found it to fail often in the more mild and common rheumatic affections. He believes it to be moft beneficial in the chronic rheumatifm of perfons advanced in age, which is accompanied with extreme rigidity of the mufcles, and inflexibility of the joints, in confequence of much expofure to cold and moifture, with hard fare and much fatigue. It was commonly taken in warm table-beer by the hofpital patients, in dofes of half an ounce, or from that to an ounce and a half twice or thrice a day, according to its effects, or to its agreement with the patient's ftomach. Its operation is various, fometimes upon the kidnies, and fometimes upon the bowels; and occafionally it produced an eruption on the fkin: but thefe effects occurred only at the firft taking; for after a fhort continuance, it ceafed to produce any fenfible operation. When it produced relief, this was obvious by the end of a fortnight, and continued flowly to increafe; and in thefe cafes the patients generally began to increafe at the fame time in bulk and fatnefs. Neverthelefs, the objections to the general ufe of this medicine, from its extremely naufeous fmell and tafte, which render it abfolutely intolerable to many ftomachs, however difguifed, and the admiffion of Dr. Bardfley, that it is only to be deemed an auxiliary, and in many refpects inferior to guaiacum, do not lead us to expect that it will ever be generally adopted, notwithftanding its reputation and extenfive employment in the Manchefter Infirmary, where the annual confumption has been nearly fixty gallons for about forty years. Bardfley, loc. cit. p. 22.

As another expedient for the cure of chronic rheumatifm, the *arfenical folution* of Dr. Fowler has been recommended by Mr. Jenkinfon and others. For our own part we have not been fo fortunate as to difcover any remedial properties of this fort in that folution; but from the evidence of two or three cafes adduced by Dr. Bardfley, it appears probable that this medicine is capable of producing very beneficial effects in protracted chronic rheumatifm, where the vital powers are much diminifhed, and the ends of the bones, periofteum, capfules, or ligaments of the joints, are likewife partially affected; though in the milder cafes, where the mufcles and their invefting membranes are the feat of the complaint, it appears to be ufelefs.

External Remedies.—Among the remedies which are ufually employed externally for the cure of chronic rheumatifm, and which, when aided by the adminiftration of medicines internally, have been found moft fuccefsful, are principally the *warm* and *vapour bath*, and various *epifpaftic*, *rubefacient* and *ftimulant* plafters, liniments, and embrocations, employed with or without confiderable *friction*.

The *warm* or *tepid bath*, from the temperature of 85° to 95° of Fahrenheit's thermometer, is very ufeful in foothing pain, and in relaxing the ftiffened joints and rigid fibres of the mufcles, efpecially in elderly patients, whofe ftrength is confiderably reduced by the length and violence of the diforder. But the ufe of a warmer bath, fo as to excite fweating, is apt to induce both local and general debility in protracted cafes, and affords but a temporary relief to the difeafe. But on the whole, the application of the *vapour* of hot water to the furface is a more efficacious remedy. Dr. Bardfley fays, "whenever the joints were found fo rigid as to be nearly immoveable, and the pains upon motion exquifitely

quifitely fevere, or when the mufcles had become contracted and almoft paralytic,—and indeed in every protracted cafe of the difeafe of the hip-joint, *lumbago*, or *fciatica*, the vapour of hot water, locally and properly applied, afforded (efpecially in conjunction with other topical applications) a fafe and often fuccefsful remedy." It may be neceffary to defcribe the mode of employing this vapour. It confifts in conveying the fteam, from a boiler, through tubes of different diameter, fo as to apply it to the different parts of the body. In all obftinate affections of the joints, the author juft quoted obferves, a pipe of nearly half an inch in diameter is to be preferred, and a quarter of an hour is the fhorteft period for its application. In the commencement, however, it is better, as a general rule, to ufe a pipe of fmaller fize, and only to permit the vapour to ftrike upon the affected part at fome diftance from its aperture; for by thefe means an inconvenience will be avoided, which has fometimes prevented the fteady application of the remedy; namely, a confiderable irritation of the fkin from an excefs of heat. By degrees the parts become able to bear a large column of vapour, at a very fmall diftance from the extremity of the pipe; and thus the remedy will be moft likely to produce its full effect. This effect, however, is generally only to be deemed auxiliary, at leaft in obftinate cafes; for it will feldom alone accomplifh the cure.

Among the epifpaftic applications, *bliftering* is commonly reforted to, and often with confiderable benefit, efpecially when the pains appear to be feated only in the fafcia and fuperficial fibres of the mufcles. A repetition of blifters is preferable on the whole, both as productive of lefs diftrefs to the patient, and more benefit to the difeafe, to the practice of keeping the blifter open by a ftimulating ointment. Some authors have recommended *iffues* in preference to blifters, where they could be applied without inconvenience. The excitement of an external inflammation, by the application of the ointment of *emetic tartar*, has been alfo employed inftead of bliftering; and in fome cafes its effects have been highly beneficial.

Rubefacients, or thofe fubftances which ftimulate the cutaneous veffels, and excite a rednefs of the furface by caufing them to be diftended with blood, have been found by the experience of all ages to be capable of removing flight inftances of chronic rheumatifm, and of alleviating the more fevere, efpecially when their operation was aided by *friction*, and by warm or ftimulant plafters. Where the pains are local and permanent, that is, not liable to fhift about from joint to joint, great advantages refult from ftimulating the fkin with an active liniment, and fupporting the excitement by means of a warm plafter. The liniments may be compofed of any ftimulant, oleaginous, fpirituous, or faponaceous liquids: as the common liniment of ammonia and oil, the foap liniment, with camphor, ammonia, tincture of cantharides, or turpentine; and the plafters may be compofed of the gum refins, efpecially ammoniacum, with the acetic acid, or vinegar of fquills, turpentine, plafter of cantharides, &c. Dr. Ferriar's formula, which is borrowed from Dr. Home, and confifted of two drachms of camphor, with an ounce of bafilicon, and half an ounce of black foap, is faid by him to have been very efficacious in the relief of *lumbago*. Thefe liniments fhould be diligently rubbed upon the parts affected, after the fkin has been warmed and irritated by the friction of hot, dry, and coarfe cloths, or the application of the flefh-brufh; or, efpecially in *fciatica* and *lumbago*, during the expofure of the part to the vapour-pipe. By thefe methods the ftimulating effects of the liniments are much increafed, the pain is more effectually relieved, and the cure much accelerated; efpecially when a warm plafter is added to keep up thefe effects. (See Bardfley, loc. cit; and Ferriar's Med. Hift. and Reflections, vol. i. p. 186.) The liniment originally employed by Dr. Home was fpread upon leather, and applied over the difeafed part; he fpeaks, not only from his own experience, but from that of others who had adopted it, of the efficacy of the prefcription. (See Medical Facts and Experiments, part i. fect. 4; and again in his Clinical Experiments and Hiftories, fect. 14.) His formula is perhaps more active than that of Dr. Ferriar, containing cumin feed and ammonia in addition to the camphor, oil of turpentine, and common black foap. But the difpenfatories abound with formulas for the compofition of ftimulating liniments and plafters of fimilar powers.

Among other ftimulants which have been employed for the cure of chronic rheumatifm, efpecially in thofe cafes which are obftinate and of long duration, or are accompanied by confiderable torpor and rigidity, and a diminution of the vital heat, the influence of the *electric* and *galvanic* fluids has been reforted to; and many teftimonies might be adduced in proof of the beneficial operations of both thefe agents. Dr. Bardfley affirms, that the application of electricity by fparks and fhocks, efpecially the former, was manifeftly advantageous; at the fame time he acknowledges, that it was chiefly in conjunction with the local application of vapour, and with tonics and anodynes, adminiftered internally, that the moft marked advantages were produced. For our own part, we have witneffed fo little decided effect from the operation of electricity in any difeafe whatever, that, after a long and frequent ufe of that agent, we have given it up in defpair. Where it produces any effect at all, it is probably by its operation upon the mind of the patient, upon the fame principle as the *metallic tractors* occafionally alleviated pain, (fee IMAGINATION, *Influence of, on the Body*,) and not from any fpecific operation upon the difeafed mufcles.

The operation of mere *friction* affiduoufly employed, either by means of flannel or rough cloths, of the flefh-brufh, or fimply of the hands, or that fort of rubbing or kneading of the body which is called *champooing*, have been often reforted to with confiderable benefit, efpecially in the cafes connected with a paralytic torpor and rigidity of the parts affected. Perhaps, indeed, it is the ftimulus of the friction, to which much of the benefit of liniments and embrocations ought to be afcribed; but as the patient's faith is chiefly fixed upon *medicated* frictions, fo it is generally neceffary to prefcribe them, in order to enfure his perfeverance in the rubbing.

The preceding obfervations have been applied to rheumatifm generally, with only occafional references to the particular forms under which it occurs, fuch as *lumbago*, *fciatica*, *pleurodyne*, rheumatic head-ache, &c. becaufe the treatment is generally applicable to the different fituations of the body in which the difeafe feats itfelf. The principal attention that is requifite to thefe varieties arifes from the r[illegible] fymptoms to thofe of fome other difea[illegible] *[illegible]urodyne*, or rheumatifm affecting the mu[illegible] and the diaphragm, being accompanied with a[illegible]icult refpiration, might be confounded with p[illegible] erroneoufly treated: but in this rheumatic affe[illegible] cheft there is feldom any cough, and no fever, two fym[illegible]oms which are neceffarily prefent in the cafe of pleurif[illegible]ain, the *lumbago* is apt to be miftaken for *nephralgia* [illegible] in the kidnies, connected with inflammation in thefe [illegible]ns, or with the prefence of gravel in them or in the [illegible]s: it may be diftinguifhed, however, from the difeafe[illegible] kidnies, by the circumftances, that the pain does not follow the courfe of the ureters, but ftretches ſtretches rather down the thighs to the toes; that it is chiefly ſevere on aſſuming the erect poſture; that it is not accompanied by ſickneſs or vomiting; and that the urine is not changed in quantity or quality. Dr. Home, and ſome others, have believed that the ſciatica is ſeated in the great ſciatic nerve, or in its ſheath, and the lumbago in the lumbar nerves.

Of *Arthritis rheumatica*, or *rheumatic gout*. This term, though improper, and calculated to miſlead us in our notions reſpecting the nature of the diſeaſe, is retained in conſequence of the want of a more correct appellation. The diſeaſe, in fact, is not a compound of gout and rheumatiſm, but probably rheumatiſm reſembling, in ſome reſpects, the gout in its appearances. It has been called, by an able teacher at a large hoſpital in Southwark, the *rheumatagra*, or *acuto-chronic* rheumatiſm. In ſome caſes, the diſeaſe is merely a partial degree of acute rheumatiſm, affecting only one or two of the ſmaller joints, as the wriſt or even the knuckles, with ſwelling, redneſs, and acute pain. This is often called gout; but as it occurs under circumſtances which differ materially from thoſe under which gout appears, is not preceded by indigeſtion, and does not terminate in the formation of chalk-ſtones, it is obviouſly a different diſeaſe. In many caſes, however, it is the conſequence of acute rheumatiſm, in which the joints laſt occupied by that diſeaſe, eſpecially the ankles and wriſts, remain ſwelled, ſtiff, and painful, and ſometimes œdematous, for many weeks. The pain, in theſe caſes, is generally aggravated at night, or by external heat; but it is accompanied by very little or no feveriſhneſs.

The more acute caſes require nearly the ſame treatment as is employed for the cure of acute rheumatiſm. But when they aſſume more of a chronic form, when the ligaments and membranes of the joints are the peculiar ſeat of the diſeaſe, or an enlargement of the extremities of the bones appears to have taken place, eſpecially in young or vigorous ſubjects, the firſt attempts to relieve ſhould be made by means of *local bleeding*, either by the application of leeches, or, what is perhaps preferable, by the operation of cupping and ſcarifying. Theſe local evacuations ſhould be repeated, if the pain and irritation are not materially relieved; and the good effects may be aided by the application of *bliſters* over the affected joints. Dr. Bardſley ſtrongly recommends the opening of a drain from the parts by means of *iſſues*, made by cauſtic; and affirms that, in obſtinate caſes, which have reſiſted all other means, he has found the happieſt effects from iſſues. The *tepid bath* will often aid the operation of theſe remedies, together with the uſe of mild diaphoretics, followed by tonic bitters, ſuch as the Peruvian bark, chalybeates, the myrrh mixture with ſteel, and the occaſional uſe of antimonials with calomel.

Nodoſity of the Joints.—Before we conclude the ſubject of rheumatiſm, it ſeems neceſſary to notice a ſtate of the joints which is generally deemed rheumatic. Dr. Haygarth, however, obſerves, that it is nearly allied to gout in its character, and in the perſons whom it attacks. Theſe *nodes*, which occur moſt commonly about the fingers, hands, and wriſts, but occaſionally alſo on the knees, ankles, feet, elbows, ſhoulders, and other joints, produce ſtrange diſtortions of the parts, twiſting the fingers, &c. in various directions, and rendering the joints almoſt immoveable. They are not ſeparate tumours, but feel as if they were an enlargement of the bones themſelves. Dr. Haygarth, indeed, is of opinion, that the ends of the bones, the perioſteum, and the capſules or ligaments which form the joints, are the ſeat of this diſeaſe; though he does not appear to have ever examined the matter anatomically. In bad inveterate caſes, he believes that the joints are not merely diſtorted, but diſlocated. The ſwellings are generally painful, eſpecially in the night, though not ſeverely, and often ſore to the touch. In a few patients, a crackling noiſe is perceived in the joints when moved, particularly in the neck. The ſkin is ſeldom, if ever, affected with inflammation. There is one diſtreſsful circumſtance belonging to this diſeaſe, that it has no intermiſſion, and but ſlight remiſſions: for during the remainder of the patient's life, the nodes gradually enlarge, impeding more and more the power of motion. The malady alſo ſpreads to other joints, without producing any alleviation in thoſe which it had previouſly attacked. In one caſe, mentioned by Dr. Haygarth, the fingers, wriſts, knees, ankles, elbows, ſhoulders, neck, and hips, were all affected with this diſeaſe at the ſame time, that is thirteen joints, excluſive of the numerous joints of the hands: if each individual joint of the hands had been taken into the account, they would have amounted to not leſs than forty. In this caſe, the malady had been rapidly advancing for ten years: yet, though theſe nodes, in their gradual progreſs, ſadly embitter the comforts, they do not ſhorten the duration of life: for Dr. Haygarth's firſt patient lived to the age of ninety-three. From the experience of this veteran phyſician it appears, that women are much more frequently the ſubject of nodoſity at the joints than men, and that it commonly firſt begins to ſhew itſelf about the period of the ceſſation of the menſes.

Various remedies have been recommmeded for the relief of theſe nodes; but they have not been found in general to be poſſeſſed of much efficacy. On the whole, the warm bath, a ſtream of warm water, ſuch as the Bath pumping, or a warm *douche* on the nodes, together with the repeated application of leeches, appear to be productive of the moſt decided benefit in this diſeaſe; and the uſe of the leeches appears to conſtitute a very important part of that practice. In bad caſes, from four to ten ſhould be applied to the affected joints once or twice a week. The temperature of the pumping and *douching* ſhould be varied, and that which appears, from the patient's report, to agree the beſt, and to be productive of the moſt decided effect in alleviating the pain and ſwelling, and in improving the power of motion in the joints, ſhould be adopted. This will be found to vary, in different perſons, from 81 to 113 degrees of Fahrenheit's thermometer.

Some authors have conceived that, together with theſe external remedies, the uſe of ſoda, or the vegetable alkali, internally, has been attended with conſiderable benefit. And Dr. Bardſley relates a caſe, in which the continued uſe of mercury, ſo as to excite a moderate ptyaliſm, was apparently remedial. See Haygarth's Clinical Hiſtory of Diſeaſes, pt. ii.; and Bardſley's Reports.

RHEXIA, in *Botany*, derived from ῥῆξις, *a rupture*, or *fracture*, is the ſynonym in Pliny of a plant, reputed to be endowed with numerous virtues, and, amongſt others, with the powers of curing ruptures, or ſimilar complaints. His deſcription leaves us in no doubt as to his plant; ſo far, at leaſt, as its being of the Alkanet tribe, a ſpecies of *Anchuſa*, or perhaps of *Echium*. Why Gronovius and Linnæus choſe this name for the preſent elegant American genus, does not appear.—Linn. Gen. 187. Schreb. 249. Willd. Sp. Pl. v. 2. 301. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 340. Purſh v. 1. 257. Juſſ. 330. Lamarck Illuſtr. t. 283. Gærtn. t. 112.—Claſs and order, *Octandria Monogynia*. Nat. Ord. *Calycanthemæ*, Linn. *Melaſtomæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, oblong, ſwelling in the lower part; limb in four deep, acute ſegments, without any intermediate teeth or ſcales; permanent. *Cor.*

 Petals

Petals four, roundiſh, ſpreading, inſerted into the calyx. *Stam.* Filaments eight, thread-ſhaped, inſerted into the calyx, longer than its limb; anthers declining, furrowed, linear, obtuſe, verſatile, with a curved beak. *Piſt.* Germen roundiſh, ſuperior, unconnected with the tube of the calyx; ſtyle ſimple, the length of the ſtamens, declining; ſtigma oblong, obtuſe. *Peric.* Capſule roundiſh, of four cells and four valves, within the body of the calyx, but unconnected with it. *Seeds* numerous, roundiſh. *Receptacles* four, attached to the central column.

Eſſ. Ch. Calyx with four permanent ſimple teeth. Petals four, inſerted into the calyx. Anthers declining, beaked. Capſule of four cells, within the body of the calyx.

Obſ. For the difference between this genus and Osbeckia, ſee that article.

Willdenow has 17 ſpecies of *Rhexia*, but we have not the means of correctly aſcertaining the generic characters of all of them. They are divided into two ſections, of which the following examples may ſuffice.

Section 1. *Leaves ſeſſile.*

R. *virginica.* Virginian Rhexia. Linn. Sp. Pl. 194. Willd. n. 1. Ait. n. 1. Curt. Mag. t. 968.—Leaves ſeſſile, lanceolate, three-ribbed, with fringe-like teeth. Calyx fringed with glands.—Native of watery places in North America, flowering in July and Auguſt. It ſucceeds tolerably with us, in a bog bed, with plenty of water, but requires ſhelter in winter; nor is it fit for general cultivation; which is much to be regretted, conſidering the great beauty and ſingularity of the large crimſon *flowers*, with their great yellow curved *anthers*. The *root* is fibrous, perennial. *Stem* herbaceous, erect, ſquare, with membranous angles. *Leaves* ſtrongly ribbed, ſmooth, with acute ſlender teeth. *Panicle* forked, ſpreading. *Calyx* brown, beſprinkled with hairs, whoſe points are glandular and viſcid.

R. *mariana.* Maryland Rhexia. Linn. Sp. Pl. 491. Willd. n. 2. Ait. n. 2. (Lyſimachia non papposa, terræ marianæ, &c.; Pluk. Mant. 123. t. 428. f. 1. Lamarck, f. 1?)—"Leaves ſeſſile, lanceolate, three-ribbed, fringed with ſoft hairs. Hairs of the calyx ſtellated."—Found in bogs, and ſandy woods, near waters, from New Jerſey to Carolina, flowering in July and Auguſt. From one to three feet high. *Flowers* handſome, either purple, light red, or pale. *Purſh.*

Sect. 2. *Leaves ſtalked.*

R. *glutinoſa.* Viſcid Shrubby Rhexia. Linn. Suppl. 216. Willd. n. 8.—Leaves ſtalked, oppoſite, elliptical, three-ribbed, ſmooth. Stem ſhrubby. Flowers in terminal, denſe, forked panicles. Calyx ſmooth.—Found in New Granada by Mutis, who ſent fine dried ſpecimens to Linnæus, along with an Indian-ink drawing, cited in the Supplement as a publiſhed work. The whole plant is very handſome, quite deſtitute of pubeſcence, but the *calyx*, and upper ſide of the *leaves*, are extremely glutinous. The *leaves* are rather above an inch long, with three ribs, united above their baſe; the under ſide pale and yellowiſh. *Flowers* copious, large, purple.

R. *inconſtans.* Stitch-leaved Rhexia. "Vahl. Ecl. v. 1. 37." Willd. n. 13. (Oſbeckia ornata; Swartz Ind. Occ. v. 2. 647.)—Leaves ovate, clothed with depreſſed briſtles; pale and three-ribbed beneath. Panicle forked, of few flowers. Calyx rough with ſpreading briſtles.—Native of elevated ſituations on the mountains of Guadaloupe, Nevis, Montſerrat, St. Kit's, &c. among moſs.—The *ſtems* are a foot or two high, erect, branched, rigid, ſquare and briſtly. *Leaves* ovate, a quarter of an inch long, their green convex upper ſide moſt elegantly clothed with ſtrong, depreſſed, yellow briſtles, as if ſtitched with gold thread. *Flowers* purple, uſually five-cleft.

R. *aquatica.* Marſh Rhexia. Swartz Ind. Occ. v. 2. 650. Willd. n. 16. Ait. n. 3. (Melaſtoma aquatica; Aubl. Guian. v. 1. 430. t. 169.)—Leaves oppoſite, heart-ſhaped, minutely crenate, nearly ſmooth. Panicles terminal, three-forked, ſlender, widely ſpreading, many-flowered. —Native of watery places in Guiana and the Weſt Indies. —*Stems* ſhrubby, a yard high. *Leaves* flat, above an inch long, pointed. *Flowers* copious, rather ſmall, white, with purple *ſtamens*. *Calyx* ſmooth.

Rhexia, in *Gardening*, contains plants of the hardy, herbaceous, perennial kind, of which the ſpecies cultivated are; the Virginian rhexia (R. virginica); and the Maryland rhexia (R. mariana).

Method of Culture.—Theſe plants may be increaſed by ſowing the ſeeds procured from their native ſituations, in the autumn or ſpring, in pots filled with good freſh mould, placing them under the protection of frames, or if in a mild hot-bed they will be rendered more forward. When ſown at the latter ſeaſon, the plants ſeldom appear the ſame year. When the plants have attained ſufficient growth they ſhould be planted out partly in a dry ſheltered eaſt border and partly in pots, to have the protection of a frame againſt the froſts in winter. They flower the ſecond year, and with care continue three or four.

And they may be introduced, as they afford ornament, in the borders as well as among flowery potted plants.

RHEXIS, or Rhegma, formed from ῥῆξις, *rupture*, of ῥήγνυμι, *I break*, in *Surgery*, denotes a rupture of the corner of the eye.

RHHENZABERN, in *Geography*, a town of France, in the department of the Lower Rhine; 8 miles S.E. of Landau.

RHIBII, in *Ancient Geography*, a people of Scythia, on this ſide of the Imaus, near the river Oxus, to which belonged the town of Dauaba. Ptolemy.

RHIGIA, a town ſituated in the interior of the eaſtern part of Hibernia, near Rhœbe, according to Ptolemy.

RHIME, or Rime, in *Poetry*. See Rhyme.

RHINANTHUS, in *Botany*, derived from ῥὶν, *a noſe*, or *ſnout*, and ἄνθος, *a flower*, becauſe of its ringent corolla, compreſſed at the upper lip, ſo as to reſemble the ſnout of ſome animal.—Linn. 304. Schreb. 400. Willd. Sp. Pl. v. 3. 188. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 649. Ait. Hort. Kew. v. 4. 2. Purſh 429. Michaux. Boreal.-Amer. v. 2. 17. Juſſ. 101. Lamarck Illuſtr. t. 517. Gærtn. t. 54. (Pedicularis; Tournef. t. 77. Elephas; Tournef. t. 482.)—Claſs and order, *Didynamia Angioſpermia*. Nat. Ord. *Perſonatæ*, Linn. *Pediculares*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, roundiſh, inflated, compreſſed, four-cleft, permanent. *Cor.* of one petal, ringent; tube rather cylindrical, the length of the calyx; limb gaping, compreſſed at the baſe: upper lip helmet-ſhaped, compreſſed, emarginate, narrower; lower ſpreading, flat, trifid half way down, obtuſe, the middle ſegment broader. *Stam.* Filaments four, the length of the upper lip, the two ſhorter ones concealed under it; anthers incumbent, cloven on one ſide, hairy. *Piſt.* Germen ſuperior, ovate, compreſſed; ſtyle thread-ſhaped, longer than the ſtamens, but ſtanding between them; ſtigma obtuſe, inflexed. *Peric.* Capſule obtuſe, erect, compreſſed, of two cells and two valves, gaping at the margins; partition contrary. *Seeds* numerous, compreſſed.

Obſ. Elephas of Tournefort has the margin of the capſule blunt; the ſeeds ſimple; and the calyx unequal, of two lips. It was ſo named from the reſemblance its flowers bear to an elephant's trunk.

Crista-galli of Rivinus has the margin of the capſule extended,

extended, the ſeeds membranous, clothed with wool; and the calyx equal, four-cleft.

Eſſ. Ch. Calyx inflated, compreſſed, four-toothed. Upper lip of the corolla compreſſed. Capſule of two cells, blunt, compreſſed. Seeds imbricated, flat.

1. R. *orientalis.* Linn. Sp. Pl. 840. (Elephas orientalis flore magno proboſcide incurva; Tournef. Voyage, v. 2. 126, with a figure.)—Upper lip of the corolla awl-ſhaped, incurved.—Native of the Levant, on the confines of Perſia, flowering in July.—*Stems* more than a foot high, hollow, ſquare, hairy. *Leaves* oppoſite, on ſhort ſtalks, notched, hairy, veined. *Flowers* on the upper part of the ſtems, fragrant, of a yellow colour, with a brown ſpot on the lower lip and two red ones on the upper. Tournefort reckons this a very ornamental plant.

2. R. *Elephas.* Linn. Sp. Pl. 840. (Elephas Campoclarenſium; Column. Ecphr. 186. t. 188.)—Upper lip of the corolla awl-ſhaped, ſtraight.—Native of ſhady woods in Italy, flowering in May.—This annual is very ſimilar in habit to the laſt, but its *calyx* is trifid, with two of the ſegments recurved, and the third larger, erect, plaited, acute. Tournefort mentions a variety of this which he found on the coaſt of the Black ſea.

3. R. *Criſta-galli.* Yellow Rattle. Linn. Sp. Pl. 840. Engl. Bot. t. 657. Curt. Lond. faſc. 5. t. 43. Mart. Ruſt. t. 148.—Upper lip of the corolla arched. Calyx ſmooth. Leaves lanceolate, ſerrated.—Common in our meadows and paſtures, flowering from June to Auguſt. *Root* annual, fibrous. *Stem* branched, ſmooth, frequently ſpotted. *Leaves* oppoſite, ſeſſile, rough; heart-ſhaped at the baſe. *Flowers* ſomewhat alternate, on ſhort ſtalks, yellow. *Seeds* with a membranous border. The Engliſh name has obtained, from the rattling of its ſeeds in the capſule.

4. R. *Trixago.* Linn. Sp. Pl. 840. (Bartſia Trixago; Sm. Prodr. Fl. Græc. Sibth. v. 1. 427. Trixago apula unicaulis; Columm. Ecphr. 199. t. 197.)—Calyx hairy or downy. Leaves oppoſite, bluntly ſerrated. Stem perfectly ſimple.—Native of Italy, the ſouth of France, and Paleſtine. It flowers in May.—*Root* annual, but throwing out runners. *Stem* more than a foot high, ſtraight, firm, ſquare, rather woolly. *Leaves* long, narrow, pale green, toothed or rather jagged. *Flowers* in large, yellow ſpikes. Ray obſerves that the figure of Columna poſſibly may be a variety of this ſpecies, for it differs in a few ſlight particulars.

5. R. *maximus.* Willd. n. 5. Desfont. Atlant. v. 2. 34.—Lower lip of the corolla longer than the upper; ſegments obtuſe, equal. Calyx villous. Upper leaves alternate, oblong, bluntly toothed. Stem branched.—Native of Crete. We know not of any figure of this ſpecies which is admitted on the authority of Willdenow and Desfontaines.—*Stem* from eighteen inches to two feet high, branched at the upper part, and downy. *Lower leaves* oppoſite. *Flowers* in yellow ſpikes at the tops of the ſtem and branches. This ſpecies has much the appearance of *Bartſia viſcoſa*, of which indeed the *R. maximus* of Lamarck is merely a variety. The ſame author makes the preſent a variety of the following.

6. R. *verſicolor.* Willd. n. 6. Desfont. Atlant. v. 2. 33.—Corolla gaping; lower lip longer than the upper; ſegments obtuſe; the middle one narrower. Calyx villous. Leaves moſtly oppoſite, lanceolate, the upper ones toothed at the baſe. Stem ſimple.—Native of Italy and the north of Africa. This differs from the preceding, in having a ſimple *ſtem*. *Leaves* linear-lanceolate, the upper ones only toothed at the baſe. *Bracteas* ovate, acuminate. *Corolla* only half as large, of a purple colour, the middle ſegment of the lower lip narrower than the other two.

7. R. *capenſis.* Willd. n. 7. (Buchnera africana; Linn. Sp. Pl. 879.)—Calyx downy. Bracteas ovate. Leaves lanceolate, toothed.—Native of the Cape of Good Hope. This is nearly allied to *R. Trixago*, becoming totally black in drying.—The *leaves* have three or four teeth on each ſide, the upper ones ſometimes alternate. *Bracteas* downy, a little pointed. *Calyx* four-cleft, obtuſe as in *Criſta-galli.*

8. R. *indicus.* Linn. Sp. Pl. 841. Fl. Zeylan. 107. Burm. Ind. 131. t. 39. f. 1.—Leaves nearly lanceolate, hairy, entire.—Native of Ceylon.—*Root* annual. *Stem* a ſpan high, erect, ſimple, ſquare, hiſpid. *Leaves* oppoſite, ſmall. *Flowers* ſeſſile, ſolitary, oppoſite, turned to one ſide.

9. R. *virginicus.* Linn. Sp. Pl. 841. Gronov. Virg. 192.—Corolla ſpreading at the throat. Leaves ſinuated and toothed.—Native of Virginia. This plant is nearly akin to *Gerardia*, of which it is moſt probably a ſpecies. The *anthers* are rough with hairs.

10. R. *trifida.* Willd. n. 10. Vahl. Symb. v. 1. 44.—Corolla wide at the throat. Leaves trifid.—Native of ſandy hills in Armenia and Galatia.—*Root* annual. *Stem* ſix inches high, herbaceous, aſcending, quite ſimple, rather downy, round. *Leaves* oppoſite, ſeſſile, downy, ribbed, deeply three-cleft. *Flowers* axillary, ſolitary, oppoſite, ſeſſile.

RHINBERG, in *Geography*. See RHEINBERG.

RHINE, a river which riſes in the Griſon Alps in three branches, which unite into one ſtream. Cæſar is the moſt ancient author who has traced the courſe of this river from its ſource in the Alps to its diſcharge into the ſea. According to this writer it commenced in the territory of the Lepontii; and Pomponius Mela mentions two lakes which it traverſes ſoon after, *viz.* the "Lacus Venetus" and the "Lacus Acronius." Of the deſcriptions given by ancient writers of this river, that of Tacitus is the moſt preciſe and ſatisfactory. The Rhine, ſays this hiſtorian, after having purſued its courſe in one bed, and arriving near the country of the Batavi, divides itſelf into two branches; one of which preſerves its name and the rapidity of its courſe along the borders of Germany until it diſcharges itſelf into the ſea; the other runs towards Gaul, in a larger channel and more tranquil ſtate, and is called by the people of the country "Vahalis," or Wahal. But it ſoon changes this name for that of "Moſa," or Meuſe, and blended with this river diſcharges itſelf into the ocean. Such is the account of Tacitus, to which we ſhall ſubjoin ſome other particulars from ancient writers. The Rhine, which, as we have ſaid, has its ſource in the Alps, aſſumes a northerly direction, and for a conſiderable interval ſeparates Gaul from Germany. At the town of "Burgenatium," or "Quadriburgium," it ſeparated itſelf into two arms or branches; the one flowing northward, and the other towards the weſt. This laſt aſſumed the name of Vahalis (Vahal), and watered the towns of Noviomagus, Grinnes, &c. united with the Moſa or Meuſe, and in this confluent ſtate diſcharged itſelf into the ſea. The other branch, which ran in a northerly direction, watered Arenatium, ſince called Caſtra Herculis; at which place commenced the canal of Druſus, "foſſa Druſiana." Here a new diviſion took place; the canal of Druſus purſued a northerly courſe, and the bed of the Rhine was directed towards the weſt. This laſt watered, beſide other places, Batavodurum, Trajectum, Lugdunum Batavorum, and emptied itſelf into the ſea, at a place called "Caſtellum Romanum." We ought, however, to obſerve, that near Trajectum it furniſhed a ſmall branch which had a northern courſe. The canal of Druſus flowed northwards, and it is now called the Yſſel. This canal, before it reached the ſea, traverſed a ſmall lake called Flevo, from which iſſued a ſmall a small river of the same name, which ran towards the sea in a northerly direction, and discharged itself into it near a place called "Castellum," which defended the entrance of this river. The lake just mentioned is considerably enlarged, and communicates with the sea under the name of Zuider-zee. The Rhine has been almost always regarded by the Romans as the boundary of their empire between Gaul, which they had conquered, and Germany, into which they made frequent incursions. According to modern accounts of the course of the Rhine, it commences, as we have said, in the Alps of the Grisons in three branches, which afterwards unite into one stream. The principal branch descends from the mountain of St. Gothard, and runs into the lake of Constance, near Rheineck; traversing the lake of Constance and Zell, it passes near Stein, Schaffhausen, Eglisau, Keiserstuhl, Seckingen, Rheinfelden, Bâle, Huningue, Strasburg, Spire, Worms, Oppenheim, Bingen, Mentz, St. Goar, Coblentz, Bonne, Cologne, Zons, Nuys, Dusseldorp, Duysberg, Rees, and Emeric, a little below which a large branch separates to the left, and takes the name of Wahal; it then proceeds to Huissen and Arnheim, near which another branch breaks off to the right and joins the Issel. The stream that still maintains the name of Rhine passes on to Wageningen, and Wyck le Duerstede, where it is again divided. The larger part to the left takes the name of the Leck and joins the Meuse; the smaller and less branch passes by Utrecht, Voerden, Leyden, &c. and loses itself at last in the sand, just before it reaches the German sea, a few miles after it has left Leyden. By the treaty of Paris in 1814, the Rhine is to remain as the boundary of France and Germany, and the main stream of this river constitutes the frontier, provided however that the changes that may hereafter take place in the course of that river shall not affect the property of the islands.

RHINE is also a river of Brandenburg, which runs into the Havel, 10 miles above Havelburg.—Also, a river of France, which runs into the Loire, near Roanne.

RHINE, *Circle of the Lower*, a division of Germany, bounded by the circles of Westphalia, Upper Rhine, Franconia, and Swabia, and by the duchy of Luxemburg and France. In conjunction with the circle of the Upper, it is said to contain 960 square German miles. The states of this circle were the electors of Mentz, Treves, and Cologne, together with the Palatine, the duke of Aremberg, the prince of Taxis, the Teutonic bailiwic of Coblentz, the prince of Nassau-Dietz, on account of the seigniory of Beilstein, the elector of Treves, on account of Lower Isenburg, and the count of Sinsendorf, on account of the burgraviate of Rheineck. The claim of the town of Gelnhausen was disputed. The summoning prince and director of the circle was the elector of Mentz. The diets of the circle have ever since the middle of the 17th century been held at Francfort on the Mayn. This circle was one of those called the "anterior circles," but which, in the years 1697 and 1702, formed with each other a mutual compact for defence against the attacks of an enemy. This compact continued, and the circle always appointed its quota of horse and foot; which quota, as well as the contribution of the circle to the aid of the empire, was generally equal to that of the circle of the Upper Rhine. In regard to religion, this circle was reckoned among the mixed.

RHINE, *Circle of the Upper*, was bounded by the circles of the Lower Rhine, Westphalia, Upper and Lower Saxony, Swabia, and Franconia, and by those of France, formerly called Alsace and Lorraine, in the latter of which were some lands belonging to this circle. The states belonging to this circle were the bishoprics of Worms and Spire, with the provostship of Weissenburg, Strasburg, Bâle, and Fulda, and the commandery of the order of St. John, and also the princely abbey of Prum, with the provostship of Odenheim, and the electorate palatinate of Simmern, Lautern and Veldenz, the palatinate of Deux-Ponts, Hesse-Cassel, Hesse-Darmstadt, Hersfeld or Hirschfeld, and Sponheim, the margraviates of Nomeny, Salm with Kirburg, Nassau-Weilburg, Nassau-Usingen, Nassau-Idstein, Nassau-Saarbrucken, and Otweiler, together with those of Waldeck, Hanau-Munzenberg, Hanau-Lichtenburg, Solms-Hohensolms, Solms-Braunfels, Solms-Ruddheim, Solms-Laubach, and the electorate of Mentz on account of Konigstein, that of Stolberg on account of the same, those of Isenburg-Birstein, Isenburg-Badingen, Washtersbach, and Mucholz, Grewiler, Grunbach, Dhaun, Leinengin-Hartenburg, Leinengin-Westerburg, and Grunstadt, Munzfelden, Witgenstein of Witgenstein, Witgenstein-Berleburg, Falkenstein, Reipolzkirchen, Creange, Wartenburg, Bretzenheim, Dachstuhl, and Ollbruck, and the imperial cities of Worms, Spire, Francfort, Friedburg, and Wetzlar. The bishop of Worms, and the elector palatinate for the duchy of Simmern, were summoning princes of this circle. The diets of the circle of the Upper Rhine were formerly held at Worms, but in the last century at Francfort; but the chancery circle of the archives belonging to it were kept at the directory at Worms. This circle, with regard to religion, was reckoned among the mixed, and to the chamber judicatory actually presented two assessors.

RHINE, *Lower*, one of the ten departments of the N.E. region of France, bounded on the N. by the departments of Mont Tonnerre and the Moselle, on the E. by the Rhine, on the S. by the department of the Upper Rhine, and on the W. by the departments of the Vosges, the Meurthe, and the Moselle, situated on the left bank of the Rhine, in N. lat. 48° 45′, containing 5695 kiliometres, or 288 square leagues, and 444,858 inhabitants, and divided into four districts, including 37 cantons, and 616 communes. The four districts or circles are, Wissembourg, including 113,786 inhabitants, Saverne with 78,398, Strasbourg with 155,647, and Barr with 97,027 inhabitants. According to M. Hassenfratz's statement, its extent in French leagues is 30 in length, and 15 in breadth. The number of circles is 5, and of cantons 30, and its population 415,080. Its contributions to the land-tax, &c. in the 11th year of the French era, amounted to 3,609,442 francs; and its expences, administrative, judiciary, and for public instruction, amounted to 359,740 fr. 33 cents. The capital of this department is Strasbourg, and it comprehends that district which, before the revolution, was Lower Alsace. As it lies between mount Vosges and the Rhine, it is diversified with eminences and plains, producing grain, wine, fruits, tobacco, saffron, and also with forests and plains.

RHINE, *Upper*, one of the ten departments of the N.E. region of France, bounded on the N. by the department of the Lower Rhine, on the S. by Switzerland, and on the W. by the departments of the Upper Saone and Vosges, situated on the left hand of the Rhine, in N. lat. 47° 40′, containing 6030 kiliometres, or 280 square leagues, and 382,285 inhabitants, and divided into five districts, or circles, including 39 cantons, and 703 communes. The five districts are Colmar, comprehending 144,821 inhabitants; Altkirch, 83,515; Delemont, 35,779; Porentruy, 34,910; and Befort, 83,260. According to the statement of M. Hassenfratz, its extent in French leagues is 24 in length, and 14 in breadth: its circles are 3, its cantons are 25, and its population consists of 283,252 persons. Its contributions to the land-tax, &c. in the

the 11th year of the French era, amounted to 2,837,063 fr. and its expences, adminiftrative, judiciary, and for public inftruction, amounted to 354,279 fr. Its capital is Colmar, and it is compofed of Upper Alface, Sundtgaut, Porentruy, and a part of the bifhopric of Bâle. The foil is in fome parts moderately fertile, and in others yields all forts of grain, wine, and paftures. It has mines of filver, copper, lead, iron, and coal, with mineral fprings.

Rhine, *Confederation of the*, now abolifhed. See Confederation, &c.

Rhine *and Mofelle*, one of the thirteen departments of that region of France called the Reunited country, bounded on the N. by the department of the Roer, on the E. by the Rhine, on the S. by the departments of Mont Tonnerre and the Saone, and on the W. by the departments of the Sarre and the Roer; fituated in N. lat. 50° 15′, and formed of a part of the electorate of Treves, S. of Roer, and on the left hand of the Rhine. Its territorial extent is 4860 kiliometres, or 290 fquare leagues, and the number of inhabitants is 203,290. It is divided into three circles or diftricts, including 30 cantons, and 675 communes. The diftricts are Coblentz, containing 69,900 inhabitants; Bonn, 70,508; and Simmern, 62,882. According to Haffenfratz, its extent in French leagues is 25 in length, and 12 in breadth: it contains 3 circles, and 30 cantons, and a population of 372,000 perfons. Its contributions to the landtax, &c. in the year 11, amounted to 1,717,463 fr.; and its expences, adminiftrative, judiciary, and for public inftruction, were 239,883 fr. 33 cents. The capital of this department is Coblentz. Several tracts in it are hilly and wooded; and others, though but indifferently fertile, produce confiderable crops of grain, flax, hemp, wine, fruits, and paftures. It has mines of iron, quarries of marble, ftone, &c.

Rhine, in *Ichthyology*, a name given by Ariftotle, Appian, and moft of the Greek writers, to that fpecies of the fqualus, which we ufually call the *fquatina*: the *fquatus* of Ifidore and Pliny. Artedi has diftinguifhed this from all the other fpecies of the fqualus, by the having no pinna ani, and the mouth in the extremity of the fnout. See Squalus.

RHINE-GRAVE, in Germany, a count palatine of the Rhine. See Grave and Palatine.

RHINE-LAND Rod, in *Fortification*, &c. a meafure of two fathom, or twelve feet, ufed by the Dutch and German engineers, &c.

RHINENCHYTES, in *Surgery*, a fyringe for the nofe.

RHINFELS, in *Geography*, a town and fortrefs of Germany, in the county of Catzenelnbogen, near St. Goar.

RHINGAU, or Rheingau, a tract of country along the Rhine, in the electorate of Mentz, extending from Baccharach to Mentz, celebrated for its excellent wine.

Rhingau, in *Ichthyology*, the name given by fome authors to the lavaretus, a fmall fifh caught in the German lakes, and fent in pickle into many parts of the world.

RHINHEIM, in *Geography*. See Reinheim.

RHINIUM, in *Botany*, a name given by Schreber, in his Genera, 701, to the *Tigarea* of Aublet, Lamarck Illuftr. t. 826; but in his addenda, 833, referred to Tetracera; fee that article hereafter.

RHINOBATOS, in *Ichthyology*, the name of a flat cartilaginous fifh, of the fquatina or monk-fifh kind, but differing from it in this, that the body is proportionably longer, and the head is more pointed; and the mouth is a great way below the end of the fnout, and placed under the head. It is from three to four feet long, and is common in the Mediterranean, and brought to market in fome parts of Naples. This is a fpecies of ray in the Linnæan fyftem. See Raia.

RHINOCEROS, in *Zoology*, a genus of the clafs Mammalia and order Bruta, of which the generic character is, horn folid, perennial, conic, placed on the nofe, not adhering to the bone. There are two

Species.

Unicornis; One-horned Rhinoceros. The one horn of this animal marks the fpecies. It inhabits marfhy places between the tropics; lives on thorns and fpinous plants; it may be tamed, and becomes mild, but when enraged it will overturn trees with its violence; its fight is weak, but its hearing and fmell are very acute.

In the year 1739 we had a young rhinoceros with one horn fhewn in England, of which Dr. Parfons has given a very accurate account in the Philofophical Tranfactions, N° 470. p. 523, &c. or Abridg. vol. ix. p. 94, &c.

The creature fed on rice, fugar, and hay; his keeper ufed to mix the rice and fugar in the following manner: feven pounds of rice and three pounds of fugar made the provifion for one day; he eat this at three meals; and befides this he eat about a trufs of hay every week, and a large quantity of greens that were brought to him at different times, and of which he feemed more fond than of dried food. He drank often, and always fwallowed a large quantity of water at a time.

He appeared very peaceable in his temper, and bore to be handled on any part of his body with great patience, except when he was hungry; but he was then always outrageous, as alfo when he was ftruck. His moft violent paffions, even on the laft occafion, were however always immediately appeafed by giving him victuals.

Notwithftanding the lumpifh afpect and heavy make of this creature, he would jump about very nimbly in his fits of paffion, and often leap to a great height; and one common mark of his fury was the ftriking his head againft the walls, or any thing elfe that was in the way, and this he would do with terrible violence. He was very apt to fall into thefe paffions in a morning, before his rice and fugar were given him, and from the whole he appeared quite untractable, and feemed able, in his paffions, to have run fo faft, as that a man on foot could not have efcaped him.

This creature was two years old, and did not exceed a young heifer in height, but was remarkably broad and thick. His head was very large; and the hinder part of it, near the ears, remarkably elevated above the reft of the face, which was flat, and funk down in a remarkable manner in the middle, rifing again towards the origin of the horn, but in a much fmaller degree.

The horn in this young animal did not rife above an inch high from its tough bafis (though in full grown animals it is fometimes three feet and a half long), and was black and fmooth at the top, but ragged downwards; and the determination of its growth is backward, not ftraight up; this is very evidently feen in the horns of old rhinocerofes, which are always curved in a confiderable degree that way. If we confider the proportion of this animal's fize to the length of its horn, and thence carry the proportion to that between the large horns we fee in the mufeums of the curious, we muft fuppofe the animal of a very ftupendous fize, when at its full growth.

The fides of the under-jaw in this creature ftand very wide afunder, flanting outward to the lower edge, and backward to the neck; the edges turn outwards from this ftructure of the bones, and the head neceffarily looks very large. The rhinoceros has four cutting teeth, one on each corner

corner of each jaw, and fix grinders in each; the firft remote from the cutting teeth. That part of the head which reaches from the fore-part of the horn to the upper lip, may be called the nofe: this is very thick and bulky, and has a kind of circular fweep down towards the noftrils; on all this part there is a great number of rugæ or wrinkles.

The noftrils are fituated very low, in the fame direction with the opening of the mouth, and not more than an inch from it; and, when viewed in a fore-view, the whole nofe, from the top of the horn to the verge of the lower lip, is fhaped like a bell. The under lip is like that of an ox, but the upper more like that of a horfe, and he ufes it as that creature does, to gather up hay from the rack, or grafs from the ground; but with this fuperior advantage, that this creature has a power of extending this lip to fix or feven inches in length from the nofe, and there drawing it to a point: with this lip, thus extended, the creature is able to grafp a ftick, or any fmall fubftance, and hold it extremely faft; and this power of prolonging the lip ferves, in many purpofes, to the fame end as the trunk of that other unwieldy animal, the elephant.

The tongue of the rhinoceros is faid to be fo rough as to be able to rub a man's flefh off from the bones; but in this young fubject it was fo foft, that it refembled that of a calf. It may poffibly grow harder with age; but the ftory of its effects feems of a piece with the many other falfe marvels reported of this animal. The eyes are dull and fleepy, much like thofe of a hog in fhape; he feldom opens them entirely; and it is to be obferved, that they are fituated nearer the nofe than thofe of any other known quadruped. The ears are broad and thin towards the top; the neck is very fhort; the fhoulders are thick and heavy; the body is thick, and juts out at the fides, and has a hollow in the back; the belly hangs low; the legs are fhort, thick, and ftrong; the hoofs are divided into three parts, each pointing forward; the tail is flender, flatted at the end, and covered on the fides with very ftiff thick black hairs; the fkin is naked, rough or tuberculated, lying about the neck in vaft folds; there is another fold from the fhoulders to the fore-legs, and another from the hind part of the back to the thighs. The fkin is thick, and feems almoft impenetrable, infomuch that it will turn the edge of a fcymitar, and refift a mufket-ball; it feels like a piece of board of half an inch thick. It is covered in all parts, more or lefs, with a fort of incruftations, refembling fcales. Thefe are fmall on the neck, and largeft of all on the fhoulders and hips; between the folds of this thick fkin, the cuticle, which is left bare, is foft and eafily penetrable. The fcabby incruftations of the fkin have been called fcales by fome writers; but this is a very wrong term, for they have nothing of the nature of fcales, nor any thing of regularity in them.

The creature is of the retromingent, and therefore probably of the retrogenerative kind. Thofe animals that have been brought to Europe have been young and fmall; but, according to Bontius, they equal the elephant in the bulk of their bodies, though they are lower, on account of the fhortnefs of their legs. They inhabit Bengal, Siam, Cochinchina, Quangfi in China, and the ifles of Java and Sumatra. They are fond of fhady forefts, the neighbourhood of rivers, and marfhy places; and are fond of wallowing in the mud like the hog. The rhinoceros is a folitary animal, brings one young at a time; is quiet and inoffenfive, but furious when provoked; very fwift and dangerous; and, though dull of fight, has a moft exquifite fmell. It grunts like a hog. The flefh of this animal is eaten. The fkin, flefh, hoofs, teeth, and dung itfelf, are ufed in India medicinally. The horns are in great repute as an antidote againft poifon, efpecially thofe of the virgin female, called abbada; cups of which are faid to communicate virtue to the liquor poured into them. Redi, who has been very fagacious in difcovering the falfity of many of the pretended medicines taken from animals, yet gives us, on the teftimony of his own experience, an account of fome very remarkable virtues in the parts of the rhinoceros. The blood, he affures us, is excellent in colics and in dyfenteries. The decoction of the fkin, he affures us, is a grand ftomachic antidote; and the horns are very valuable and alexipharmic.

This animal is the unicorn of fcripture, and the Indian afs of Ariftotle, who fays it has but one horn.

Bicornis; Two-horned Rhinoceros. This fpecies inhabits Africa, but, according to Pallas, the bones of it are found buried in the north of Ruffia. Its flefh refembles that of a hog; the vifcera thofe of a horfe; the fecond horn is fhorter, and placed over the firft; it has no gall-bladder, and no fore-teeth; the fkin is without folds, granulated, and of a deep afhen-grey; between the legs it is fmooth, and flefh-coloured; in other parts there are a few briftles, but they are moft numerous about the ears and end of the tail. This animal inhabits Africa only; and feems, in its manners, to agree with the former. The mifchief it does is more the effect of a fenfelefs impulfe than of rage; for, though its fight is bad, its fenfes of hearing and fmelling are exquifite, fo that the leaft noife or fcent puts it in motion; and in running to the fpot from which the alarm proceeds, it overturns and tramples on animals, or any thing elfe which it meets with in its way, but never ftays or returns to renew the charge. There is a variety, but not often feen, that has three horns; the third being an excrefcence on one of the others.

Mr. Bruce's defcription of the manner of feeding, as well as of fome other particulars relative to the two-horned rhinoceros, feems highly worthy of notice. He informs us, that "befides the trees capable of moft refiftance, there are, in the vaft forefts within the rains, trees of a fofter confiftence, and of a very fucculent quality, which feem to be deftined for his principal food. For the purpofe of gaining the higheft branches of thefe, his upper lip is capable of being lengthened out, fo as to increafe his power of laying hold with this, in the fame manner as the elephant does with his trunk. With this lip, and the affiftance of his tongue, he pulls down the upper branches which have moft leaves, and thefe he devours firft. Having ftript the tree of its branches, he does not therefore abandon it; but, placing his fnout as low in the trunk as he finds his horns will enter, he rips up the body of the tree, and reduces it to thin pieces, like fo many laths; and when he has thus prepared it, he embraces as much of it as he can in his monftrous jaws, and twifts it round with as much eafe as an ox would do a root of celery, or any fuch pot-herb or garden-ftuff.

"When purfued, and in fear, he poffeffes an aftonifhing degree of fwiftnefs, confidering his fize, the apparent unwieldinefs of his body, his great weight before, and the fhortnefs of his legs. He is long, and has a kind of trot, which, after a few minutes, increafes in a great proportion, and takes in a great diftance; but this is to be underftood with a degree of moderation. It is not true, that in a plain he beats the horfe in fwiftnefs. I have paffed him with eafe, and feen many worfe mounted do the fame; and though it is certainly true that a horfe can very feldom come up with him, this is owing to his cunning, but not his fwiftnefs. He makes conftantly from wood to wood, and forces himfelf into the thickeft part of them. The trees that are dry are broke down, like as with a cannon-fhot, and fall behind him,

him, and on his side, in all directions. Others that are more pliable, greener, or fuller of sap, are bent back by his weight, and the velocity of his motions; and, after he has passed, restoring themselves like a green branch to their natural position, they sweep the incautious pursuer and his horse from the ground, and dash them in pieces against the surrounding trees.

"The eyes of the rhinoceros are very small, and he seldom turns his head, and therefore sees nothing but what is before him. To this he owes his death, and never escapes, if there is so much plain as to enable the horse to get before him. His pride and fury then make him lay aside all thoughts of escaping, but by victory over his enemy. He stands for a moment at bay; then, at a start, runs straight forward at the horse, like the wild boar, whom, in his manner of action, he very much resembles. The horse easily avoids him, by turning short to a side; and this is the fatal instant: the naked man, with the sword, drops from behind the principal horseman, and, unseen by the rhinoceros, who is seeking his enemy, the horse, he gives him a stroke across the tendon of the heel, which renders him incapable of further flight or resistance.

"In speaking of the great quantity of food necessary to support this enormous mass, we must likewise consider the vast quantity of water which he needs. No country but that of the Shangalla, which he possesses, deluged with six months' rain, and full of large and deep basons, made in the living rock, and shaded by dark woods from evaporation, or watered by large and deep rivers, which never fall low or to a state of dryness, can supply the vast draughts of this monstrous creature. But it is not for drinking alone that he frequents wet and marshy places: large, fierce, and strong as he is, he must submit to prepare himself against the weakest of all adversaries. The great consumption he constantly makes of food and water necessarily confine him to certain limited spaces; for it is not every place that can maintain him. He cannot emigrate, or seek his defence among the sands of Atbara."

The rhinoceros with two horns was the species described by Martial, under the name of *rhinoceros cornu gemino*, who relates its combat with the bear.

> "Namque gravem gemino cornu sic extulit ursum,
> Jactat ut impositas taurus in astra pilas."
> Spect. Epig. 22.

The Romans, who procured their rhinoceroses from Africa, represent them with double horns. That figured in the Prenestine pavement, and that in a coin of Domitian, have two horns; that which Pausanias describes (ix. 9.) under the name of Ethiopian bull, had one horn in the nose, and another lesser higher up; and Cosmas Ægyptius (tom. ii. 334.), who travelled into Æthiopia, in the reign of Justinian, also attributes to it the same number. Augustus introduced a rhinoceros (probably of this kind) into the shows, on occasion of his triumph over Cleopatra. Dion Cassius, lib. ii. Phil. Trans. abr. vol. ix. ubi supra. Id. vol. lvi. p. 32, &c.

M. Geoffroy of France thinks there are, or at least have been, no less than five different species of the rhinoceros; *viz.* 1. The rhinoceros africanus, cornu gemino of Camper, who has given a figure of the skull in the Petersburgh Transactions for 1777. 2. The species found fossile in Siberia, which M. Geoffroy contends is different from the common two-horned rhinoceros, though of that division of the genus. 3. That of which the skull is figured by Camper, and described by him in a letter to Dr. Pallas, in the Petersburgh Transactions. This is a single-horned species, and has been often confounded with the common rhinoceros. 4. The common single-horned Asiatic rhinoceros. And, 5. The Sumatran rhinoceros, described by Mr. Bell in the Phil. Trans. of the Royal Society of London.

RHINOCEROS *Avis*, in *Ornithology*, the rhinoceros-bird, a name given by authors to a species of Indian raven, called by others *corvus Indicus cornutus*; the beak of which is frequently brought over into Europe. This, in the Linnæan system, is a species of *Buceros*; which see.

It is a very ugly bird, and of a very rank smell. It much exceeds the European raven in bigness, and its head and neck are very thick. Its eyes are very large, and its beak of a very remarkable figure, having a large and thick horn-like protuberance on its upper part. The whole beak is bent like a bow, not hooked at the end like the beaks of the hawk, &c. It is of a yellowish-white below, and on the upper part towards the head is of a fine gay red, and the rest of a yellowish-white; the upper chap is serrated. The horn grows out from the head with this, and runs along it, and bends up at its extremity; its upper and under part are red, its middle yellow. The bird feeds on carrion.

RHINOCEROS, in the *History of Insects*, a species of beetle, so called, because it has a kind of horn upon its head.

RHINOCOLURA, or RHINOCORURA, in *Ancient Geography*, a town of Syria, 22 miles from Raphia, and which formed a kind of boundary between Syria and Egypt. Strabo attributes it to Phœnicia; and Pliny calls the sea, on a strait of which this place is situated, the "Sea of Phœnicia." Diodorus Siculus says, that this town, situated on the confines of Egypt and Syria, near the sea, was destitute of all the conveniencies of life; that its water was bitter and noxious, and that it was surrounded with salt marshes. It was in the vicinity of this place that the Israelites were nourished with quails.

RHINOMACER, in *Entomology*, a genus of insects of the order Coleoptera. The generic character is, antennæ setaceous, seated on the snout; it has four feelers, growing thicker towards the end; the last joint is truncate. There are three species, none of which are found in this country.

Species.

CURCULIOIDES. This is grey and downy; the antennæ and legs are black. It inhabits Italy. It resembles a curculio. The antennæ are setaceous and black, and as long as the thorax; the last joint is sharp; the snout is flat, and impressed in the middle.

ATTELABOIDES. This is piceous-downy; the antennæ and legs are testaceous. It is found in divers parts of Sweden. The snout is elevated and projected; the body is cinereous.

CÆRULEUS. This species is of a blueish colour, and it is subvillous; the base of the antennæ and legs are yellow, It inhabits Calabria, and has been thought to be a species of the *Attelabus*; which see.

RHINOPTES, a word used by the ancients to express a person, who, from an ulcer in the great canthus of the eye, laying open the passages to the nose, can see through his nostril.

RHINOW, in *Geography*, a town of the Middle Mark of Brandenburg, on the Rhine; 20 miles N. of Brandenburg.

RHINSBERG. See REINSBERG.

RHINSBERGERS, in *Ecclesiastical History*. See COLLEGIANS.

RHIPÆI MONTES, in *Ancient Geography*. See RIPHÆAN *Mountains*.

RHIPSALIS, in *Botany*, Gærtn. t. 28. (See CACTUS, sp. 25.) It is curious to observe how the representation of the fructification of this plant, in Miller's Illustration of the Linnæan system, is made to answer to the generic character of *Cassytha*, for which it had been erroneously taken.

RHIPTASMOS, a word used by the ancients to express prefs a reftleffnefs and frequent toffing about, a very common fymptom in fevers.

RHISOPHAGI, in *Ancient Geography*, a people of Ethiopia, in the vicinity of the ifle of Meroe, upon the banks of the rivers Aftaboras and Aftapas, according to Diodorus Siculus.

RHISPIA, a town of the Higher Pannonia, at a diftance from the Danube, and fituated between Savaria and Vincendria. Ptolemy.

RHISUS, a town of Greece, on the coaft of Theffaly, according to Strabo and Steph. Byz. Pliny mentions a town of this name in Magnefia.

RHITHYMNA, a town fituated on the northern coaft of the ifle of Crete. Ptolemy.

RHITIA, a town of Africa, in Mauritania Cæfarienfis; placed by Ptolemy in the interior of the country between Arina and Victoria.

RHITTIUM, a town of Lower Pannonia, upon the banks of the Danube, between Acumincum Legio and Taururum, according to Ptolemy.

RHIUM, a promontory on the N.E. part of Achaia: it formed with Anti-Rhium, another promontory oppofite to it, and more northerly, the ftrait by which the Ionian fea communicated with the gulf of Corinth.—Alfo, a town of the Peloponnefus, in Meffenia, upon the gulf of Thuriates, oppofite to the promontory Tanarus, according to Strabo.—Alfo, a promontory on the E. fide of the ifland of Corfa, between mount Rhætius and the town Urcipium. Ptolemy.

RHIUSIAVA, a town of Germany, on the banks of the Danube, between Aræ Flaviæ and Alcimænis. Ptolemy.

RHIW-ABON, or RUABON, in *Geography*, a market-town in the cwmwd of Maelor Gymraeg, cantref of Uwck-Nant, (now called the hundred of Bromfield,) county of Denbigh, North Wales, is fituated on rifing ground, at the diftance of four miles S.S.W. from the town of Wrexham. The market-day here is Monday, weekly; befides which, there are fairs on the laft Friday in February, the 22d of May, and the 20th of November. The petty feffions for the Ruabon divifion of the hundred are held in this town. The church is an ancient ftructure, but is in good repair, and contains feveral monumental erections. One, to the memory of the firft fir Watkin Williams Wynne, difplays a figure of the deceafed in a loofe robe. On one fide is a figure of his fon, and on the other that of his daughter, both in kneeling poftures. This monument was erected by Ryfbrack. Near it ftand thofe of the late fir Watkin Williams Wynne, bart., and his lady; both of them the workmanfhip of Nollekens, and worthy of his chafte and claffic chiffel. The latter exhibits lady Wynne in the character of Hope, ftanding, and reclining her arm on an urn; the whole being placed upon a pedeftal, made in the fhape of a Roman altar. The other principal monuments commemorate Henry Wynne, efq., tenth fon of fir John Wynne of Gwidir, who died in 1671; fir John Wynne of Wynftay, and his wife Jane; and another fir John Wynne, fon of the above, with his wife, the heirefs of Watftay. In a chapel, on the fouth fide of the communion table, is likewife an altar tomb, fupporting the recumbent figures of a man in armour, and a female habited in a mantle. From an infcription round the edge of the entablature, it appears that thefe reprefent John ap Ehs Eyton, efq., who died in 1526, and Elizabeth Caffley, his wife, who died in 1524.

Rhiw-Abon is noted as the birth-place of Dr. David Powell, who tranflated into Englifh the Hiftory of Wales, written by Caradoc of Llancarfan, with the Continuation by Humphrey Llwyd; and who likewife firft edited the works of Giraldus Cambrenfis, and publifhed a treatife, entitled "De Britannica Hiftoria recte intelligenda." He died in 1590. This parifh is very extenfive, and contains five townfhips. The town confifts, according to the population returns of 1811, of 263 houfes, and 1137 inhabitants. The parifh abounds with collieries, the produce of which is conveyed to different parts of the country, by means of the Ellefmere canal, which paffes near the town, and forms a junction with the canals that penetrate Wales on the one fide, and communicate with the Grand Trunk Navigation on the other. Adjoining Rhiw-Abon is Wynnftay-hall, the feat of fir Watkin Williams Wynne, bart. The houfe is large, but, owing to the heterogeneous and patched character of its architecture, it poffeffes little elegance of external appearance. The apartments in the interior, however, are grand and fpacious, and contain feveral good portraits of the Wynnes, the Williamfes, and the Seymours, painted by Vandyke, fir Godfrey Kneller, and other eminent artifts. Clofe to the houfe is a building, originally fitted up as a theatre, but now appropriated for an annual agricultural meeting, auxiliary to the fociety at Wrexham. A fhow of cattle takes place on the occafion of each meeting, at which premiums are adjudged for the beft fpecimen of every fpecies of ftock, and alfo for other hufbandry improvements. This eftate was anciently the refidence of Madoc ap Gryffydd Maelor, lord of Bromfield, and founder of Valle-Crucis abbey. From the circumftance of the ancient rampire, called Watt's Dyke, running through the park, it was long denominated Watftay-park, in allufion thereto. It extends above eight miles in circumference, and is ornamented with plantations, a fine lake, and various buildings. Among the objects of the laft mentioned kind is a column, 100 feet high, built of free ftone, from a defign by the late Mr. Wyatt. It was erected as a tribute of maternal affection, in memory of fir Watkin Williams Wynne, father to the prefent baronet. In another part of the grounds is a tower, or rotunda, intended to commemorate the heroes of the Cambrian legion, who fell in the caufe of loyalty, under fir Watkin, during the late rebellion in Ireland. The fpot on which this tower is fituated commands an extenfive view of mountains, woods, and the meanderings of the Dee. The valley, watered by that river here, difplays the moft picturefque and romantic fcenery, whofe beauties peculiarly excited the admiration of the celebrated lord Lyttelton. The turnpike-road from Rhiw-Abon to Ofweftry, which croffes this valley, is formed for nearly two miles on the embankment of Offa's Dyke. It is here ten feet high, and broad enough for two carriages to run abreaft. Near this road is a remarkable tumulus, fuppofed to be the burying-place of fome chieftain flain in a battle, fought in this neighbourhood, about the year 1161, between Owain Cyfeiliog, prince of Powys, and the Englifh, and terminated in favour of the ancient Britons. This victory gave rife to the beautiful poem, called "Hirlas Owain," or the Drinking-Horn of Owain, compofed by the prince himfelf; which, according to Mr. Pennant, ranks with the beft Pindaric ode of the Grecian fchool. About three miles northward from Rhiw-Abon is Erdigg, or Erddig, the feat of Simon Yorke, efq. The houfe, which has been lately modernized, contains fome valuable paintings; and the library is the depofitory of many curious Welfh MSS., including the Seabright collection. The grounds are laid out with much tafte, but the efforts of art are too apparent. The continuation of Watt's Dyke extends acrofs thefe grounds, running along one fide of a bank between the two vallies, by which the domain is bounded. Not far from hence are the fragments of a cemented wall, and various foundations of buildings, furrounded by a triple intrenchment of a pentagonal form. Thefe

These are supposed by some to be of Roman origin, but others conceive that they mark the scite of a Saxon fort, constructed by the Mercians to defend their line of demarcation, as fixed by the great Offa. This last opinion is rendered the more probable, by the fact of there being some vestiges of a similar fort more to the northward, and on the same line. Philip Yorke, esq., ancestor to the present proprietor of Erddig, was author of "The History of the five royal Tribes of Wales;" a work abounding with so much information, that it is greatly to be lamented that he did not favour the world with his intended Stemmata, or Fifteen Tribes.

The district in the vicinity of Rhiw-Abon, particularly towards Wrexham, abounds with valuable mines. The iron ore, found in the adjacent mountains, is exceedingly rich, and affords excellent iron. The principal works carried on are those of Brymba and Bersham. The latter, which are situated at Pont-y-Penca, consist of forges, slitting, rolling, and stamping mills, &c. with an extensive cannon foundery, inferior only to that on the banks of the Carron, in North Britain. Besides cannon, these works produce wheels, cogs, bars, pipes, cylinders, rollers, columns, pistons, &c.; also furnace boilers, steam caissons, and various other articles which were formerly made of copper. Carlisle's Topographical Dictionary of Wales, 4to. 1813. A Tour round North Wales, by the Rev. W. Bingley, B.A., F.L.S., 8vo. 2 vols. 1800.

RHIZAGRA, in *Surgery*, an instrument for extracting the stumps of the teeth.

RHIZANA, in *Ancient Geography*, a town placed by Ptolemy in the interior of Dalmatia.—Also, a town of Asia, in Gedrosia, upon the sea-coast near Coiamba. Ptol.—Also, a town placed by Ptolemy in Arachosia, between Alexandria and Arbaca.

RHIZINIUM, or RHISINUM, or *Rhison*, a town of Dalmatia, on a gulf to which it gave the name of Rhisonicus Sinus. Ptol.

RHIZIUM, RHIZÉ, a town of Asia, in the Colchide, on the coast of the Euxine sea, and W. of the mouth of the small river "Rhizius."

RHIZOBOLUS, in *Botany*, a name of Gærtner's, from ῥίζα, *a root*, and βάλλω, *to throw*, or *cast*, because the plant is remarkable for throwing out a number of roots. —Schreb. 369. Mart. Mill. Dict. v. 4. Gærtn. t. 98. (Caryocar; Linn. Mant. 154. Willd. Sp. Pl. v. 2. 1243. Pekea; Aublet. Guian. v. 1. 594. Juss. 249. Lamarck Illustr. t. 486.)—Class and order, *Polyandria Tetragynia*. Nat. Ord. *Sapindi*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, fleshy, cloven half way down into five, roundish, concave segments. *Cor.* Petals five, ovate, rounded, concave, fleshy, inserted below the segments of the calyx, and much larger. *Stam.* Filaments very numerous, thread-shaped, longer than the corolla, inserted into the receptacle; anthers roundish. *Pist.* Germen superior, square, in the bottom of the calyx; styles four, thread-shaped, longer than the corolla; stigmas obtuse. *Peric.* Drupas four, kidney-shaped, compressed, inserted by their wedge-shaped inner edge into the conical receptacle, of one cell, with a fleshy covering, and a soft pulp like butter. *Seed.* Nuts solitary, kidney-shaped; kernels solitary, kidney-shaped.

Ess. Ch. Calyx five-cleft half way down. Petals five. Germen four-sided, superior. Nuts four, single-celled and single-seeded.

1. R. *butyrosus*. Lesser Suwarrow Nut. (Caryocar butyrosum; Willd. n. 1. Pekea butyrosa; Aubl. Guian. t. 238.)—Fruit smooth. Leaves digitate, smooth on both sides.—Native of woods in Guiana, and cultivated at Cayenne; where it flowers in June and July, and bears fruit in September. This lofty *tree* rises to the height of eighty feet, or more, and is much branched at the summit; the inner branches erect; the outer horizontal or declining. *Trunk* three feet in diameter, with a grey *bark*, and reddish, compact *wood*. *Leaves* opposite, digitate; leaflets entire, oval, pointed. *Flowers* white, in large bunches, at the extremities of the branches. *Fruit* yellowish.

2. R. *tuberculosus*. Large, or Common, Suwarrow Nut. (Caryocar tomentosum; Willd. n. 2. C. nuciferum; Linn. Mant. 247. Pekea tuberculosa; Aubl. Guian. t. 239.)—Fruit tubercled. Leaves digitate, downy beneath.—Native of Guiana, producing fruit in July. This *tree* differs from the preceding in having thicker *leaves* which are downy beneath, and ash-coloured. *Fruit* larger and tubercled, the pulp dry, not buttery. The *nut* is sweet and palatable, containing a rich oil. Not unfrequent in our fruiterers' shops, and known by the name of Suwarrow Nut. It is figured in Clus. Exot. 27. f. 1, by the name of Amygdala guianensis.

RHIZOMA, an appellation bestowed, by several late authors, on the tuberous *caudex*, or body, of some roots; as that of *Iris Germanica*, and many other of the natural order of *Ensatæ* of Linnæus and Gawler. See ROOT.

RHIZOMORPHA, so called from its resemblance to the branching fibrous roots of various plants, is a genus of fungi, established by Persoon, in his Synopsis, 704. One of its species, *R. subcorticalis*, figured by Micheli, Nov. Gen. t. 66. f. 3, is called by that author, p. 125, Agaricum nigrum reticulatum compressum, e mortuis arboribus inter corticem et lignum, interdum in ipso ligno innascens, ac latè se diffundens. Ray, Vaillant, and others, have likewise considered this substance as a fungus. Persoon's generic character is "Creeping, rigid, smooth, with a villous pith."

He enumerates two species besides the above; *subterranea*, found among wet timber-work, in mines; and *setiformis*, found among dead leaves in woods. This last is figured in Dill. Musc. t. 13. f. 11, b. They are all, to us, very obscure, and perhaps imperfect productions.

RHIZOPHORA, a Linnæan genus, whose name is derived from ῥίζα, *a root*, and φέρω, *to bear*, or *carry*; the seed germinating before it falls from the branches, and sending down a remarkably long cylindrical root into the earth.—Linn. Gen. 236. Schreb. 317. Willd. Sp. Pl. v. 2. 843. Mart. Mill. Dict. v. 4. Juss. 213. Lamarck Dict. v. 6. 187. Illustr. t. 396. Gærtn. t. 45. Loureir. Cochinch. 296. (Mangles; Plum. Nov. Gen. t. 15. Bruguiera; Lamarck Illustr. t. 397.)—Class and order, *Dodecandria Monogynia*. Nat. Ord. *Holeraceæ*, Linn. *Caprifolia*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, spreading, cloven into four, or more, oblong, acuminate, permanent segments. *Cor.* Petals four or more, oblong, somewhat shorter than the calyx. *Stam.* Filaments scarcely any, alternately shorter; anthers from four to twelve, small, pointed. *Pist.* Germen superior, roundish; style awl-shaped, cloven half way down, grooved at each side; stigmas acute. *Peric.* fleshy, nearly ovate, including only the base of the seed. *Seed* solitary, oblong-club-shaped, pointed, fleshy at the base.

Obs. The number in the parts of the flower varies.

Ess. Ch. Calyx four or five-cleft. Corolla of four or five petals. Seed solitary, very long, fleshy at the base.

1. R. *conjugata*. Linn. Sp. Pl. 634. Fl. Zeylan. 81. —Leaves ovate-oblong, rather obtuse, entire. Calyx sessile. Fruit cylindrical, awl-shaped.—Native of India. All that is known of this species may be gathered from the *Flora Zeylanica*, where it is described as a *tree* whose *leaves* are stalked, smooth. *Calyxes* twin. *Fruit* very long, pendent.

2. R. *gymnorhiza*. Linn. Sp. Pl. 634. (Mangium celsum; Rumph. Amboin. v. 3. 102. t. 68.)—Leaves ovato-lanceolate, entire. Root lying upon the ground.—Found in many parts of the East Indies, and in the islands of the South seas.—A middling-sized *tree* with a lofty, erect *trunk*, covered with a thick brown-red *bark*. *Leaves* on stalks, smooth, scattered, sometimes heaped together at the top. *Flowers* solitary, scattered, red, having usually from ten to thirteen petals, and twice as many stamens.

The bark of this tree is useful in dyeing a rufous or chesnut colour, which may easily be changed into a fine permanent black, as Loureiro informs us.

3. R. *Candel*. Linn. Sp. Pl. 634. (Tsjerou-Candel; Rheede Hort. Malab. v. 6. 63. t. 35.)—Leaves obtuse. Flower-stalks in forked pairs, longer than the leaf. Fruit awl-shaped. Native of the East Indies in shallow salt water. A *tree* about seven feet high. *Leaves* opposite, on short stalks, rather long, with round edges. *Flowers* composed of five or six thick, reflexed, white, slightly fragrant petals. *Fruit* very like that of the following species.

4. R. *Mangle*. Mangrove-tree. Linn. Sp. Pl. 684. Jacq. Amer. 141. t. 89. Browne Jam. 211.—Leaves pointed. Fruit slender-club-shaped. Found in moist situations, both in the East and West Indies. A *tree* about fifty feet high, with white *wood*, and a rusty-coloured *bark*. *Leaves* ovate, ribbed, entire, shining, coriaceous, dotted beneath. *Stalks* axillary, solitary, two or three-flowered, slightly triangular. *Flowers* white, having mostly eight petals.

Jacquin and Browne each give an elaborate and curious description of the fruit of this tree and the mode in which the seed germinates. From it's growing usually near the sea, the lower branches frequently become a support to the American oyster, and this circumstance doubtless gave rise to an ancient fabulous opinion, that shell-fish sometimes grew on trees, like fruit.

5. R. *cylindrica*. Linn. Sp. Pl. 635. (Cari-Candel; Rheede Hort. Malab. v. 6. 59. t. 33.)—Fruit cylindrical, obtuse.—Native of salt marshes in Malabar. This species is closely allied to *gymnorhiza*, of which indeed Gærtner considers it to be a variety. It is rather taller, and not so much branched. *Leaves* much smaller, and on shorter stalks. *Fruit* green when young, but afterwards reddish-blue.

R. *corniculata*. See ÆGICERAS.

R. *caseolaris*. See SONNERATIA.

We dare not venture to adopt *R. sexangula* of Loureiro, without further information than is furnished by that author respecting it.

RHIZUS, in *Ancient Geography*, a port of Cappadocia, near Trebizond, between the town of Pitiusa and the promontory of Athenæ. Ptolemy.

RHO, in *Geography*, a town of Italy, in the department of the Olona; eight miles W. of Milan.

RHOARA, in *Ancient Geography*, a town of Asia, in Parthia, between Casipraca and Semina. Ptolemy.

RHOAS, a river of the Colchide, according to Pliny.

RHOBASCI, a people of Scythia, on this side of the Imaus, placed by Ptolemy near the most easterly sources of the river Rha.

RHOBODUNUM, a town of Germany, upon the banks of the Danube, between Phelicia and Andupedum. Ptolemy.

RHOBOGDIUM, a promontory placed by Ptolemy in the northern part of Hibernia.

RHOBONDA, a town of Africa, in Mauritania Cæsariensis, between Tupusuptus and Ausum. Ptolemy.

RHOCAS, the watery eye. See EPIPHORA.

RHODA, or RHODE, *Rosas*, in *Ancient Geography*, a town of Hispania Anterior, belonging to the Indigetes, and N. of a small gulf. It is said to have been built by the Rhodians on the banks of a small river which flowed from the Pyrenées, and called by Pomponius Mela "Thicis." But Cellarius conjectures that it was founded by the inhabitants of Emporiæ, who came thither from the town of Rhodes, in the island of that name.—Also, a town of Gallia Narbonnensis, at the mouth and on the banks of the Rhone, according to Pliny; who adds, that it was built by the Rhodians. St. Jerome intimates that the Rhone took its name from this town.

RHODANNUS, or RODANNUS, a small river which had its source in the palatinate of Pomerania, and discharged itself into the Vistula at Dantzick.

RHODANUS FLUVIUS. See RHONE.

RHODE, a river of the European Sarmatia, in the vicinity of the Axiaces. Pliny.

RHODE *Island*, in *Geography*, one of the United States of America, situated between 41° 17′ and 42° N. lat. and between 71° 6′ and 71° 52′ W. long. Its north line is 29 miles long and its west line 49. The coast west of the bay measures 22 miles, the mouth of the bay 16, and the coast east of the bay 5, in all 43; while the greatest width measured on a parallel is 37 miles. Rhode island contains about 1580 square miles; of which about 190 are water, and about 90 are included in the islands. It is bounded N. and E. by the Massachusetts, S. by the Atlantic, and W. by Connecticut. It is divided, according to the following statement, into five counties and thirty-one townships.

Counties.	No. of Towns.	Population. 1790.	1800.	1810.	Chief Towns.
Providence	- 10	24,391	25,854	30,769	Providence.
Newport	- 7	14,300	14,845	16,294	Newport.
Washington	- 7	18,075	16,135	14,968	S. Kingston.
Kent	- 4	8,848	8,487	9,834	Warwick.
Bristol	- 3	3,211	3,801	5,072	Bristol.
Totals	- 31	68,825	69,122	76,937	

This state sends two representatives to congress. The tribe of Indians who inhabited Rhode island at the time of its settlement, was the Narragansetts, who were a brave and powerful people. The first settlement in this state was made by Roger Williams, and a party of malecontents from Massachusetts, in 1635; and in 1643 a charter was obtained for the whole colony by sir Henry Vane. The charter, on which the present constitution is founded, was obtained of Charles II. in 1663. In May 1789, Rhode island adopted the federal constitution. The inhabitants of this state are chiefly of English descent. Agreeably to the charter just mentioned, the legislature is composed of a council of 12, including the governor and deputy governor, all chosen annually, and a house of representatives, consisting of deputies from the several towns, chosen twice a-year. There is one supreme court, which sits twice a-year in each county, and an inferior court of common pleas and general sessions of the peace for each county, sitting also twice a-year. The militia of this state amount to between 7000 and 8000 men, organized and disciplined in a manner similar to the rest of the New England militia. The settlement of Rhode island is said to have originated in a religious dispute; and some of its first settlers were exiles from the Massachusetts, on account of their religious opinions. The prejudice and animosity thus excited were never thoroughly removed; but they were long cherished by the descendants of the first occupiers; and even to this day, there has never been a congregational minister settled on the west side of the

bay,

bay, except in Providence. The mass of the people, it is said, on the west side of the bay, has generally been ignorant, irreligious, and loose in their morals. The tone of religious sentiment and of morals, in Providence, Newport, and Bristol, and other towns adjoining these on the east of the bay, has been much raised by the emigrants from Massachusetts and Connecticut, and the establishment of religious institutions. The traveller sees few of the improvements in agriculture, roads, manufactures, or mode of living, which he finds in the neighbouring states; and meets with little of that civility for which other parts of New England are remarkable. The missionary labours, however, have not been without their good effects. With respect to the religious profession of this state, the Baptists are the most numerous; most of whom are Calvinistic; some are Arminians, and a few of them are seventh-day Baptists. A still smaller number consists of those who claim peculiar sanctity, and are denominated Separate Baptists. The other denominations are Congregationalists, who have eight ministers; Episcopolians, who have four, one of whom is the bishop of the eastern diocese; Moravians, and Jews. In this state religion is not supported by law; but the clergy are maintained by the voluntary contributions of their people. The number of clergy, as they have no stated salary, enforced by law, is extremely small; but the state of religion and morals, in a great part of the state, is lamentably low. Literature has of late been encouraged. Brown university at Providence, deriving its present name from Nicholas Brown, esq., who gave the institution 5000 dollars, was founded in 1764 at Warren, and removed to Providence in 1770. (See College.) Academies are established at Providence, Newport, Bristol, Warren, East-Greenwich, and South-Kingston. Schools are kept during the winter-months in most towns of the state, though not provided for by the laws; and upon the whole the state of society is improving. In this state there are 13 banks. The chief exports are flax-seed, lumber, horses, cattle, beef, pork, fish, poultry, onions, butter, cheese, barley, grain, spirits, and cotton and linen goods. More than 600 vessels enter and clear annually at the several ports. In 1804 the amount of exports was 1,735,671 dollars, and in 1810, 1,331,576 dollars. The imports consist of European and West India goods, and logwood from the bay of Honduras. The inhabitants, particularly those of Newport and Bristol, were, not long since, largely concerned in the slave trade, even in defiance of the laws of the state. A turnpike road passes from Providence, W.S.W., through Scituate and Coventry, meeting a similar road in Lisbón, Connecticut, which leads through Windham to Hartford; its length is about 25 miles. Another road strikes the Connecticut line S. of this, and passes through Norwich, New London, to New Haven and New York; this is the great southern road from Boston to New York; but the roads in this state have been much neglected. This state is reckoned as healthy as any country in America. The winters in the maritime parts of the state are milder than in the inland country; and the summers are delightful: the extreme heats that occur in other parts of America, being allayed by cool and refreshing breezes from the sea. The rivers and bays swarm with various kinds of fish; and this state produces corn, rye, barley, oats, and in some parts wheat, sufficient for home consumption, and the various sorts of grasses, fruits, and culinary roots and plants in great abundance and perfection. Cyder is made for exportation. The north-western parts of the state are rocky and barren, and of course thinly inhabited. The tract of land lying between North and South Kingston on the east, and Connecticut on the west, called "Shannock" country, or "Purchase," is excellent grazing land, and inhabited by a number of wealthy farmers, who rear some of the finest neat cattle in New England; they keep large dairies, and make butter and cheese of the best quality, and in large quantities for exportation. Iron ore is found in great plenty in several parts of the state; so that the most considerable manufactures of this state are those of iron; and also abundance of lime-stone, which furnishes lime for exportation. In this state are several mineral springs; and one in particular near Providence, to which many people resort for bathing, and for drinking the water.

Rhode *Island*, is an island from which the American state takes its name, near the coast of Massachusetts, about 40 miles S.W. from Boston. It is about 15 miles from N. to S., and on an average $3\frac{1}{2}$ miles wide, and is divided into three townships, *viz.* Newport, Portsmouth, and Middleton. This island is pleasant and salubrious, and is a noted place of resort for invalids from southern climates. Between 30,000 and 40,000 sheep are fed on the island, besides neat cattle and horses. N. lat. 41° 25′. W. long. 71° 20′.

Rhode *River*, the westernmost water of the N.W. branch of Cape Fear river, in North Carolina.

RHODEN, a town of Germany, in the county of Waldeck; 24 miles N.N.W. of Waldeck.

RHODES, *Island of*, in *Ancient* and *Modern Geography*, an island of Asia, situated in the Mediterranean, very near the coast of Caria or Natolia, and N.E. of the island of Crete, but much larger than this island. Pliny states its circuit at 125 miles; but Isidore makes it 103 miles. According to Sonnini, it is much longer than it is broad; its greatest length, in a direction from N. to S., being about 12 leagues, and breadth 6; and its circuit is commonly estimated at 44 leagues. Its form is nearly triangular, whence it obtained the name of "Trinacria;" and it was also known formerly by the names of Ophiusa, Asteria, Æthrea, Cerymbia, Poessa, Atabyria, Marcia, Oloessa, Stadia, Telchinis, Pelagia, and Rhodus. The latter appellation has prevailed in later ages; and its etymology has been sought in the Greek Rhodon, signifying a rose, with which flower the island abounded. In confirmation of this etymology it has been alleged that several Rhodian coins are still extant, exhibiting, on one side, the sun, and on the reverse a rose. Diodorus Siculus deduces the origin of its name from Rhoda, the daughter of Apollo by Venus. Others, however, have preferred the etymology of Bochart, who, availing himself of one of its ancient names, *viz.* Ophiusa or Snake island, given to it on account of the numerous snakes with which it was infested, when it was first inhabited, says that the Phœnicians also called it Snake island, which, in their language, signified "Gesirat Rhod," the latter word meaning a snake, whence the Greeks afterwards formed the name of Rhodes, which the island has since preserved. Another name by which it was distinguished, in common with the island of Cyprus, was Macaria, or fortunate, referring to the nature of the climate and of the soil. But it is said to surpass Cyprus, if not with respect to the fertility of the land, at least by its milder and more agreeable temperature. In this island the heat is not excessive, so that long droughts do not burn the plants, dry up the waters, or cause the inhabitants to suffer. The fertility and productiveness of its soil gave occasion to the fable, embellished by the poets, of those golden showers which they pretended to have once fallen upon it. It formerly produced, in great plenty, all sorts of delicious fruits, and wines of so exquisite a flavour, that they were used by the Romans chiefly in their sacrifices, and thought to be, as Virgil informs us, (Georg. l. ii.) too good for mortals. Although the heat is not scorching, yet the air is so serene, that no day ever passes without sun-shine; whence the poets feigned Phœbus

to

to be in love with this iſland, which, as they ſay, was a mere marſh, altogether uninhabitable, till it was loved by Phœbus and raiſed out of the waters by his powerful influence. To this purpoſe Sonnini deſcribes its temperate climate, pure air, and fine ſprings, which at all times ſupply the wants of its inhabitants, and render it agreeable; its vallies of a rich and fertile ſoil, covered by plentiful harveſts, and clothed with rich paſtures, ſhaded by trees bearing precious fruits, ſuch as the olive, the orange, and the fig-tree, with flowers that embelliſh with their luſtre, and perfume with their ſweet emanations; ſloping hills on which the vine is cultivated, or which preſent to numerous flocks a luxuriant and odoriferous herbage; mountains on which grow the moſt beautiful trees, whoſe verdure is perennial; all which would ſtill render it one of the moſt delightful abodes in the world, did not the iron hand of the Turks efface a part of the colours of this ſmiling picture. A gloomy nakedneſs, ſays the ſame author, diffuſes melancholy over places formerly adorned by the riches of nature and induſtry; and the men who are called thither by an agreeable and truly happy country, are driven back by the terror inſpired by a horde of ſpoilers. Happineſs no longer inhabits an iſland formerly "fortunate," and the golden ſhower, which the poets of antiquity cauſed to fall there, as an emblem of its riches and brilliant advantages, is converted into a ſtorm of deſolation.

In the time of Homer the iſland of Rhodes had three cities, *viz.* Lindus, now *Lindo*, Camirus or *Camiro*, and *Ialyſus*, the moſt ancient city in the whole iſland; to which in after ages was added a fourth, bearing the name of the iſland. (See each reſpectively.) Theſe three cities were built, according to Diodorus, by Tlepolemus, the ſon of Hercules, before the Trojan war. But Strabo and Cicero inform us, that they were founded by the Heliades, or grandſons of Phœbus, Ialyſus, Camirus, and Lindus, who gave each of them his own name. Other writers ſay, that they were built by the Dorians not long after their migration; and hence Athenæus reckons them among the Dorian colonies. Herodotus ſays, they were founded by the daughters of Danaus, who landed in this iſland, after having put to death the ſons of Ægyptus, their huſbands. In the city of Lindus was a magnificent temple, built, according to Plutarch, in honour of the Lindian Minerva, a ſtatue of which, together with the mother of Jupiter Dodonæus, both of exquiſite workmanſhip, were found in the rubbiſh of the city, after it had been accidentally reduced to aſhes, and removed to Conſtantinople. In this temple there were alſo ſeveral pictures by Parrhaſius, Zeuxis, and other great maſters. Lindus and Ialyſus were well fortified in the time of the Peloponneſian war, as we learn from Thucydides; but Camirus was without walls. The three cities now mentioned were, as Strabo informs us, three different republics, independent of each other, governed by their own laws, till the inhabitants abandoned them, and removed to the city of Rhodes.

This iſland was firſt peopled, according to Diodorus Siculus, by the Telchinæ from Crete; but dreading a deluge, they abandoned their habitations, and made way for the Heliades, or grand-children of Phœbus, who took poſſeſſion of it, after Apollo had cleared it of the mud, with which it had been covered by the deluge. The Heliades, being infeſted with ſerpents, ſent for Phorbas from Theſſaly, upon the ſuggeſtion of the oracle at Delos, who brought with him a number of Theſſalians, ſettled on the iſland, deſtroyed the ſerpents, and after his death was honoured as a demi-god. A colony of Cretans afterwards ſettled at Camirus, in this iſland, under the conduct of Althæmenes, ſon of Catreus, king of Crete; and by direction of the oracle, he was honoured after his death as a hero or demi-god. Not long before the Trojan war, Tlepolemus, the ſon of Hercules, in compliance with the inſtruction of the oracle, which he conſulted, left Argos, and ſettled in Rhodes. He here planted a colony, which he governed as king of the iſland with great equity. Diodorus ſays, theſe were the firſt inhabitants of Rhodes. After the Trojan war, the beſt part of the iſland was taken poſſeſſion of by the Dorians, who expelled the ancient proprietors, and the Doric dialect was commonly uſed throughout the whole iſland.

The Rhodians applied themſelves, at an early period, to trade and navigation, and for many ages were ſovereigns of the ſea: their laws being the ſtandard by which all controverſies relating to maritime affairs were decided. Theſe laws and conſtitutions were ſo juſt, that they were afterwards incorporated into the Roman pandects, and followed in all the provinces of the Roman empire.

The government of Rhodes was originally monarchical; and ſeveral kings are ſaid to have reigned there long before the Trojan war; but of theſe we have no account. Among the eminent writers of this iſland, we have an enumeration of the following, whoſe names we can only mention: *viz.* Ariſtophanes, Eudemus, Hieronymus, a Peripatetic philoſopher, Leonidas, Piſander, Panetius, Apollonius Molon, Timocreon, Præciphanes, Anthæas, &c. The authors of the Univerſal Hiſtory (ubi infra) have given a brief account of ſome of them, and referred for an ampler detail to Meurſius's learned treatiſe on the iſland of Rhodes, printed at Amſterdam in 1675, and publiſhed with thoſe on Crete and Cyprus by the ſame author.

In the time of the Trojan war, and after that epoch, the kings who reigned in this iſland were, Tlepolemus, Dorieus, Damagetus, Diagoras, Evagoras, Cleobulus, Eraſtides, Damagetus II., and Diagoras II. The laſt of theſe ſovereigns proved conqueror in the Olympic, Iſthmian, Nemæan, and Argian games, and on that account is celebrated by Pindar. His three ſons were alſo victors in the Olympic ſports. Upon the death of Diagoras II. ſome extraordinary revolution muſt have happened; as another family had poſſeſſion of the throne. After the death or expulſion of the laſt king, the republican government prevailed over the whole iſland; during which the Rhodians engaged in trade and navigation, became very powerful by ſea, and planted ſeveral colonies in diſtant countries; *viz.* Rhodus in Spain, and Parthenope in the country of the Opici. At this time they were maſters of the Balearic iſlands, then called the Gymnaſian iſlands. During the Peloponneſian war the Rhodians firſt joined the Athenians, revolted from them to the Lacedæmonians, and afterwards joined the former. At this time the republic of Rhodes was rent into two factions, the people favouring the Athenians, and the nobles the Lacedæmonians; but the latter at laſt prevailed; democracy was aboliſhed, and an ariſtocracy introduced in its room. Under this form of government the ſtate enjoyed a profound tranquillity, until the third year of the 105th olympiad, which was the third year of the reign of Philip the ſon of Amyntas, when the Social war broke out, which, after it had laſted five years, was concluded by a treaty, very little to the honour of Athens. By this treaty, Rhodes, Chios, Cos, and Byzantium, were to enjoy full liberty, and be quite independent of Athens. The Rhodians, however, did not remain long unmoleſted; but they were oppreſſed by Mauſolus, king of Caria, who had aſſiſted them in throwing off the Athenian yoke. After ſuffering for ſome time, they equipped a fleet, invaded Caria, and regained their liberty. Artemiſia, the queen of Mauſolus, by an act of treachery, poſſeſſed herſelf of the city of Rhodes, and put to death the chief citizens

citizens who had planned the Carian expedition. In this ſtate of diſtreſs, the Rhodians recurred to the Athenians, and either by their aſſiſtance, or by exertions on their own part, after the death of Artemiſia, were reſtored to their ancient liberty. From this time till the reign of Alexander the Great the Rhodians enjoyed undiſturbed tranquillity; and as they delivered their cities and harbours to his cuſtody, they were on that account highly favoured by that prince. Diodorus indeed tells us, that Alexander depoſited his laſt will in the archives of the city of Rhodes, and ſhewed, on all occaſions, a greater value for the Rhodians than for any other of the Greek nations. But they no ſooner had heard of his death, than, taking up arms, they drove out the Macedonian garriſons, and once more became a free people. About this time Rhodes, the capital city, ſuffered very much from an inundation, accompanied by a tempeſt and hailſtones of an extraordinary ſize, which demoliſhed many houſes, and killed a great number of the inhabitants. The Rhodians ſoon repaired the damage which they had ſuſtained, by a renewed and very ſedulous application to trade and navigation, the only ſources of their wealth and power. Although they were in amity with the neighbouring princes, and were deſirous of obſerving a ſtrict neutrality, by which prudential caution they were become one of the moſt opulent ſtates of Aſia; yet their inclination, concurring with their intereſt, they ſecretly attached themſelves to Ptolemy: the moſt advantageous branches of their commerce ſpringing from Egypt. When Antigonus, who had engaged in a war with Ptolemy for the iſland of Cyprus, demanded ſuccours of them, and they heſitated in declaring againſt their ancient friend and ally, his anger was excited, and he immediately ordered one of his admirals to ſail with his fleet to Rhodes, and ſeize all the ſhips that ſailed out of the harbour for Egypt. The Rhodians, finding their harbour blocked up by the fleet of Antigonus, equipped a great number of gallies, attacked the enemy, and obliged him, with the loſs of many ſhips, to quit his ſtation; Antigonus was incenſed, and threatened to beſiege their capital with his whole army. They remonſtrated, but with little effect, and the only terms of accommodation they could obtain, were, that they ſhould declare war againſt Ptolemy, that they ſhould admit Antigonus's fleet into their harbour, and that 100 of their chief citizens ſhould be ſurrendered as hoſtages for the performance of theſe articles. The Rhodians applied to their allies, and particularly to Ptolemy, for aſſiſtance; and after great preparations on both ſides, Demetrius put himſelf at the head of a large body of troops, increaſed by pirates and mercenaries, who wiſhed to plunder Rhodes of its riches, and having laid waſte the country round the city, approached the city itſelf with his powerful forces, and fortified his camp with ſtrong ramparts and a triple paliſade. The Rhodians adopted every poſſible meaſure for a vigorous defence. After repeated aſſaults on the part of Demetrius, which were repulſed with great ſlaughter, he brought forward a newly invented machine, called "helepolis," with a variety of other engines, and he employed in the management of them about 30,000 men. The beſieged, in the mean while, raiſed a new wall, within that which the enemy intended to batter with the helepolis. The city was furiouſly aſſaulted on all ſides, both by ſea and land; and an honourable capitulation on the part of the Rhodians being refuſed by Demetrius, the attack was renewed, and a breach made in the wall; but the beſieged fought in the breach with ſuch intrepidity, that the enemy, after ſeveral unſucceſsful attempts, were forced to abandon the enterpriſe and retire. A ſeaſonable ſupply of proviſions arriving ſafe at Rhodes, the beſieged gained new courage, and determined to ſet fire to the enemy's engines. In the execution of this project a great number of Demetrius's troops fell victims, and the conflagration was ſo great, that Demetrius thought it moſt prudent to move off his machines, leſt they ſhould be utterly deſtroyed. Whilſt the Rhodians were thus, with equal valour and perſeverance, defending themſelves and annoying the enemy, an embaſſy arrived at the camp of Demetrius from Athens, and the other cities of Greece, ſoliciting him to make peace with the Rhodians. A ceſſation of arms was agreed upon, and terms were offered by Demetrius, which were rejected by the Rhodians. The aſſault was renewed, and a breach having been made, it was entered by a detachment of Demetrius's men; which occaſioned great confuſion in the city: but the Rhodians fought like men in the utmoſt deſpair, and animated by their leaders, who encouraged one another, they propoſed a laſt effort for the defence of their city and country, which was that of breaking into the very centre of the enemy's battalion, in the execution of which meaſure they killed both their commanders. After their death, the reſt were eaſily thrown into diſorder, and all to a man were either killed, or taken priſoners. The Rhodians alſo, on this occaſion, loſt many of their braveſt commanders. At length the helepolis was rendered uſeleſs, by the ſtratagem of a Rhodian engineer, and this misfortune, it is ſaid, induced Demetrius to conclude a peace. Thus the ſiege, after it had continued a whole year, was raiſed (B.C. 303); and the Rhodians amply rewarded all thoſe who had diſtinguiſhed themſelves in the defence of their country. One inſtance of laudable conduct on the part of Demetrius during the ſiege deſerves to be recorded. At this time Protogenes, a celebrated painter, who was a native of Cannus, a city of Caria, reſided at Rhodes. His houſe was in the ſuburbs; and he could not be prevailed upon to quit it. The prince, ſurpriſed at this reſolution, aſked him why he did not, like the other inhabitants, ſecure himſelf within the walls? Protogenes replied, that he was under no apprehenſion, ſince he was ſenſible that Demetrius had declared war againſt the Rhodians, and not againſt the arts. The prince was ſo pleaſed, that he took the painter under his protection, and placed a guard round his houſe, to preſerve him from the inſults of the ſoldiery. The chef-d'œuvre of this Protogenes was the picture of Ialyſus, ſuppoſed by the Rhodians to have founded their city. The Rhodians having concluded a peace upon advantageous and honourable terms, devoted themſelves again to trade and navigation; by which they not only became maſters of the ſea, but the moſt opulent and flouriſhing ſtate of all Greece. Their next war was with the Byzantines; and about the time of its termination the famous Coloſſus of Rhodes was overturned by an earthquake, which did other conſiderable damage. In the year B.C. 203, the Rhodians joined Attalus, king of Pergamus, againſt Philip, king of Macedon; and a triple alliance was formed between the Romans, Attalus, and the Rhodians. In proceſs of time, the fidelity of the attachment of the Rhodians to the Romans, of which they had once and again exhibited unequivocal evidence, was ſuſpected; and this ſuſpicion was confirmed when they engaged with Perſes, the ſon of Philip, to ſtand neuter. The Roman ſenate was incenſed, and the Rhodians ſent meſſengers to appeaſe their wrath, but their efforts were unavailing. At length, however, in the year B C. 166, they were admitted to an alliance with Rome and favoured by the ſenate. From this period, to the breaking out of the Mithridatic war, the Rhodians enjoyed their liberties, while all the other ſtates and colonies of Greece were brought under the Roman yoke, and became provinces of that republic. In the civil war between Cæſar and Pompey, they aſſiſted the latter with a numerous fleet; but after the death of Pompey they

they ſided with Cæſar, which drew upon them the diſpleaſure of C. Caſſius, who advanced to their iſland with a powerful fleet, and demanded the ſurrender of their fleet, with which demand they refuſed to comply. The conſequence was a ſea-engagement, in which the Rhodians were defeated; and it has been obſerved, that this was the firſt time in which they were fairly overcome in a ſea-fight. Caſſius proceeded to take poſſeſſion of Rhodes and to plunder it. He alſo ordered fifty of the chief citizens to be put to death, and others were proſcribed. He ſtripped them of all their money, and even the temples of all their valuable furniture, veſſels and ſtatues. He announced, by a public cryer, that any perſon who ſhould diſcover any hidden treaſures ſhould receive a tenth part by way of recompence; and the reſult was, that he thus extorted from private perſons above 8000 talents. He then fined the city in 500 more, and leaving L. Varus, with a ſtrong garriſon to exact the fine, without any abatement, he returned to the continent.

After the death of Caſſius, Marc Antony reſtored the Rhodians to their ancient rights and privileges, beſtowing upon them the iſlands of Andros, Naxos, Tenos, and the city of Myndus. But theſe the Rhodians ſo oppreſſed and loaded with taxes, that Antony, though a great friend to the Rhodian republic, was obliged to diveſt her of the ſovereignty over thoſe places, which he had, a little before, ſo liberally beſtowed upon her. From this time to the reign of the emperor Claudius, we find no mention made of the Rhodians. That prince deprived them of their liberty for having crucified ſome Roman citizens. However, he ſoon reſtored them to their former condition, as we read in Suetonius and Tacitus. The latter adds, that they had been as often deprived of, as reſtored to, their liberty, by way of puniſhment or reward for their different behaviour, as they had obliged the Romans with their aſſiſtance in foreign wars, or provoked them with their ſeditions at home. Pliny, who wrote in the beginning of Veſpaſian's reign, ſtyles Rhodes a beautiful and free town. But this liberty they did not long enjoy, the iſland being ſoon after reduced, by the ſame Veſpaſian, to a Roman province, and obliged to pay a yearly tribute to their new maſters. This province was called the province of the iſlands. The Roman prætor, who governed it, reſided at Rhodes, as the chief city under his juriſdiction; and Rome, notwithſtanding the eminent ſervices rendered her by this republic, thenceforth treated the Rhodians not as allies but vaſſals.

Under Conſtantine this iſland remained part of the Eaſtern empire; but the puſillanimity and vices of the princes who ſucceeded, ſhook it to its foundation. In the twelfth year of the reign of Conſtans, Moawiah, Othman's lieutenant, made himſelf maſter of Rhodes. At length the Greek emperors expelled the Mahometans, and kept poſſeſſion till the time of Baldwin, who, having made himſelf ſovereign of Conſtantinople, ſent a prefect to Rhodes. Some time after it was conquered by Ducas. Then the brave warriors, known by the name of the knights of St. John, attacked, and, after a bloody battle, took it; in which heroiſm triumphed over numbers and valour. Mahomet II. tarniſhed the luſtre of his laurels, by beſieging this place, defended by a ſmall band of heroes. In the year 1523, Soliman ſaw a numerous army periſhing under its walls; and if this redoubtable conqueror of Hungary and Perſia did at length ſubdue Rhodes, attacked on all ſides by the forces of the Turks, the greater was the ſhame of the Chriſtian princes, who did not ſend a ſingle veſſel to the aid of its intrepid defenders. Deſtroyed, rather than vanquiſhed, they were almoſt buried under the ruin of their forts. Soliman could not enter the town without wading through the blood of his ſoldiers; and in it he found nothing but heaps of ruins, defended by a ſmall company of knights, covered with wounds, who afterwards removed to Malta. (See MALTA). The governor-general of this iſland is a pacha, who has abſolute power. The Greeks and Jews have a chief, named the Moutevali, who is their intendant-general, and has the regulation of the tax, called carach,—a capitation tax impoſed by the grand ſeignior on all his ſubjects who are not Mahometans, but is paid only by the men.

The ſoil of the iſland is dry and ſandy, but watered by its numerous ſprings. It is very fertile: corn thrives well; and its yellow and heavy grain affords flour as white as ſnow, which makes excellent bread. It needs only cultivation to raiſe an ample ſupply, not only for its own conſumption, but for a large exportation. The number of families in the whole iſland is eſtimated at 4700 Turks, 2500 Greeks, and 100 Jews, in all 7300, or about 36,000 inhabitants. N. lat. 36° 26'. E. long. 27° 32'.

RHODES, the capital city of the iſland above deſcribed, as well as the chief ſeat of its government, is ſituated to the N.E. of the iſland, at the foot of a hill of gentle aſcent, and in an agreeable plain, environed at ſome diſtance with ſeveral hills full of ſprings, and covered with all kinds of fruit-trees. This ſtately city was built by the ſame architect whom the Athenians had employed in building the Piræus, or part of Athens; *viz.* Hippodamus, a native of Miletus, and eſteemed one of the beſt architects Greece ever produced. It was built, according to Strabo and Ariſtides, in the form of an amphitheatre, ſurrounded with walls like thoſe of Munichia, embelliſhed with moſt ſtately buildings, ſtraight and broad ſtreets, pleaſant avenues, fine groves, large ſquares, &c. Dio Chryſoſtom ſays, that moſt of the Pagan deities had temples in this city; among which that of the Sun, called by the Dorians Halcium, was one of the moſt noble ſtructures of antiquity. Strabo mentions the temple of Bacchus, enriched with a great number of pictures by Protogenes. Heſychius, Appian, and Suetonius, ſpeak of the temples of Iſis, of Ocridian, and Diana, as maſter-pieces of art. Each of theſe temples contained immenſe treaſures, the offerings of votaries from all parts of Greece, Aſia, and Italy. In the Dionyſium, or temple of Bacchus, was a ſtatue of Pluto of maſſy gold, and an incredible number of other ſtatues and pictures. Pliny informs us, that, in his time, there were in the city of Rhodes above 3000 ſtatues, moſt of them executed with great taſte; and Ariſtides ſays, that there were more valuable ſtatues and pictures in this ſingle city than in all the other cities of Greece. The pictures of Menander, king of Caria, and of Anæus, the ſon of Neptune, by Apelles, and thoſe of Perſeus, Hercules, and Meleager, by Xeuxis, are highly extolled by Pliny, and other ancient writers. That of Meleager was there ſcorched by lightning, as Pliny tells us, but that accident did not in the leaſt deaden the luſtre and brightneſs of its colour.

In the Roman times this city was famous for the ſtudy of all ſciences, and reſorted to by ſuch of the Romans as were deſirous of improving themſelves in literature; ſome of the ancients repreſenting it as equal to Athens itſelf. It had a very convenient harbour, at the entrance of which were two rocks; and on theſe rocks, though 50 feet aſunder, the famous coloſſus is ſuppoſed to have ſtood. See COLOSSUS.

The city of Rhodes is ſtill a place of conſiderable note; being pleaſantly ſituated on the ſide of a hill, three miles in compaſs, and fortified with a treble wall; but its ramparts partake of the ſame neglect and decay of every thing that is in the poſſeſſion of the Turks. The ſtreets are wide, ſtraight, and well paved; and the houſes built after the Italian taſte. The chief haven is now very different from what it is ſaid to have been in its ancient ſtate. It is no

longer

longer that basin, whose deep waters afforded a commodious shelter to ships of every size; nor are the quays enlivened by the activity of a flourishing trade. It is now little frequented except by Greek boats, and by a few merchant vessels which put in there; it is half choked up, and ships of war are obliged to cast anchor without, where they are but indifferently protected from the winds and waves by some points of land and some shoals. The entrance of the harbour is defended, on the one side, by a square tower, constructed by a grand master of the order; inscriptions and other marks recall to mind the period of its foundation. The Turks still call it St. John's tower, although the Greeks have changed this name into that of St. Nicholas, more generally adopted in the Levant. On the other side is a tower, not so high, nor so strong, which is named St. Angelo's or St. Michael's tower. The harbour is as if divided into two by a small mole, which projects within it, and forms an inclosure, into which boats alone can enter, and which, on that account, is called Boat harbour. Independently of the large harbour, there was another on each side; the one was the harbour for gallies, where they can no longer enter at this day; the other is choked up, and almost entirely dry. Every thing, says Sonnini, is destroyed; every thing is annihilated under a government, which knows only to enjoy, or rather to abuse the present, and to which the most simple calculations of foresight are unknown. Yards for shipbuilding, which might, with so much reason, be called workshops of dilapidation, are established at Rhodes for the Ottoman navy; the timber is brought from the fine and vast forests of Caramania, and even from those of the island. But the construction of ships is so slow, and the timber so injudiciously selected, that they are sometimes half-rotten before they are entirely finished.

In several places of the city of Rhodes are still to be seen marks of the ancient possession of the order of St. John of Jerusalem; a long street preserves the name of Rue des Chevaliers; it is perfectly straight, and formed of old houses, in which remain the armorial bearings of the members of the order. The ancient church of St. John is become the principal mosque; the hospital has been transformed into public granaries; and the palace of the grand master, falling into ruins, is almost entirely deserted. N. lat. 36° 25′. E. long. 27° 45′.

Rhodes, a town of Africa, in the kingdom of Tunis, situated on an eminence, between the lake of Tunis and the sea, at a distance from some hills, where Hanno was defeated by Regulus.

Rhodes, *Colossus of.* See Colossus.

Rhodes, *Straits of.* See Malta.

RHODEZ. See Rodés.

RHODIA, in *Botany.* See Rhodiola.

RHODIGINUS, Cœlius, in *Biography*, a learned Italian, whose proper name was Ludovico Celio Richeri, was born at Rovigo about the year 1450. He studied at Ferrara and Padua, and then travelled into France, in which country he resided a considerable time. On returning to Italy, he filled the office of public professor in his native place from 1491 to 1497, and again obtained the same appointment in 1503; after this he opened a school at Vicenza, where he continued till 1508, when he was invited to Ferrara by duke Alfonzo I. In the year 1515, Francis I. nominated him to the chair of Greek and Latin eloquence in Milan, as successor to Demetrius Chalcondylas. He returned in 1521 to Padua, and in 1523 he was re-admitted to the council of his native city, and deputed from it to Venice, to congratulate the new doge. So great was his loyalty, or his gratitude, that, in 1525, he died of grief, on account of the defeat and capture of Francis at the battle of Pavia. He was author of various works; of these, the principal is entitled "Antiquæ Lectiones," of which he published sixteen books, and fourteen more were added after his death. It was printed at Basil in 1566, and again at Franckfort in 1666. It has been characterised as a miscellany of profound erudition, in which abstruse words in Greek and Latin are explained, obscure passages in the best authors are elucidated, and corrupt ones rectified; recondite histories and ancient rites are narrated, and many arcana of the deepest philosophy, especially of the Platonic school, are brought to light; "whence," says the learned Vossius, "I am often moved with wonder, and indeed with indignation, in observing that the precious labours of such a man are so little in the hands of the youth of the present time." By Julius Scaliger he was denominated "the Varro of the age." Gen. Biog.

RHODIOLA, in *Botany*, from ῥόδον, *a rose*, because the root of this plant, when dried, has a rose-like smell. Rhodiola is literally the diminutive of Rhodia, a name applied by ancient writers to the wood or root of some plant (suspected by Linnæus to be a *Convolvulus*) possessing a similar fragrant property.—Rose-Root.—Linn. Gen. 526. Schreb. 693. Willd. Sp. Pl. v. 4. 807. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 1082. Ait. Hort. Kew. v. 5. 397. Juss. 307. Lamarck Illustr. t. 819.—Class and order, *Dioecia Octandria.* Nat. Ord. *Succulentæ*, Linn. *Sempervivæ*, Juss.

Gen. Ch. Male, *Cal.* Perianth inferior, four-cleft, concave, erect, obtuse, permanent. *Cor.* Petals four, oblong, obtuse, erect, spreading, twice as long as the calyx, deciduous. Nectaries four, erect, emarginate, shorter than the calyx. *Stam.* Filaments eight, awl-shaped, longer than the corolla; anthers simple. *Pist.* Germens four, superior, oblong, acuminate; styles and stigmas obsolete. *Peric.* abortive. *Seeds* none.

Female, *Cal.* Perianth as in the male. *Cor.* Petals four, generally imperfect, of a coarse texture, erect, obtuse, equal with the calyx, permanent. Nectaries as in the male. *Pist.* Germens four, superior, oblong, acuminate, ending in simple, straight styles; stigmas obtuse. *Peric.* Capsules four, corniculate, opening inwardly. *Seeds* numerous, roundish.

Obs. Schreber says (in his Appendix, 839), that professor Dahl having seen specimens of Rhodiola with perfect flowers, *viz.* with ten stamens and five pistils, the genus should properly be united to Sedum. Linnæus, however, in his *Flora Lapponica*, mentions a specimen found in Lapland with perfect flowers; but, at the same time, he tells us, that such flowers are barren, none being fertile, except those true female flowers, on a separate plant, which have no stamens, and but imperfect petals. Hence it appears, that the present plant is truly dioecious in habit, although it may occasionally incline to the perfect structure of Sedum.

Eff. Ch. Male, Calyx in four parts. Petals four. Nectaries four, notched.—Female, Calyx and nectaries like the male, but somewhat smaller. Petals of a coarse texture. Capsules four, many-seeded.

1. R. *rosea.* Rose-root. Linn. Sp. Pl. 1465. Engl. Bot. t. 508. Fl. Dan. t. 183.—Found in the clefts of Alpine rocks, and sometimes on rocks by the sea-shore, in different parts of Great Britain; flowering in May and June. —*Root* perennial, fleshy, white or greyish, when dried emitting a fragrance like that of rose-water. *Stems* perfectly simple, erect, a span high, thickly beset with leaves. *Leaves* imbricated, sessile, obovate, acute, fleshy, glaucous, smooth, toothed towards the top, in the male tipped with red. *Cyme* terminal, sessile, much branched, composed of numerous yellow flowers, the female ones dotted with red.

—It ſhould be remarked, that the odour of the root is greatly impaired by culture.

Miller cultivated a variety of this plant for many years at Chelſea, which was ſmaller in all its parts, and had purpliſh flowers.

We can by no means admit *Rhodiola biternata*, Loureir. Cochinch. 627, becauſe that author had never ſeen the female flowers; and his deſcription of its twining ſtem, and doubly-compound leaves, renders it in habit ſo totally unlike the original *Rhodiola*.

Rhodiola, in *Gardening*, comprifes a plant of the low herbaceous, odoriferous, ſucculent, perennial kind, of which the ſpecies cultivated is the common, or yellow roſewort (R. roſea).

Of which there is a variety, in which the roots are ſmaller; the ſtalks ſmall, and not above five inches long; the leaves ſmall, ending with a purple point; the petals are purpliſh, and the ſtamens little longer than the petals. It flowers later than the common ſort.

Method of Culture.—This plant may be increaſed by planting cuttings of the ſtalks in the beginning of April, ſoon after they come out from the head, in a ſhady border; covering them cloſe down with a glaſs, and keeping them dry, when they moſtly put out roots in about ſix weeks; but the cuttings ſhould be laid in a dry room at leaſt a week before they are planted out, otherwiſe they are apt to rot and be deſtroyed. They may alſo be raiſed by parting the roots in the beginning of autumn, when the ſtalks begin to decay; and when the fleſhy parts are cut or broken, they ſhould be laid to dry a few days before they are planted. They require a ſhady ſituation, and a dry undunged ſoil, in which they will continue many years. They afford variety in the borders, clumps, &c.

RHODITES Lapis, the *Roſe-ſtone*, in *Natural Hiſtory*, the name given by authors to a kind of aſtroites, or ſtar-ſtone, in which the figures more repreſent roſes than ſtars; they are in both owing to coralloide bodies immerſed in the ſtone; which, according to their various ſpecies, afford a different figure, when cut tranſverſely, in cutting the ſtone into plates for uſe.

RHODIUM, in *Chemiſtry*, a new metal, found in crude platina, ſo called from the roſe-colour of a dilute ſolution of the ſalts containing it, by Dr. Wollaſton, to whoſe inquiries we are indebted for proof of its exiſtence, and an account of its properties. This metal is thus procured: ſome crude platina being digeſted in moderately dilute nitro-muriatic acid, a browniſh-red ſolution is obtained; from this the platina is to be ſeparated, for the moſt part, by muriate of ammonia, and the reſidual liquor is to be heated with zinc; by this treatment a black powder will be obtained, and the ſupernatant fluid will conſiſt of the muriates of zinc and iron. This black powder, by digeſtion in very dilute nitric acid, will be freed from the copper and lead which it uſually contains, and the reſidue is to be digeſted in dilute nitro-muriatic acid, till every thing ſoluble is taken up. To this ſolution a little common ſalt is to be added, and the whole evaporated to dryneſs; after which, by repeatedly waſhing with warm alcohol, the ſoda-muriates of platina and palladium will be diſſolved, leaving behind a pure ſoda-muriate of rhodium.

This ſalt is readily ſoluble in hot water, and depoſits on cooling rhomboidal cryſtals of a bright roſe-colour. Sal ammoniac occaſions no turbidneſs in the ſolution; but if a few drops of muriate of platina are added to the mixture, an immediate yellow precipitate is thrown down. Neither pruſſiat of potaſh, nor hydro-ſulphuret of ammonia, nor the carbonated alkalies, produce any precipitate; but the pure alkalies throw down a yellow oxyd, ſoluble either in alkalies or acids. The muriate of this metal is an uncryſtallizable ſalt of a roſe-colour, and ſoluble in alcohol; with nitre, or the muriates of ammonia or ſoda, are formed cryſtallizable triple ſalts inſoluble in alcohol.

Nitrate of rhodium is alſo uncryſtallizable. It appears not to be decompoſable by ſilver, but is ſo by copper, mercury, and moſt of the other metals.

The ſoda-muriate of this metal affords a black powder by digeſtion with zinc; which, when heated with borax, acquires a white metallic luſtre, but is infuſible by any heat that has hitherto been applied. It is, however, fuſible, either with arſenic or ſulphur, and may be again ſeparated from thoſe ſubſtances by heat, but it does not acquire by this treatment any degree of malleability. It combines with moſt metals, and with ſilver and gold forms very malleable alloys, which are unaltered by a high heat, but become encruſted with a black oxyd when ſlowly cooled; an alloy of ſix parts of gold and one of rhodium differs but little in colour from fine gold, but is much more difficultly fuſible. The ſpecific gravity of rhodium appears to be ſomewhat more than 11. That of an alloy conſiſting of one part rhodium and about two parts lead, was 11.3; which is ſo nearly that of lead itſelf, that each part of this compound may be conſidered as having about the ſame ſpecific gravity. Phil. Tranſ. for 1804, vol. xciv. pt. 2. See Palladium and Platina.

Rhodium *Lignum*. See Aspalath.

Rhodium *Marmor*, a name given by the ancients to a marble brought from Rhodes; it was a good white, but inferior to the Parian, and was uſed by the Romans in their public buildings, and ſometimes in ſtatuary.

RHODIUS, in *Geography*, a river of European Turkey, which takes its ſource N.E. of mount Ida; and after receiving ſome rivulets which flow from the neighbouring mountains, and traverſing a ſpace of twelve or fifteen miles, diſcharges itſelf into the Helleſpont, by the ſide of the caſtle of Dardanelles. Its waters, which are far from being abundant in ſummer, are kept back and employed in the irrigation of the lands; but in winter, ſwelled by the rains which are frequent in that ſeaſon, it occupies a bed ſufficiently large to deſerve the name of river. The inhabitants of the Dardanelles, built on its banks, have conſtructed a wooden bridge, at ſome diſtance from its mouth, in order to be able to croſs at all times to the left bank, and repair to the fields which they cultivate beyond it. Behind the caſtle, between the town and the river, is a tolerably extenſive walk, naturally turfed, and ſhaded by very tall plane-trees. This river waters an extremely fertile valley, formed by a plain to the eaſt of the town. In this town are reckoned ſcarcely 4000 inhabitants, Greeks, Muſſulmans, and Jews. Its poſition is agreeable, its territory is fertile, and its productions are very diverſified. To the N.E. is a riſing ground, covered with vines; and at the extremity of the fore-mentioned valley are found indications of a volcano; among others are to be ſeen conſiderable blocks of granite, the quartzoſe part of which is almoſt converted into glaſs. A little farther on is a fertile and circular bottom of ſmall extent, ſurrounded by mountains covered with wood.

In the territory of the Dardanelles are cultivated cotton, ſeſamum, various kitchen-garden plants, the vine, the olive-tree, and ſeveral ſpecies of fruit-trees. The orange-trees begin to grow here in the open air; and a tolerable large quantity of grain is collected here. The neighbouring mountain furniſh the "velanida," (ſee Quercus *Ægilops*,) and gall-nut uſed in trade. Olivier.

Rhodius, in *Ichthyology*, the Acipenser *Sturio*. See Sturgeon.

RHODODENDRA, in *Botany*, a natural order of plants, named after its principal genus, (ſee the next article,) and

and conſtituting the fiftieth in Juſſieu's ſeries, or the ſecond of his ninth claſs; for the characters of which claſs ſee ERICÆ and GUAIACANÆ. The following are the marks of the order in queſtion.

Calyx divided, permanent. *Corolla* inſerted into the bottom of the calyx; ſometimes of one petal, and lobed; ſometimes almoſt polypetalous, the limb being ſo very deeply divided. *Stamens* definite, diſtinct; in the monopetalous genera inſerted into the corolla; in the reſt into the baſe of the calyx. *Germen* ſuperior; ſtyle one; ſtigma ſimple, often capitate. *Capſule* ſuperior, of ſeveral cells, and ſeveral valves, both margins of each valve inflexed, and connected with the central axis, (or *columella*,) ſo that each forms a cell, containing numerous minute ſeeds. *Stem* ſhrubby, more or leſs lofty. *Leaves* alternate, or more rarely oppoſite; the young ones, in many inſtances, revolute at the margin.

Section 1. *Corolla monopetalous.*

Kalmia, Rhododendrum, and *Azalea*; all Linnæan genera; to which is to be added MENZIESIA; ſee that article.

Sect. 2. *Corolla imperfectly polypetalous.*

Rhodora, Ledum, Befaria, (now more correctly written *Bejaria*, by Ventenat and others; the Spaniards having pointed out the error, which originated in a miſtake of Linnæus, in reading Mutis's manuſcript,) and *Itea*; all likewiſe Linnæan genera.

Juſſieu conſiders the *Rhododendra* as eſſentially diſtinguiſhed from his *Ericæ*, by the want of horns to the anthers, and eſpecially by the inflexed margins of the valves of the capſule. It does not appear to us that theſe characters are, either of them, ſtrictly abſolute. Mr. Saliſbury has long ago obſerved, that the leaves of the *Rhododendra* have always a remarkable glandular tip.

RHODODENDRUM, from ῥόδον, *a roſe*, and δένδρον, *a tree*, a name adopted by Linnæus from Dioſcorides, whoſe ῥοδόδενδρον however is but a ſynonym to his νήριον, our *Nerium*, or Roſe-bay; the ῥοδοδάφνη of the modern Greeks.—Linn. Gen. 218. Schreb. 294. Willd. Sp. Pl. v. 2. 603. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 49. Purſh v. 1. 297. Juſſ. 158. Lamarck Illuſtr. t. 364. Gærtn. t. 63. —Claſs and order, *Decandria Monogynia*. Nat. Ord. *Bicornes*, Linn. *Rhododendra*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, in five deep ſegments, permanent. *Cor.* of one petal, widely funnel-ſhaped; its limb ſpreading, with five rounded unequal ſegments. *Stam.* Filaments ten, thread-ſhaped, about the length of the corolla, declining; anthers incumbent, oval, abrupt, of two cells, opening by two terminal pores. *Piſt.* Germen with five angles, abrupt; ſtyle thread-ſhaped, the length of the corolla; ſtigma obtuſe. *Peric.* Capſule ovate, ſomewhat angular, of five or ten cells, formed by the inflexed margins of the valves, which finally ſeparate from the five or ten-angled central column. *Seeds* numerous, minute.

Eſſ. Ch. Calyx inferior, in five diviſions. Corolla of one petal, ſomewhat funnel-ſhaped, irregular. Stamens declining. Capſule of five or ten cells; partitions from the inflexed margins of the valves.

1. R. *ferrugineum*. Ruſty-leaved Rhododendrum. Linn. Sp. Pl. 562. Willd. n. 1. Ait. n. 1. Jacq. Obſ. faſc. 1. 26. t. 16. Auſtr. t. 255.—Leaves ſmooth; ruſty beneath. Cluſters terminal. Corolla with a cylindrical leprous tube. Calyx fringed.—Native of heathy plains on the alps of Switzerland, Savoy, Auſtria, Siberia, and the Pyrenees, flowering in Auguſt. It is not difficult of culture with us, in bog earth, on an open border, and is one of the moſt elegant of ſhrubs. The *ſtem* is about two feet high, very buſhy. *Leaves* evergreen, ſtalked, alternate, elliptic-oblong, an inch or an inch and a half in length; convex, ſmooth, and dark ſhining green above; ruſty beneath, but deſtitute of all pubeſcence. *Flowers* above half an inch long, in terminal roundiſh cluſters; their *corolla* of a peculiarly rich and beautiful crimſon, externally dotted with white. Haller ſays there is a rare white-flowered variety. The plain of mount Cenis glows with the rich bloſſoms of this plant in July and Auguſt, exhibiting one of the moſt lovely ſcenes in nature. See Smith's Tour on the Continent.

2. R. *hirſutum*. Hairy Rhododendrum. Linn. Sp. Pl. 562. Willd. n. 4. Ait. n. 3. Jacq. Auſtr. t. 98. (Ledum alpinum; Cluſ. Hiſt. v. 1. 82. Ger. Em. 1290. Balſamum alpinum Geſneri; Lob. Ic. 367.)—Leaves elliptic-obovate, ſharpiſh, fringed; dotted beneath. Corolla with a cylindrical leprous tube.—Native of the Swiſs and Auſtrian alps. Cultivated, like the former, in this country; flowering rather earlier. This is moſt nearly related to *R. ferrugineum*, next to which therefore we prefer placing it. The chief diſtinction conſiſts in the *leaves* being fringed with rigid hairs; their form more obovate and flat, and their under ſide leſs ruſty. We never could perceive much difference in the *flowers*, except perhaps thoſe of *hirſutum* being rather paler, and more of a pink hue.

3. R. *dauricum*. Daurian Rhododendrum. Linn. Sp. Pl. 562. Willd. n. 2. Ait. n. 2. Pall. Roſſ. v. 1. t. 32. Curt. Mag. t. 636. Andr. Repoſ. t. 4. (Chamærhododendros folio glabro majuſculo, amplo flore roſeo; Amm. Ruth. 181. t. 27.)—Leaves elliptic-oblong, dotted, naked. Corolla nearly wheel-ſhaped.—Native of Siberia, in mountainous ſituations. It ſucceeds in our gardens with the ſame treatment as the two foregoing, but flowers much earlier, and though evergreen in its own country, is leſs perfectly ſo with us; requiring moreover ſome ſhelter for its bloſſoms, during the ſeverity or uncertainty of our winter or early ſpring. The *leaves* are dotted on both ſides with minute ſcales, and their midrib is, when young, a little downy. *Flowers* roſe-coloured, nearly ſeſſile; their corolla widely expanded, with ſcarcely any tube, its outſide ſlightly hairy, not leprous. Mr. Andrews ſeems to have printed "*petiolis longiſſimis*," by miſtake for "*breviſſimis*," as the *footſtalks* are in fact very ſhort.

4. R. *camtſchaticum*. Barberry-leaved Rhododendrum. Pall. Roſſ. v. 1. p. 1. 48. t. 33. Willd. n. 3. (Chamærhododendros berberis folio, flore amplo roſeo; Gmel. Sib. v. 4. 126.)—Leaves obovate, fringed, ſmooth, reticulated with veins. Corolla wheel-ſhaped. Found by Steller, in mountainous ſpots in Beering's iſland, and the north-eaſt part of Kamtſchatka, flowering in July and Auguſt. The ſhrubby *ſtems* are procumbent, branched, about a foot long. *Leaves* ſtalked, obovate, an inch or more in length, blunt, with a very ſmall point, fringed at the margin, but ſmooth on both ſides, deſtitute of dots or ſcales, of a thin texture, ſtrongly and copiouſly reticulated with interbranching ribs and veins. *Flowers* roſe-coloured, larger than the laſt, being nearly two inches wide, each on a long, ſolitary, hairy, terminal ſtalk. *Segments* of the calyx flat, oblong, obtuſe, ribbed and veiny, ſometimes very hairy externally, ſometimes only fringed at the edges. This very ſhowy plant is mentioned in Mr. Aiton's Epitome of Hort. Kew. 373, as having come into the hands of our cultivators in 1799, but we have never met with it in any garden.

5. R. *Chamæciſtus*. Thyme-leaved Rhododendrum. Linn. Sp. Pl. 562. Willd. n. 5. Ait. n. 4. Jacq. Auſtr. t. 217. Curt. Mag. t. 488. (Ledum foliis ſerpilli, ad margines cilii inſtar piloſis, flore purpureo; Mich. Gen. 225. t. 106. Ciſtus humilis auſtriaca Cluſii; Ger. Em. 1278.)—Leaves obovate, acute, fringed, poliſhed, almoſt veinleſs. Corolla wheel-

wheel-ſhaped.—Native of the alps of Auſtria, Carniola, and the north of Italy. Firſt raiſed from ſeed in England, in 1786, by the ſkilful Mr. Loddiges of Hackney. A ſhrubby nearly procumbent plant, much ſmaller than the laſt, and differing eſſentially in the more thick and coriaceous texture of its *leaves*, which are of a dark green, and highly poliſhed, with ſcarcely any viſible veins. The elegant purpliſh *flowers* are not above an inch broad. Their *calyx* has hairy, convex, not flat, ſegments. Anthers deep purple.

6. R. *caucaſeum*. Caucaſian Rhododendrum. Pall. Roſſ. v. 1. p. 1. 46. t. 31. Willd. n. 6. Ait. n. 5. Curt. Mag. t. 1145.—Stem decumbent. Leaves rugged above; downy and ruſty beneath. Umbels terminal. Corolla nearly wheel-ſhaped.—Native of the loftieſt ſummits of mount Caucaſus, near perpetual ſnow, where, according to Pallas, nothing elſe, beſides Whortle-berries and Juniper, grow. Introduced at Kew, by ſir Joſeph Banks, in 1803. Mr. Loddiges finds it flower more freely under his care than the following. A low ſhrub, ſpreading on the ground, but of a ſtouter habit, with larger more coriaceous foliage, than any of the foregoing. The *leaves* are elliptical, ſtalked, three or four inches long; convex and of a dark ſhining green, with a rugoſe ſurface, above; concave, veiny, and covered with fine ruſty down, underneath. *Footſtalks* alſo downy. *Flowers* large, moderately concave; white or pale fleſh-coloured within, their upper ſegments dotted about the baſe with green; the outſide crimſon. They form terminal *umbels*, with large, oblong, concave, permanent *bracteas* at the baſe.

7. R. *chryſanthum*. Yellow Rhododendrum. Linn. Suppl. 237. Willd. n. 7. Ait. n. 6. Pall. Roſſ. v. 1. p. 1. 44. t. 30. (R. officinale; Saliſ. Parad. t. 80. Andromeda, n. 9; Gmel. Sib. v. 4. 121. t. 54.)—Stem decumbent. Leaves reticulated, ſmooth on both ſides; paler beneath. Umbels terminal. Corolla nearly wheel-ſhaped. Native of the mountains of Siberia, Kamtſchatka, and Beering's iſland. Introduced by Mr. Joſeph Buſh, in 1796, into our gardens, where it flowers, though rarely in the middle of ſummer, like the laſt. Some have imagined theſe two ſpecies to be varieties of each other; but the preſent differs eſſentially in having the *leaves* quite ſmooth and naked beneath, not to mention the uniformly yellow colour of the *flowers*. An infuſion of the young leaves is much celebrated in Ruſſia as a cure for the rheumatiſm. This medicine is taken internally, to promote perſpiration. Some have recommended it for venereal complaints. Willdenow juſtly obſerves, that this ſhrub is altogether different from *R. dauricum*, to which the younger Linnæus, by ſome ſtrange miſtake, compares it.

8. R. *ponticum*. Purple Rhododendrum. Linn. Sp. Pl. 562. Willd. n. 8. Ait. n. 7. Jacq. Ic. Rar. t. 78. Pall. Roſſ. v. 1. p. 1. 43. t. 29. Curt. Mag. t. 650. Andr. Repoſ. t. 379. (Chamærhododendros pontica maxima, folio laurocerasi, flore cæruleo-purpuraſcente; Tourn. Voyage, v. 2. 99.)—Leaves oblong, ſmooth and even on both ſides. Corymbs terminal. Segments of the calyx oval, obtuſe. Corolla bell-ſhaped, ſpreading.—Native of the Levant, in moiſt ſhady places. Common in the European gardens, where it blooms magnificently in the open ground in June, and, by forcing in a pot, may be had much earlier, as almoſt every window and balcony in London evinces. This ſhrub is uſually five or ſix feet high, with brown ſpreading *branches*. The *leaves* are evergreen, a ſpan in length, elliptic-lanceolate, or oblong, more or leſs acute; ſhining, dark green, even and ſmooth above; equally ſmooth, but paler beneath, contrary to Willdenow's definition. The large purple *flowers* grow, many together, in large, terminal, corymboſe cluſters. The gardeners obtain mule varieties, ſome of them with deciduous leaves, between this plant and the Azaleas. Tournefort thought the poiſonous quality of the honey about Pontus, mentioned by ancient authors, might be partly owing to this plant; at leaſt this ſeems to be what produced a ſort of honey called *Moenomenon*, becauſe, as Pliny relates, it took away the reaſon of thoſe who ate it. What is generally reported of the honey of Pontus appears, however, by what Tournefort has collected, to belong to that yielded by *Azalea pontica*, our beautiful yellow Azalea; and this is confirmed by what the Turks told him of the dangerous effluvia of the flowers of this laſt mentioned plant.

9. R. *arboreum*. Indian Tree Rhododendrum. Sm. Exot. Bot. v. 1. 9. t. 6.—Leaves elliptic-lanceolate; ſmooth and ſhining above; downy beneath. Corymbs terminal. Capſule of ten cells. Stem arboreous.—Found by lieutenant-colonel Hardwicke, in the Sewalic chain of mountains, which ſeparates the plains of Hindooſtan, from the Himmaleh mountains. It generally grows in foreſts of oak, in elevated ſituations, where the ſoil is black vegetable mould, on a ſtony bed. The flowers appear in March and April; the ſeeds are ripened in May or June. The natives know this tree by the name of *Boorans*, and uſe the wood for the ſtocks of muſquets. The *ſtem* is truly arboreous, riſing in a columnar form to the height of twenty feet; its diameter being from ſixteen to twenty-four inches. The *bark* is light as cork, flaking off in large portions. *Branches* aſcending, crooked and brittle, leafy at their extremities. *Leaves* ſhaped much like the laſt, but diſtinguiſhed by the denſe, white, ſilky downineſs of their under ſurface. *Flowers* in large terminal cluſters, of a rich deep crimſon, of little fragrance and ſhort duration, their *corolla* ſhaped much like the laſt, but we do not find it ſpotted within. Segments of the *calyx* ſhallow. *Germen* elliptical, white and downy, with ten furrows. *Capſule* of the ſame ſhape, with ten cells, an unique inſtance, as far as we know, in the preſent genus; but certainly, all things conſidered, not authoriſing any generic ſeparation of this ſpecies from the reſt. We know not whether the ſeeds of this noble tree have vegetated in England. It would probably ſucceed in the moderate warmth of a conſervatory.

10. R. *maximum*. Laurel-leaved Rhododendrum. Linn. Sp. Pl. 563. Willd. n. 9. Ait. n. 8. Purſh n. 1. Curt. Mag. t. 951. (R. foliis nitidis ovalibus, &c.; Trew Ehret. t. 66. Kalmia foliis lanceolato-ovatis, &c.; Mill. Ic. t. 228.)—Leaves oblong; convex and reticulated above; ſmooth and pale beneath. Corymbs ſurmounted by the branches. Segments of the calyx oval, obtuſe. Corolla bell-ſhaped, ſpreading.—Native of mountainous ſituations in North America, near rivulets and lakes, flowering from June to Auguſt. *Purſh*. Though, according to Mr. Aiton, introduced by Peter Collinſon in 1736, twenty-ſeven years before the *ponticum*, it is beyond compariſon leſs common in our gardens. Botaniſts have not very clearly defined the ſpecific difference between theſe two ſpecies. The *leaves* of the preſent are moſt convex, and more ſenſibly reticulated with minute ſunk veins, on their upper ſide, while the under is ſtill more pale, than in *ponticum*. The *flowers* of the *maximum* are more delicately coloured, having the red and white tints of an apple-bloſſom, while the green and yellow dots on their upper ſegment are ſtrikingly conſpicuous. All their ſegments are more elliptical, concave, and far leſs dilated and wavy than in *ponticum*. The *infloreſcence* moreover is almoſt umbellate, and more denſe, ſtanding between two branches of the preſent year, which always riſe conſiderably above it. There are mule varieties in the gardens between theſe ſpecies. Mr. Purſh mentions two American varieties, or perhaps ſpecies: one with flatter *leaves*, and ſmaller

ſmaller whitiſh flowers: the other much taller, even twenty feet high, with large purple *flowers*, and much larger *leaves*, whoſe two ſides are more alike in colour than the common *maximum*. This laſt variety, which we too have ſeen in Mr. Vere's curious garden at Kenſington Gore, merits further examination, having certainly more reſemblance to *ponticum* than to *maximum*, except its gigantic ſtature, which far exceeds both.

11. R. *punctatum*. Carolina Dotted-leaved Rhododendrum. Willd. n. 10. Ait. n. 9. Purſh n. 2. Andr. Repoſ. t. 36. Venten. Jard. de Cels, t. 15.—Leaves elliptic-oblong, acute; ſmooth above; ſprinkled with minute reſinous dots beneath. Umbels ſurmounted by the branches. Segments of the calyx rounded, very ſhort. Corolla funnel-ſhaped, leprous externally.—Native of the mountains of South Carolina, from whence it was brought to England by the late Mr. John Fraſer, in 1791. It ſucceeds well in our gardens on a peat border, flowering early in the ſummer. This is a much humbler ſhrub than any of the varieties of the *maximum*, though its mode of infloreſcence accords with that ſpecies. The *corolla* is roſe-coloured, dilated and wavy as in *R. ponticum*, but ſmaller; its outſide rough or glandular, as in the *ferrugineum*. The *leaves* are elliptical, coriaceous, acute at both ends; dark green and very ſmooth above; paler, ſomewhat ruſty, and very thickly beſprinkled with glandular reſinous dots, beneath.

12. R. *catawbienſe*. Catawba Rhododendrum. Michaux Boreal-Amer. v. 1. 258. Purſh n. 3 Ait. Hort. Kew. Epit. 373. Curt. Mag. t. 1671.—Leaves oval, rounded at each end, ſmooth, paler beneath. Umbels ſurmounted by the branches. Segments of the calyx elongated. Corolla bell-ſhaped.—Native of the high mountains of Virginia and Carolina, particularly on the head waters of the Catawba river, flowering in May and June. *Purſh*. Mr. Fraſer introduced it here in 1809, and brought a report of the *flowers* being ſcarlet; but they have ſince proved of a pale purpliſh roſe-colour, with very ſlight traces of thoſe green dots within, which make ſo great a part of the beauty of *R. maximum*. The *ſhrub* is of a very humble ſize, hardly three feet high, and flowering before it attains even that height; but all its parts are large. The *leaves* are broad, coriaceous, rounded and blunt at both ends; paler beneath, and very obſcurely dotted on the veins. The ſegments of the *calyx* are ſaid to be remarkably elongated, an eſſential mark of diſtinction, which ought to have been ſhewn in the, otherwiſe excellent, figure. We cannot help wiſhing alſo that the uncouth name, given by Michaux, had not been retained; but who ſhall cleanſe the Augean ſtable of modern botanical nomenclature?

Rhododendrum, in *Gardening*, contains plants of the hardy, deciduous, and evergreen, flowering, ſhrubby kinds, the dwarf roſe-bay, of which the ſpecies cultivated are, the ruſty-leaved rhododendrum (R. ferrugineum); the hairy rhododendrum (R. hirſutum); the dwarf rhododendrum, or roſe-bay (R. chamæciſtus); the purple rhododendrum (R. ponticum); and the broad-leaved rhododendrum (R. maximum).

Method of Culture.—Theſe plants may be increaſed by ſowing the ſeeds, which are very ſmall, as ſoon as poſſible after they are procured, either in a ſhady border, or in pots filled with freſh loam, having them very lightly covered with a little fine mould, and plunging the pots up to their rims in a ſhady border, and in hard froſt covering them with bell or hand-glaſſes; taking them off in mild weather. When they are ſown early in autumn, the plants come up the following ſpring, when they muſt be kept ſhaded from the ſun, eſpecially the firſt ſummer, and duly refreſhed with water; in the autumn following removing them to a ſhady ſituation, on a loamy ſoil, covering the ground about the roots with moſs, to guard them from the froſt in winter and keep the ground moiſt in the ſummer ſeaſon. They may alſo be increaſed from ſuckers or offsets, which they produce plentifully where they grow naturally, but ſeldom in this climate.

And they are very ornamental in the border, clumps, and other parts of ſhrubberies.

Rhododendrum *Cryſanthemum*, golden-flowered rhododendrum, in the *Materia Medica*. The leaves of this ſpecies are uſed in medicine. They are inodorous, and have an auſtere, aſtringent, bitteriſh taſte. Water extracts their virtue either by infuſion or decoction. Theſe leaves are reckoned ſtimulant, narcotic, and diaphoretic. Upon being taken, they firſt increaſe the arterial action and heat of the body, producing diaphoreſis, which effects, according to Dr. Home, are followed by a proportional diminution of excitement: the pulſe in one caſe having been reduced 38 beats. In large doſes, they produce nauſea, vomiting, purging, delirium, and all the ſymptoms of violent intoxication. The plant and its effects were firſt deſcribed by Gmelin and Steller in 1747, as a Siberian remedy for rheumatiſm; but it was not much noticed till after 1779, when Kœlpin ſtrongly recommended it in this diſeaſe, and alſo in gout and lues venerea. It has not been much uſed in this country; but from the reſult of ſome trials of it in Scotland, it obtained a place in the Edinburgh Pharmacopeia. It has been given in the form of decoction, made by boiling ℥iv of the leaves in f℥x of water, in a cloſe veſſel, over a ſlow fire, for 12 hours. The doſe of the ſtrained liquor is from f℥j to f℥ij given twice a day, and generally increaſed. Woodv. Med. Bot. Thomſon's Lond. Diſ.

RHODOLÆNA, in *Botany*, from ῥοδον, *a roſe*, and χλαινα, *a cloak*, or *outer covering*; a genus ſo named by Aubert du Petit-Thouars, in his *Plantes des Iſles d'Afrique*, faſc. 3, becauſe of the fine roſe colour of the flowers, which are ſaid to be very large and ſplendid. *De Theis*.

RHODOMAN, Lawrence, in *Biography*, a learned German, was born, in 1546, at Saſſowerf, in Upper Saxony. He ſtudied at the college of Ilfield, and acquired ſuch a knowledge of claſſical literature, that he became an able inſtructor both in public and private. He taught in ſeveral ſeminaries of learning, and was profeſſor of Greek at Jena ſeven years, and of hiſtory at Wittemberg for four years. He died in 1606, at the age of 60. He was deeply learned in the Greek language; but his chief ſervice to literature was by his Latin verſion of Diodorus Siculus: he was author of a hiſtory of Martin Luther, in Greek verſe, and many other pieces. Bayle.

RHODOMELON, a name given by the ancients to a confection made of roſes, quinces, and honey, uſed as a grateful aſtringent and detergent in many caſes.

RHODON, in *Pharmacy*, from ῥοδον, *roſa*, a name applied to ſome compoſitions, where roſes are the chief ingredient, as *diarrhodon*, *&c.* Hence alſo *rhodoſaccharum*, *i. e. ſugar of roſes*. See Rose.

RHODOPE, in *Biography*, a famous courtezan and player on the flute, in antiquity, was born in Thrace. She was at firſt a ſlave in the ſame houſe as Æſop. Charaxus, the brother of Sappho, was violently enamoured of her, and having purchaſed her, gave her her liberty. She eſtabliſhed herſelf at Mucrates, where ſhe became a courtezan, and amaſſed immenſe riches. Pliny ſays that ſhe built, at her own expence, the moſt beautiful of the Egyptian pyramids; but Herodotus, and Bayle from his authority, reject this tale; nor do they give any more credit to the following ſtory.

One day, when ſhe was bathing, and her attendants watching

watching her clothes, an eagle pounced upon one of her ſhoes, and carrying it away, flew with it to Memphis, where he let it fall near king Pſammiticus. This prince, admiring the beauty of the ſhoe, ordered the officers of his houſehold to ſeek, throughout all Egypt, the perſon to whom the ſhoe appertained. She was found and brought to him; and he eſpouſed her. But how are we to reconcile this fact with her being married to Æſop? It is, however, certain, ſay the Encyclopædiſts, that this fabuliſt, notwithſtanding his deformity and uglineſs, had the art to make himſelf beloved by her.

RHODOPUS GALLINULA, in *Ornithology*, a name given by ſome authors to the bird more uſually known by the name *tringa*.

RHODORA, in *Botany*, ſo called by Linnæus, from ῥοδον, *a roſe*, in alluſion to the colour of its flowers, and probably, at the ſame time, to preſerve an analogy with its near relation *Rhododendrum*.—Linn. Gen. 218. Schreb. 294. Willd. Sp. Pl. v. 2. 603. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 49. Purſh v. 1. 298. Juſſ. 159. Lamarck Illuſtr. t. 364. Claſs and order, *Decandria Monogynia*. Nat. Ord. *Bicornes*, Linn. *Rhododendra*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, minute, of one leaf, with five teeth, permanent. *Cor.* Petals three, unequal; the two lowermoſt lanceolate, equal; the upper one wedge-ſhaped, aſcending, three-lobed, the middle lobe rather longeſt. *Stam.* Filaments ten, thread-ſhaped, declining, the length of the corolla; anthers rounded, two-lobed. *Piſt.* Germen ovate, furrowed, ſuperior; ſtyle thread-ſhaped, declining, rather longer than the ſtamens; ſtigma thickeſt, abrupt, convex. *Peric.* Capſule ovate-oblong, with five furrows, of five cells and five valves, the partitions from the inflexed margins of the valves. *Seeds* numerous, minute.

Eſſ. Ch. Calyx five-toothed. Corolla of three petals, unequal. Stamens declining. Capſule ſuperior, of five cells; the partitions from the inflexed margins of the valves.

1. R. *canadenſis*. Canadian Roſe-bloſſom. Linn. Sp. Pl. 561. Willd. n. 1. Ait. n. 1. L'Herit. Stirp. v. 1. 141. t. 68. Curt. Mag. t. 474. (Chamærhododendros; Duham. Sem. Append. 10. t. 27. f. 2, 3.)—Native of Canada and Newfoundland; very hardy in our gardens, except that, flowering in April and May, its bloſſoms are often injured. Curtis ſays it bears gentle forcing remarkably well. Sir Joſeph Banks brought this ſhrub to England in 1767; but it flowered at Paris, for the firſt time, in March 1756. Duhamel ſuggeſted the propriety of eſtabliſhing it as a new genus, which Linnæus adopted and named; but afterwards, having never ſeen the plant, he ſtruck it out, nor did he aſſign any reaſon for this meaſure. The accuracy of Duhamel is, at length, confirmed, and the *Rhodora* re-eſtabliſhed. The *ſtem* is buſhy, erect, two or three feet high, with round, ſmooth, grey or reddiſh branches, never quite ſtraight. *Leaves* deciduous, alternate, ſtalked, elliptical, acute, entire, veiny, hairy, ſlightly glaucous, about an inch and half long, and half an inch wide. *Flowers* appearing before the leaves, in terminal ſolitary umbels, four or five in each umbel, of a bright elegant roſe colour, with violet *anthers*, inodorous. *Petals* ſpreading, each an inch long. *Capſule* clothed with ruſty down.

RHOE, in *Ancient Geography*, a river of Aſia Minor, in Bithynia.

RHŒADEÆ, in *Botany*, the 27th natural order, among the *fragmenta* of Linnæus; of which there is no explanation in his *Prælectiones*, publiſhed by Giſeke. The genera referred hither, at the end of the Gen. Pl., are *Argemone*, *Chelidonium*, *Papaver*, *Podophyllum*, *Sanguinaria*, *Bocconia*. We place them according to the manuſcript corrections of the author, who has ſubjoined *Cytinus*, *Ariſtolochia*, and *Aſarum*.

This order, without the additions, which certainly do not belong to it, is equivalent to the firſt ſection of Juſſieu's PAPAVERACEÆ. (See that article.) Its name is taken from the Greek appellation of the field poppy, ῥοιας, *Papaver Rhœas* of Linnæus; which was ſo called from ῥεω, *to fall off*, becauſe of the ſhort duration of its petals.

RHŒAS, in *Surgery*, a diminution of the caruncula lachrymalis from diſeaſe.

RHŒTICO, in *Geography*, a mountain of Germany, in the county of Pludentz; 6 miles S. of Pludentz.

RHŒTUM, or RHŒTIUM, in *Ancient Geography*, a town of Aſia Minor, in the Troade, on the coaſt of the Helleſpont. According to Strabo, it was built on an eminence near the tomb of Ajax. The promontory called "Rhœtium" was four miles diſtant from that of Sigæum.

RHŒXUS, a port of Aſia, on the coaſt of Cilicia, at the mouth of the river Sarus. Steph. Byz.

RHŒZIA, in *Geography*, a city of Perſia, in the province of Mingrelia, ſituated on the Hippus, the uſual reſidence of the princes of Mingrelia, but which they changed in ſummer for Taqueri, a very pleaſant ſpot, ſeven verſts S. of Ghoni. In Rhœzia much ſilk is cultivated; and all that is prepared in the other parts of Mingrelia is alſo carried thither, to be ſold or manufactured. The manufacture, however, of that commodity is not well underſtood, as they only make a poor ſort of handkerchiefs, or common taffeties.

RHOGE, in *Ancient Geography*, an iſland on the coaſt of Lycia, placed by Pliny in the vicinity of that of Cyprus. Steph. Byz.

RHOGME, in *Surgery*, a rupture or fracture.

RHOGMOI, in *Ancient Geography*, a port of Aſia, on the coaſt of Cilicia. Steph. Byz.

RHOGOMANIS, or RHOGONIS, a river of Aſia, in the Perſide. Ptolemy places the mouth of this river in the ſouthern part of the Perſide, on the Perſian gulf. According to Nearchus, it was a ſmall river, 200 ſtadia from the river Granis.

RHOITES, the name of a medicine among the ancients, which is a ſort of rob of the juice of pomegranates. Dioſcorides deſcribes it as the ſimple juice of the fruit, evaporated over the fire to the conſiſtence of an extract; but Paulus Ægineta gives the receipt to be three parts juice of pomegranate, and one part honey, boiled to the evaporation of a third part. So that the rhoites of Dioſcorides was a true rob of pomegranates; the other rather honey of pomegranates, like our honey of roſes.

RHOMB. See RHOMBUS.

RHOMBITES, in *Ancient Geography*, a river of Aſiatic Sarmatia. Ptolemy.

RHOMBO, in *Ichthyology*, the name of a peculiar fiſh of the rhombus, or turbot kind, called *rhombus aculeatus* by Aldrovand, Geſner, and other writers. It is a large fiſh, of an aſh-coloured green on the back, and white on the belly. It has no ſcales; but the ſkin of its back is divided by lines, ſomething in the manner of the ſkins of ſnakes. The mouth is very large, and is well furniſhed with teeth; and the palate has a number of tubercles, armed alſo with a ſort of teeth. It feeds on fiſh, and its fleſh is very delicate. It is very common in the markets at Venice, and is caught in the neighbouring ſeas, and in many other places. See PLEURONECTES *Maximus*.

RHOMBOIDÆUS *Major* and *Minor*, in *Anatomy*, names given by Albinus to what he makes two muſcles, though Winſlow and others account it only one. What Winſlow

Winflow calls the inferior portion of the rhomboidalis, Albinus calls rhomboidæus major; and what he calls the upper portion of that mufcle, Albinus calls rhomboidæus minor. See RHOMBOIDEUS.

RHOMBOIDALIS. See RHOMBOIDÆUS.

RHOMBOIDES, in *Geometry*, a quadrilateral figure, whofe oppofite fides and angles are equal, but which is neither equilateral nor equiangular; or, it is an oblique-angled parallelogram.

Such is the figure N O P Q, *Plate* XII. *Geometry*, *fig.* 1. For the method of finding the area of a rhomboides, fee RHOMBUS.

RHOMBOIDES, in *Ichthyology*. See CHÆTODON *Argus*, *Striatus*, &c.

RHOMBOIDEUS, in *Anatomy*, a mufcle of the fhoulder, fo called on account of its fhape; dorfo-fcapulien of Chauffier.

It is a broad, flattened, quadrilateral mufcle, placed obliquely at the lower part of the neck and upper part of the back, and extending from the lower portion of the ligamentum nuchæ, and the fuperior fpinous proceffes of the back, to the bafis of the fcapula. The whole of its fibres go obliquely from the fpine downwards and outwards to the fcapula; thus as it is regularly quadrilateral, it has a correct rhomboid figure. Its pofterior furface is chiefly covered by the trapezius; the latiffimus dorfi lies on a fmall portion of it below; and between thefe two mufcles its fibres are covered by the fkin only. The ferratus fuperior pofticus, fplenius, longiffimus dorfi, facrolumbalis, the ribs, and the external intercoftal mufcles, are covered by its anterior furface. Its upper edge goes from the lower part of the ligamentum nuchæ, obliquely outwards and downwards, to the bafis of the fcapula oppofite to the commencement of the fpine of the bone. In great part of its extent this edge is in contact with the levator fcapulæ. The lower margin reaches from the fpinous procefs of the fourth or fifth dorfal vertebra to the inferior angle of the fcapula. The two edges are nearly of equal length, and parallel to each other. The internal edge is attached to the lower portion of the ligamentum nuchæ, to the laft cervical fpinous procefs, to the four or five fuperior dorfal fpines, and to the interfpinal ligaments of thofe bones. The outer edge is fixed to the bafis of the fcapula, from its inferior angle to above the origin of the fpine, between the fupra and infra fpinatus behind, and the ferratus magnus in front.

The rhomboideus is partly mufcular, partly aponeurotic. Its inner edge is attached by aponeurotic fibres, having the fame direction as the flefhy one, fhort above, and longer below. It is fixed to the upper part of the fcapula by fhort aponeurofes; its infertion in the remainder of the bafis is by an aponeurofis attached only at its upper and lower extremities, leaving a paffage between thefe points for branches of the tranfverfalis colli artery. The mufcular fibres are all directed obliquely from within outwards, and from above downwards.

The mufcle is generally divided into two portions, united by cellular tiffue to a fuperior fmaller, and an inferior larger one: thefe are called the rhomboideus minor and major.

By drawing the bafis of the fcapula obliquely upwards and backwards, the rhomboideus carries the inferior angle towards the fpine, and makes the anterior angle of the bone, conftituting the fhoulder, roll forwards and downwards. Thus it reftores the fcapula to its fituation after the fhoulder has been raifed. It concurs in this action with the levator fcapulæ.

RHOMBOIDIA, in *Natural Hiftory*, the name of a genus of fpars, given them from their being of a rhomboidal form. They owe this figure to an admixture of particles of iron, and confift of fix planes.

Of this genus there are only two known fpecies, *viz.* a white thin one with very thin crufts, and a whitifh-brown thick one with thicker crufts. They are both found in the foreft of Dean in Gloucefterfhire, and in other places, where there are iron-ores. Hill.

RHOMBUS, Ῥομβος, is formed of ῥομβος, of ῥομβειν, *to encompafs* or *turn round*, in *Geometry*, an equilateral rhomboid; or a quadrilateral figure, whofe fides are equal and parallel, but the angles unequal; two of the oppofite ones being obtufe, and the other two acute. Such is the figure A B C D, *Plate* X. *fig.* 11.

To find the Area of a Rhombus, or Rhomboides.—Upon C D, which is here affumed as a bafe, let fall a perpendicular A E, which will be the altitude of the parallelogram: multiply the bafe by the altitude, the product is the area. Thus, if C D be $= 456$, and A E $= 234$, the area will be found 106704.

For it is demonftrated, that an oblique-angular parallelogram is equal to a rectangle upon the fame bafe C D, and of the fame altitude A E (fee PARALLELOGRAM). But the area of a rectangle is equal to the factum of the bafe into the altitude; therefore the area of an oblique-angular parallelogram is equal to the fame. See RECTANGLE.

The area of a parallelogram, rhombus or rhomboides, may be found by means of the following proportion: As radius, *i. e.* fine of 90° or tangent of 45°, is to the fine of any angle of a parallelogram, fo is the product of the fides including the angle to the area of a parallelogram: that is, $AD \times DC \times$ nat. fine of the angle $D =$ the area. For having drawn the perpendicular A E, the area, by the firft rule, is $AE \times DC$; but as rad. 1 (fin. $< E$) : fin. $< D$ :: $AD : AE =$ fin. $< D \times AD$; therefore $AE \times DC = DC \times$ fin. $< D \times AD$ is the area; or, 1 : fin. $< D$ :: $AD \times DC$: fin. $< D \times AD \times DC =$ the area of the parallelogram.

N.B. As the angles of a fquare and rectangle are each 90°, whofe fine is 1, this rule is the fame as the former.

E. G. 1. What is the area of a rhomboides, whofe length is 36 feet, flope-height 25.5 feet, and one of the lefs angles 58°? Here rad. or 1 : .8480481 (nat. fine of 58°) :: 918 ($= 25.5 \times 36$) : 778.5081558, the area. Or, by ufing the logarithms, rad. (10.0000000) : fin. 58° (9.9284205) :: log. of 918 (2.9628427) : 778.5081, the number correfponding to the log. (2.8912632).

2. What is the area of a parallelogram whofe angle is 90°, and the including fides 20 and 12.25 chains? Anf. 245 acres.

3. What is the area of a rhombus, each of whofe fides is 21 feet 3 inches, and each of the lefs angles 53° 20′? Anf. 362.208757 feet.

4. How many acres are in a rhomboides whofe lefs angle is 30°, and the including fides 25.35 and 10.4 chains? Anf. 13 acres 29.12 perches.

The area of either of the forementioned figures may alfo be had by the following rule, which is common to all quadrilaterals. As radius is to the fine of the angle which the interfecting diagonals of a parallelogram make with each other, fo is the product of the diagonals to double the area: that is, $\frac{AC \times BD \times \text{nat. fine of the angle } R}{2} =$ the area.

N. B. Becaufe the diagonals of a fquare and rhombus interfect at a right angle, whofe fine is 1, half the product of their diagonals is the area; that is, $\frac{1}{2} AC^2$ in the fquare and $\frac{1}{2} AC \times BD$ in the rhombus is the area.

E. G.

E. G. 1. How many acres are in a piece of land, in the form of a rhombus, whose diagonals are 30 and 20 chains? Anf. 30 acres.

2. How many yards of painting are in a rectangle, whose diagonals, interfecting in an angle of 30°, are each 32 feet? Anf. $28\frac{4}{9}$.

3. What is the area of a rhomboides, whose diagonals, making an angle of 60°, are 30 and 25 feet? Anf. 324.7595 feet. Hutton's Menfuration.

RHOMBUS, *Solid*, two equal and right cones joined together at their bafes.

RHOMBUS, in *Ichthyology*, a fpecies of the *Pleuronectes*; which fee. See alfo PLEURONECTES *Maximus* and TURBOT, and P. *Paffer*.

RHOMBUS, in *Conchology*, the name given by the generality of authors to a genus of the fhell-fifh, much more properly called by fome *cylindrus*.

RHOMBUS, among *Surgeons*, denotes a fort of bandage of a rhomboidal figure.

RHON, in *Ancient Geography*, a river of India, among the people called Gandarii. Steph. Byz.

RHONDE, in *Geography*. See RONDE.

RHONE, a river of France, formed by the union of three fprings, which rife in mount Sufberg, a part of the Grimfell, at the eaftern extremity of the Valais. It paffes through the lake of Geneva to Seiffel, &c. and thence to Lyons, where it joins the Sâone, and after watering Vienne, Valence, Viziers, Avignon, Arles, &c. difcharges itfelf by feveral mouths into the Mediterranean.

RHONE, *Mouths of the*, *Bouches de Rhône*, one of the twelve departments of the S.E. region of France, bounded on the N. by the county of Venaiffin, on the N.E. by the department of the Lower Alps, on the E. by the department of the Var, on the S. by the Mediterranean, and on the W. by the department of the Gard: 5315 kiliometres in extent, or 269 fquare leagues, and containing a population of 320,072 perfons. It is divided into three circles or diftricts, including 26 cantons and 108 communes. The circles are, Marfeilles, having 142,058 inhabitants; Aix, 97,938; and Tarafcon, 80,076. According to M. Haffenfratz, its extent in French leagues is 30 in length and 20 in breadth; its circles are 5, its cantons are 40, and its population confifts of 446,643 perfons. It is a portion of Lower Provence, and lies in N. lat. 43° 40′. Its capital is Aix. Its contributions to the land-tax, &c. amounted, in the 11th year of the French era, to 3,612,199 fr.; and its expences, adminiftrative, judiciary, and for public inftruction, to 354,531 fr. 33 cents. Many of the hills in the northern diftricts are bare rocks, deftitute of foil and verdure. The chief productions of the department are grain, wine, filks, olives, fruits, and paftures. It has mines of iron, alum, vitriol, with quarries of marble, &c. Pools and marfhes are difperfed near the coaft.

RHONE, or *Rhone and Loire*, one of the eleven departments of the E. region of France, bounded on the N. by the department of the Sâone and Loire, on the E. by the departments of the Ain and the Ifere, on the S. by the departments of the Ardêche and the Upper Loire, and on the W. by the departments of the Puy de Dôme and the Allier: to the E. it is bounded by the river Rhine, and the Loire paffes nearly through its centre from N. to S. Its extent is 2935 kiliometres, or 147 fquare leagues, and its population confifts of 345,644 perfons. It is divided into 2 circles, 25 cantons, and 261 communes. Its circles are Villefranche, including 106,262 inhabitants, and Lyons, having 239,382. According to Haffenfratz, its extent in French leagues is 20 in length, and 9 in breadth; its circles are 2, its cantons 32, and its population is 323,177. It lies in N. lat. 46° between Ain and Loire, and comprehends the provinces formerly called Lyonnais and Beaujolais. Its capital is Lyons. The plains yield fcanty crops of grain and pafture; the gentle eminences are covered with vineyards, and the fummits of the mountains are clothed with pines. This department has mines of copper, lead, coal, quarries of marble, freeftone, &c.

RHOPALA, in *Botany*, a name altered by Schreber from the *Roupala* of Aublet, which, being of barbarous origin, and unexplained by the publifher, he contrived, by the above alteration, to derive from ῥόπαλον, *a club*, or *ftake*. This may very well apply to the fize and nature of the woody ftem, which rifes to the height of three or four feet, before it fends off any branches. Vahl and Willdenow have contrived to retain the barbarifm, without adding any thing to the fenfe.—Schreb. 62. Brown. Tr. of Linn. Soc. v. 10. 190. (Roupala; Aubl. Guian. v. 1. 83. Juff. 79. Lamarck Illuftr. t. 55. Gærtn. fuppl. t. 217. Rupala; "Vahl Symb. v. 3. 20." Willd. Sp. Pl. v. 1. 536.)—Clafs and order, *Tetrandria Monogynia*. Nat. Ord. *Proteaceæ*, Juff. Brown.

Gen. Ch. *Cal.* none. *Cor.* Petals four, fpatulate, regular, concave, recurved at the extremity. Nectary of four glands, feparate or combined, at the bafe of the germen. *Stam.* Filaments four, fhort, inferted above half way up the petals; anthers oblong, two-lobed, projecting beyond their recurved extremities. *Pift.* Germen fuperior, ovate, with rudiments of but two feeds; ftyle awl-fhaped, permanent, the length of the corolla; ftigma vertical, club-fhaped, undivided. *Peric.* Follicle ovate, fomewhat woody, of one cell. *Seeds* two, bordered, winged at each end, the kernel central.

Eff. Ch. Calyx none. Petals four, regular, recurved. Stamens inferted into the middle of each petal. Nectary of four glands. Stigma vertical, club-fhaped. Follicle of one cell. Seeds two, bordered, winged at each end.

The habit of the genus is arborefcent. *Leaves* alternate, rarely whorled; fimple, entire or toothed, rarely pinnate, or ternate, on the fame branch. *Spikes* axillary, fometimes terminal, racemofe, the *flowers* in pairs with a fingle *bractea* to each pair.

1. R. *montana*. (Roupala montana; Aubl. Guian. v. 1. 83. t. 32. Lamarck t. 55. Rupala montana; Willd. n. 1.)—Leaves alternate, entire, ovate, folded, fhort-pointed, reticulated with veins. Spikes axillary, folitary, longer than the leaves. Flower-ftalks, petals and germen clothed with rufty down.—Native of the Serpent Mountain in Guiana, flowering in Auguft. *Aublet.* A fmall *tree*, feven or eight feet high; its trunk three or four feet. *Bark* wrinkled and cracked, whitifh, as well as the *wood*. Both exhale, when cut, a ftrong fetid fcent, like that of the ferpents of the fame country. *Leaves* fmooth, of a firm dry texture, about three inches long. *Footftalks* an inch long, inflated at the bafe. *Flowers* about eight or ten alternate feffile pairs, in each lax *fpike*.

2. R. *media*. Brown n. 2.—Leaves alternate, entire, ovate, flat, pointed, running down the footftalk, with depreffed veins. Clufters axillary, folitary, longer than the leaves. Partial flower-ftalks and petals fomewhat hairy. Germen downy.—Gathered in the fame country by Von Rohr, who fent fpecimens to fir Jofeph Banks. This feems very nearly related to the foregoing.

3. R. *nitida*. Br. n. 3. (Ropala nitida; Rudge Guian. v. 1. 26. t. 39.)—Leaves alternate, entire, elliptical, fhort-pointed, flat. Clufters axillary, folitary, about the length of the leaves. Partial flower-ftalks, petals and germen fmooth.—Gathered by Jofeph Martin in Guiana. *Brown.*

4. R.

4. R. *moluccana* Br. n. 4.—Leaves alternate, entire, elliptical, flat, finely veined, somewhat reticulated, longer than the clusters. Partial flower-stalks and petals smooth.—Gathered in the Molucca islands, by the late Mr. Christopher Smith. *Herb. Banks.*

5. R. *cochinchinensis.* Br. n. 5. (Helicia cochinchinensis; Lour. Cochinch. 83, on the authority of a specimen seen by Mr. Brown, in sir Joseph Banks's collection, from the author.)—Leaves alternate, elliptic-ovate, short-pointed, flat, somewhat serrated above half way down. Clusters axillary, solitary, about the length of the leaves. Partial flower-stalks, petals and germen smooth.—Native of woods in Cochinchina. (See Helicia.) Mr. Brown observes, that what Loureiro describes as a four-cleft *calyx*, are really the nectariferous glands, united at their base, and remaining after the petals are fallen. Such a mistake might well render his description unintelligible, without a sight of the plant.

6. R. *serrata.* Br. n. 6.—Leaves alternate, broadly elliptical, scarcely pointed, serrated; somewhat contracted and entire at the base; paler beneath. Clusters axillary, solitary, shorter than the leaves. Partial flower-stalks, petals and germen downy.—Gathered by Mr. Christopher Smith in the Molucca isles.

7. R. *dentata.* Br. n. 7.—Leaves alternate, ovato-lanceolate, folded, toothed, tapering at each end; with a linear point. Clusters axillary, solitary, rather longer than the leaves. Petals and germen downy.—Gathered by Mr. Alexander Anderson in Guiana. *Herb. Banks.*

8. R. *peruviana.* Br. n. 8. ("Embothrium monospermum; Fl. Peruv. et Chil. v. 1. 63. t. 98.")—Leaves alternate, ovate, serrated, woolly; rusty beneath. Clusters axillary, solitary, longer than the leaves.—Native of the colder mountains of Peru.

9. R. *diversifolia.* Br. n. 9. ("Embothrium pinnatum; Fl. Peruv. et Chil. v. 1. 63. t. 99.")—Leaves alternate, simple or pinnate, very veiny; downy beneath. Clusters axillary, solitary, longer than the leaves. Follicles cimeter-shaped, downy.—Native of waste ground, and the borders of fields, in Peru.

10. R. *sessilifolia.* Br. n. 10. (Roupala sessilifolia; Richard Act. Soc. Hist. Nat. Par. v. 1. 106. Poiret in Lamarck Dict. v. 6. 316. Rupala sessilifolia; Willd. n. 2. Ropala hameliæfolia; Rudge Guian. v. 1. 22. t. 31.)—Leaves four in each whorl, nearly sessile, oblong, somewhat wedge-shaped, slightly pointed, entire. Clusters terminal, umbellate. Flowers whorled.—Native of Guiana. The *leaves* are, in the figure, precisely obovate, tapering at the base, a span long. *Clusters* about the same length, erect, stalked, forming an umbel at the top of the branch or stem; their partial stalks hairy, imperfectly whorled, very numerous.

RHOPALIC Verses, among the *Ancients*, a kind of verses which began with monosyllables, and were continued in words growing gradually longer and longer to the last, which was the longest of all.

They had their name from the Greek ῥόπαλον, *a club*, which, like them, begins with a slender tip, and grows bigger and bigger to the head. Such is that verse of Homer:

Ω μάκαρ Ατρείδη μοιρηγενὲς, ὀλβιόδαιμον.

And this Latin one of Ausonius:

"Spes deus æternæ stationis conciliator."

RHOPALOSIS, a distemper of the hair described by the ancients, and seeming to be the same with what we call the *Plica Polonica*; being a sort of matting together of the hair into long and thick tresses.

RHOPE, formed of ῥέπω, *to preponderate*, a word used by the Greek writers to express a violent tendency of the humours to any particular part of the body.

RHOPIUM, in *Botany*, from Ῥώπιον, *a slender shoot*, the flower-stalks of this plant having a delicate, twiggy appearance.—Schreb. 608. Willd. Sp. Pl. v. 4. 150. (Meborea; Aubl. Guian. 826. Juss. 437. Lamarck Illustr. t. 731.)—Class and order, *Gynandria Triandria.* Nat. Ord. *Euphorbiæ*, Juss. See Meborea.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, permanent, cloven into six, lanceolate, acute segments, each having a little bordered cavity at the base. *Cor.* none. *Stam.* Filaments none; anthers three, cloven, each adhering to a single style under the stigma, with distant cells, bursting transversely. *Pist.* Germen superior, roundish or triangular; styles three, erect, approximated; stigmas flat, acute, bent down over the anthers. *Peric.* Capsule composed of three obtuse-angled lobes, with six cells, and six valves: partitions from the middle of the valves. *Seeds* two, one adhering to each side of the partition, ovate.

Eff. Ch. Calyx six-cleft. Corolla none. Anthers three, with remote cells, and placed in the middle of the styles. Styles three. Capsule three-lobed, of three cells, each with two seeds.

1. R. *citrifolium.* Willd. (Meborea guianensis; Aubl. Guian. t. 323.)—Native of woods in Guiana, where it flowers and bears fruit in January. The *stem* of this shrub is from three to four feet in height, branched towards the summit. *Leaves* alternate, ovate, acute, smooth, entire, nearly sessile. *Stipulas* twin, small, deciduous. *Flowers* corymbose, axillary and terminal, of a yellowish-green colour, each standing on a long, slender stalk, which is furnished with a scale at its base.

RHOPOGRAPHI, Ῥωπογράφοι, formed of ῥῶπος, *toys* or *odd ware*, and γράφω, *I paint*, in *Antiquity*, an appellation given to certain painters, who confined themselves to low subjects, such as animals, plants, landscapes, &c.

The same appellation has been also given to such as cut figures of men, &c. in box, phillyrea, yew, &c. in gardens.

RHOSOLOGIA, in *Ancient Geography*, a town of Asia, in Galatia, in the country of the Teitsages, between Venzala and Sarmalia. Ptolemy.

RHOSOS, a town situated on the gulf of Issus, at the eastern extremity of the Mediterranean sea, between two defiles, one of which led to Syria, and was called the "gates of Syria;" and the other formed by mount Amanus and the sea-coast, communicating with Cilicia, and called the "Amanic gates." Ptolemy places this town in Syria, and Strabo places it in Cilicia. After the death of Seleucus Nicator, Demetrius caused the statue of Fortune to be conveyed hither. It was famous for the manufacture of earthen vessels, mentioned by Cicero, when he was governor of Cilicia, in a letter to Atticus. Sapor, king of Persia, burnt this city, after he had taken prisoner the emperor Valerian, A.D. 260. It was pillaged under the reign of Arcadius, in the year 404, by the Isaurians, a savage people, who inhabited the mountains. Jupiter was worshipped in this town; and the statue of this deity was engraven on the medals of Rhosos.

RHOSSICUS Scopulus, a promontory of Asia, in Syria, near the gulf of Issicus.

RHOT, in *Geography*, a river of Switzerland, which runs into the Aar, 5 miles W. of Zoffingen.

RHOTANUM, in *Ancient Geography*, a river of Corsica, the mouth of which is placed by Ptolemy on the eastern side, between Valeria Colonia and the port of Diana.

RHOX, a word ufed by fome authors to exprefs the tunica uvea of the eye.

RHUBARB, Rhabarbarum, in *Botany*. See Rheum.

Rhubarb, *Rheum Palmatum*, in the *Materia Medica*. The rhubarb, called the rhabarbarum officinale, was fuppofed, in the year 1732, to be fupplied by fome plants fent from Ruffia, to Juffieu of Paris, Rand at Chelfea, and Linnæus at Upfal. Accordingly thefe plants were adopted by Linnæus, in his firft edition of the Species Plantarum, under the name of rheum rhabarbarum. This, however, was not very generally received as the genuine rhubarb plant. But in order to afcertain this matter more completely, Kauw Boerhaave procured, from a Tartarian rhubarb merchant, the feeds of thofe plants, which he annually fold, and which were admitted at Peterfburgh to be the true rhubarb. Thefe feeds were foon difcovered by de Gorter to produce two diftinct fpecies; *viz.* the R. rhabarbarum of Linnæus, or R. undulatum, as it has been fince called; and another fpecies, declared by Linnæus to be a new one, and firft mentioned in the fecond edition of the Species Plantarum, in 1762, under the name of R. palmatum. But before this time, de Gorter had repeatedly fent its feeds to Linnæus, and the young plants conftantly perifhed: at length he obtained the frefh root, which fucceeded very well at Upfal, and enabled the younger Linnæus to defcribe this plant in the year 1767. However, two years antecedent to this, Dr. Hope's account of the rheum palmatum, as it grew in the Botanic garden near Edinburgh, had been read before the Royal Society at London; and of the great eftimation in which this plant was held by him we have the following proof. "From the perfect fimilarity of this root with the beft foreign rhubarb in tafte, fmell, colour, and purgative qualities, we cannot doubt our being at laft poffeffed of the plant which produces the true rhubarb, and may reafonably entertain the agreeable expectations of its proving a very important acquifition to Britain." (See Phil. Tranf. for the year 1765.) But from the relation above given, it appears that the feeds of both R. undulatum and R. palmatum were tranfmitted to Peterfburgh as thofe of the true rhubarb: we are therefore to conclude, that the former fpecies has an equal claim to this importance with the latter; and from further inquiries made in Ruffia, there is the beft authority for believing that the R. compactum alfo affords this very ufeful drug. Bergius fays, "Rheum palmatum producit *rhabarbarum* in officinis *Sibiricum* appellatum: certe e feminibus a Bucharis e montofis Tibeti in Ruffiam apportatis, et poftea fatis hocce rheum palmatum enatum eft." (Vide Pallas Reife, &c. vol. iii. p. 157.) "*Rhabarbarum* vero *Chinenfe* ex alia fpecie rhei defumptum effe videtur." (Vide Georgi Reife, &c. vol. i. p. 211.) The feeds of the rheum palmatum were firft introduced into Britain in 1762, by Dr. Mounfey, who fent them from Ruffia, and were fuppofed to be a part of thofe already mentioned; and fince their profperous cultivation by the late profeffor of botany at Edinburgh, the propagation of this plant has been gradually extended to moft of our Englifh gardens, and with a degree of fuccefs which promifes in time to fuperfede the importation of the foreign root. The R. rhaponticum is a different fpecies from either of thefe. This is fuppofed to be the rhabarbarum of the ancients. It is well known that the ancient rhubarb had not the purgative virtues of the modern. Two forts of rhubarb are ufually imported into this country for medical ufe, *viz.* the Chinefe and the Tartary rhubarb. Mr. Bell informs us, in his travels, that the beft rhubarb grows in that part of the Eaftern Tartary called Mongallia, which ferves as a boundary between Ruffia and China; or, on the chain of mountains in Tartary, which ftretches from the Chinefe town Selin to the lake Kokonor, near Thibet. This plant, he fays, does not run and fpread itfelf like docks, but grows in tufts at uncertain diftances, as if the feed had been dropped with defign. As the Mongalls do not think it worth cultivating, the marmots, which burrow under the fhade of its fpreading leaves, and probably feed on its leaves and roots, contribute to its increafe, partly by the manure which their dung affords it, and principally by cafting up and loofening the earth, into which the ripe feeds, blown by the wind, fall, and where they immediately take root. After digging and gathering the rhubarb, the Mongalls cut the large roots into fmall pieces, in order to make them dry the more readily. The roots are taken up in autumn, according to Mr. Bell's account; but according to Pallas, in April and May: and after being cleaned, and cut tranfverfely into pieces of a moderate fize, thefe pieces are placed on tables, and turned three or four times a day for five or fix days. In the middle of every piece they fcoop a hole, through which a cord is drawn, in order to fufpend them in a convenient place, but fheltered from the fun, and expofed to the air and wind; and by this practice they deftroy fome of the beft part of the root.

The proper exficcation of this root is certainly attended with great difficulty, and the cultivators of rhubarb in this country have not yet agreed as to the beft mode of accomplifhing it. The recent root, in this procefs, according to the experiment of fir William Fordyce, lofes nearly ninetenths of its weight; and as others fay, feven-eighths. In China the roots are not dug up till winter; and the cultivators, after cleaning, fcrape off the bark, and cutting them, dry the flices by frequently turning them on ftone flabs, heated by a fire underneath; after which, the drying is completed by hanging them up in the air, expofed to the greateft heat of the fun. Part of the Tartarian rhubarb is carried to Turkey through Natolia; but the greateft part is conveyed by the Bucharians to Kiachta, on the Ruffian frontier, where it is examined by a Ruffian apothecary, and the beft pieces only are felected and fent to Peterfburgh. The Chinefe is conveyed to Canton, and there purchafed by the agents of the Eaft India Company.

Of the two forts of rhubarb above mentioned, the Chinefe is chiefly obtained in the province of Xenfi or Shenfee, under the name "Taihoung." It comes immediately from the Eaft Indies, in oblong pieces, flattifh on one fide, and convex on the other; compact, hard, heavy, internally of a dull red colour, variegated with yellow and white; and when recently powdered, appears yellow; but on being kept, becomes gradually redder. The fecond is the moft valuable, and is brought to us from Turkey and Ruffia, in roundifh pieces, with a large hole through the middle of each; it is more foft and friable than the former fort, and exhibits, when broken, many ftreaks of a bright red colour. This fort, unlefs kept very dry, is apt to grow mouldy and worm-eaten; the other is lefs fubject to thefe inconveniences. Some of the more induftrious artifts are faid to fill up the worm-holes with certain mixtures, and to colour the outfide of the damaged pieces with powder of the finer forts of rhubarb, and fometimes with cheaper materials. The marks of the goodnefs of rhubarb are, the livelinefs of its colour when cut, its being firm and folid, but not flinty or hard; its being eafily pulverable, and appearing, when powdered, of a fine bright yellow colour; its imparting to the fpittle, on being chewed, a deep faffron tinge, and not proving flimy or mucilaginous in the mouth. Its tafte is fubacrid, bitterifh, and fomewhat ftyptic; the fmell is flightly aromatic.

Turkey rhubarb is generally preferred to the Eaſt India ſort, though the latter is more aſtringent, but has ſomething leſs of an aromatic flavour. Tinctures made from both, with equal quantities of rectified ſpirit, have nearly the ſame taſte; on drawing off the menſtrua, the extract left by the tincture of the Eaſt India rhubarb proves in taſte conſiderably ſtronger than the other. They ſeem both, ſays Dr. Lewis, to be the produce of the ſame climate, and roots of the ſame ſpecies of plant, taken up probably at different ſeaſons, or cured in a different manner. Lewis's Mat. Med.

The Ruſſian rhubarb and Turkey rhubarb, ſometimes diſtinguiſhed in the ſhops, ſeem to be the root of the ſame ſpecies of plant, grown in the ſame place, and prepared in the ſame manner; but Mr. A. T. Thomſon (Lond. Diſp.) inclines to believe, that the Eaſt Indian is the root of a different ſpecies, very probably of the "undulatum;" and the mode of preparation appears to be evidently different, from the aſpect of the pieces.

Good Ruſſian or Turkey rhubarb, ſays Mr. Thomſon, has a peculiar, ſomewhat aromatic odour, and a bitter, ſlightly aſtringent, ſubacrid taſte; feels gritty between the teeth when chewed, and tinges the ſaliva of a bright yellow colour. It breaks with a rough hackly fracture, is eaſily pulverized, and affords a powder of a bright buff yellow colour. Water at 212° takes up 24 parts in 60; the infuſion is of a brown colour, nearly clear, and reddens litmus paper. Alcohol extracts 2.7 from 10 parts, and gives a tincture of a rich golden colour, which reddens tincture of litmus; is not altered in its tranſparency by the addition of water; and ſtrikes a blackiſh olive hue with ſolution of ſulphate of iron, but no immediate precipitate falls. Sulphuric ether takes up 1.5 in 10 parts of this rhubarb; the tincture is of a golden yellow hue, and when evaporated on water, leaves a thin pellicle of yellow reſin, and abundance of extractive diſſolved in the water, combined, however, with tannin. Eaſt Indian or Chineſe rhubarb has a ſtronger odour, and is more nauſeous to the taſte than the Turkey; breaks with a more compact and ſmoother fracture; and affords a powder of a redder ſhade. Water takes up 30 parts in 60; the infuſion is not ſo deep coloured as that of Ruſſian rhubarb, more turbid, and reddens alſo litmus paper. Alcohol extracts 4 parts in 10; the tincture is of a much deeper colour, and browniſh; gives a deeper red to litmus tincture; is rendered ſlightly turbid by the addition of water; and ſtrikes a green, not black, olive with ſulphate of iron, which it alſo quickly and copiouſly precipitates. Ether takes up 2 parts in 10; the tincture is deeper coloured, and when evaporated on water, affords the ſame reſults as the former kind, except that the compound of tannin and extractive is more ſoluble.

The infuſion of Chineſe rhubarb is more copiouſly precipitated by ſolution of iſinglaſs than that of the Ruſſian. Infuſion of yellow cinchona throws down a copious greeniſh precipitate from infuſion of Ruſſian rhubarb, and a leſs copious, but more denſe, bright yellow precipitate from that of Chineſe rhubarb.

The following tables ſhew the effects of re-agents on the aqueous infuſion of the two varieties of rhubarb.

Table I.—Precipitates formed by Acids, Alkalies, and Neutral Salts.

Variety of Rhubarb.	Sulphuric Acid.	Nitric Acid.	Muriatic Acid.	Oxymuriatic Acid.	Solution of Potaſs.	Solution of Subcarbonate of Potaſs.	Lime Water.	Muriate of Barytes.	Silicated Potaſs.
Ruſſian.	copious, greeniſh-yellow.	ſcanty, flocculent, pale yellow.	ſcanty, very ſlowly formed, yellow.	ſlowly formed, pale olive.	none, but ſtrikes a deep lake colour.	none, but ſtrikes a reddiſh-brown.	ſcanty, ſlowly formed, brown.	ſcanty, olive-green.	none, but ſtrikes a deep brown.
Chineſe.	more copious, browniſh-yellow.	leſs ſcanty, pale yellow.	ſcanty, quickly formed, browniſh-yellow.	ſlowly formed, orange-yellow.	none, a deeper lake.	none, but renders it turbid, and deep reddiſh-brown.	copious, quickly formed, brown.	leſs ſcanty, orange-yellow.	none, but ſtrikes a deep brown.

Table II.—Precipitates formed by Solutions of Metallic Salts.

Variety of Rhubarb.	Solution of Oxyſulphate of Iron.	Solution of Nitrate of Silver.	Solution of Nitrate of Mercury.	Solution of Nitrate of Lead.	Solution of Muriate of Mercury.	Solution of Acetate of Lead.	Solution of Tartarized Antimony.
Ruſſian.	copious, nearly black.	ſcanty, pale greeniſh-yellow.	copious, olive-yellow.	ſcanty, ſlowly formed, yellow.	ſcanty, ſlowly formed, pale olive.	ſcanty, greeniſh-yellow.	ſcanty, ſlowly formed, whitiſh.
Chineſe.	copious, deep olive-green.	copious, orange-yellow.	copious, heavy, bright yellow.	ſcanty, ſlowly formed, deeper yellow.	copious, quickly formed, heavy yellow.	copious, yellow.	ſcanty, ſtill more ſlowly formed.

When the refidue, after the action of water, is digefted in muriatic acid, and folution of ammonia added in excefs, the liquid becomes milky, and depofits oxalate of lime. What remains confifts of woody matter, a fmall portion of alumen, and filex. Of the fpecimens which we examined, one drachm of the Ruffian rhubarb yielded twenty-fix grains of the oxalate, while the fame weight of Eaft Indian yielded only eighteen grains.

From the refults of the above experiments, rhubarb appears to contain a large portion of extractive matter, a fmall portion of refin, mucus, tannin, gallic acid, a colouring matter, oxalate of lime, and minute proportions of alumen and filex. They fhew that the two varieties differ from each other in feveral refpects. The Ruffian contains more tannin, oxalate of lime, and refin; the Chinefe more extractive and gallic acid. But the purgative principle is ftill unafcertained, although it appears to be combined with the extractive, and hence is foluble in water.

The yellow colour of rhubarb, it is faid, is much lefs deftructible than many other vegetable yellows. Aqua fortis, and other acids which deftroy the colour of faffron, turmeric, &c. make no change in that of rhubarb, or at moft render it only turbid. Volatile fpirits heighten the colour, and incline it to red. Fixed alkaline falts have this effect in a greater degree. Mr. Model affirms that a confiderable quantity of felenites is contained in rhubarb. In one experiment he obtained fix ounces of felenites from four pounds of rhubarb; and in the other, no lefs than an ounce of felenites from two ounces and five drachms of old rhubarb. Rozier's Journal for July, 1775.

Rhubarb is a mild cathartic, and commonly confidered as one of the fafeft and moft innocent of the fubftances of this clafs. Befides its purgative virtue, it has a mild aftringent one, difcoverable by the tafte, and by its ftriking an inky blacknefs with chalybeate folutions: hence it is found to ftrengthen the tone of the ftomach and inteftines, to leave the belly coftive, and to be one of the moft ufeful purgatives in diarrhœas, dyfenteries, and all diforders proceeding from a debility and laxity of the fibres: it is frequently given with a view to this ftomachic and corroborating virtue, rather than to its producing any confiderable evacuations. It tinges the urine of a high yellow colour. Rhubarb in fubftance purges more effectually than any preparation of it: the dofe is from a fcruple to a drachm. From ℈j to ʒß of the powdered root opens the bowels freely; and from grs. vi to grs. x may be given for a dofe, when its ftomachic properties only are required. By roafting it with a gentle heat, till it becomes eafily friable, its cathartic power is diminifhed, and its aftringency fuppofed to be increafed. The purgative virtue of rhubarb is extracted more perfectly by water than by rectified fpirit; the root remaining after the action of water is almoft, if not wholly, inactive; whereas, after repeated digeftion in fpirit, it proves ftill very confiderably purgative: when the rhubarb has given out to fpirit all that this menftruum can extract, it ftill imparts a deep colour, as well as a purgative impregnation, to water. A drachm of the extract, formed by infpiffating the watery infufion, is not more efficacious than a fcruple of the root in fubftance; but half a drachm of the extract, formed from the fpirituous tincture, proves moderately purgative, though fcarcely more fo than an equal quantity of the powder. The fpirituous extract diffolves almoft wholly in water; and hence the tincture, like the fpirituous infufions of moft other vegetables, does not turn milky on being mixed with aqueous liquors: of the watery extracts fcarce above one-fourth is diffolved by rectified fpirit, and the part that does not diffolve proves more purgative than that which does. Hence it appears, that rhubarb contains much more gummy or mucilaginous than refinous matter; and its purgative quality feems to refide chiefly in a combination of gummy and faline matter.

"The qualities of this root," fays Dr. Cullen (Mat. Med. vol. ii.), "are that of a gentle purgative, and fo gentle that it is often inconvenient by reafon of the bulk of the dofe required, which in adults muft be from half a drachm to a drachm. When given in a large dofe, it will occafion fome griping, as other purgatives do; but it is hardly ever heating to the fyftem, or fhews the other effects of the more draftic purgatives. The purgative quality is accompanied with a bitternefs, which is often ufeful in reftoring the tone of the ftomach, when it has been loft; and for the moft part, its bitternefs makes it fit better on the ftomach than many other purgatives do. Its operation joins well with that of neutral laxatives; and both together operate in a leffer dofe than either of them would do fingly.

"Some degree of ftipticity is always evident in this medicine; and as this quality acts when that of the purgative has ceafed, fo in cafes of diarrhœa, when any evacuation is proper, rhubarb has been confidered as the moft proper means to be employed. I muft, however, remark here, that in many cafes of diarrhœa, no further evacuation than what is occafioned by the difeafe is neceffary or proper. The ufe of rhubarb in fubftance for keeping the belly regular, for which it is frequently employed, is by no means proper, as the aftringent quality is ready to undo what the purgative had done; but I have found that the purpofe mentioned may be obtained by it, if the rhubarb is chewed in the mouth, and no more is fwallowed than what the faliva has diffolved. And I muft remark, in this way employed it is very ufeful to dyfpeptic perfons. Analogous to this is the ufe of rhubarb in a folution, in which it appears to me that the aftringent quality is not fo largely extracted as to operate fo powerfully, as when the rhubarb was employed in fubftance."

The operation of rhubarb is quickened by the addition of neutral falts and calomel, the purgative powers of which it alfo reciprocally augments; fo that a compound, formed of fmall portions of rhubarb and a neutral falt or calomel, acts with more certainty, and quicker, than large dofes of either feparately taken. Rhubarb is particularly adapted for the greater number of cafes of diarrhœa, as it evacuates any acrid matter that may be offending the bowels, before it acts as an aftringent. As a ftomachic and aftringent, it is ufefully given in dyfpepfia, hypochondriafis, and in a weakened relaxed ftate of the bowels, combined with ginger, nutmeg, foda, or bitters. Externally its powder is fometimes fprinkled over ulcers, to affift their granulation and healing.

Its officinal preparations are as follow: *viz. Infufum rhei,* Lond. Pharm., infufion of rhubarb, prepared by macerating for two hours a drachm of rhubarb root, fliced, with half a pint of boiling water, in a lightly covered veffel, and ftraining it.

Infufum rhei palmati, Edinb. Pharm., infufion of rhubarb, prepared by macerating half an ounce of bruifed rhubarb root with eight ounces of boiling water, in a covered veffel, for twelve hours, and then adding one ounce of fpirit of cinnamon, and ftraining it. Thefe infufions differ chiefly in their ftrength; but that of the Edinburgh difpenfatory is rendered pleafanter by the addition of the fpirit. The colour of both is a reddifh-brown, much deepened by the addition of alkalies. The following fubftances either occafion precipitation,

precipitation, or alter the properties of this infusion, and are therefore incompatible in formulæ with it: *viz.* the strong acids and lime-water, solution of sulphate of iron, sulphate of zinc, nitrate of silver, oxymuriate of mercury, superacetate of lead, and tartarized antimony; infusions of catechu, cinchona, and cusparia.

These infusions are the best form in which rhubarb can be given, when they are intended for acting on the bowels. The dose of the former may be from f℥j to f℥iv, and of the latter half the quantity, united with neutral salts or aromatics, as circumstances may direct.

Extractum rhei, Lond. Pharm., extract of rhubarb, is obtained by macerating for four days, in a gentle heat, a pound of bruised rhubarb root, with a pint of proof spirit, and seven pints of water; then straining the solution, and setting it apart that the feculencies may subside. Pour off the clear liquor, and evaporate it to a proper consistence. The virtues of rhubarb are impaired during this process of inspissation, and the simple infusion is preferable. The dose is from grs. x to ʒß, given in the form of pills, or dissolved in peppermint water.

Tinctura rhei, Lond., tincture of rhubarb, is prepared by macerating for fourteen days two ounces of rhubarb root sliced, half an ounce of cardamom seeds bruised, two drachms of saffron, in two pints of proof spirit, and filtering. The Dublin pharmacopeia directs to take of rhubarb root sliced, two ounces; lesser cardamom seeds husked and bruised, and liquorice bruised, of each half an ounce; saffron, two drachms; and proof spirit, two pints: to digest for seven days, and then filter.

Tincture rhei palmati, Edinb., tincture of rhubarb, is prepared by digesting for seven days three ounces of rhubarb root sliced, half an ounce of lesser cardamom seeds bruised, in two pounds and a half of proof spirit, and filtering through paper.

Tinctura rhei composita, Lond., compound tincture of rhubarb, is prepared by macerating for fourteen days two ounces of rhubarb root sliced, half an ounce of liquorice root bruised, ginger root sliced, and saffron, of each two drachms, in a pint of water, and twelve fluid ounces of proof spirit, and then filtering.

Tinctura rhei et aloes, tincture of rhubarb and aloes, formerly *elixir sacrum*, or sacred elixir, Edinb., is prepared by digesting for seven days ten drachms of rhubarb root sliced, six drachms of soccotorine aloes powdered, half an ounce of lesser cardamom seeds bruised, in two pounds and a half of proof spirit, and filtering through paper.

Tinctura rhei et gentianæ, tincture of rhubarb and gentian, Edinb., formerly *tinctura rhei amara*, or bitter tincture of rhubarb, is obtained by digesting for seven days two ounces of rhubarb root sliced, half an ounce of gentian root sliced, in two pounds and a half of proof spirit, and filtering through paper.

All these tinctures of rhubarb are purgative and stomachic; but they are not generally used in the first intention, on account of the strength of the menstruum, and are therefore more usually employed as adjuncts to saline purgatives, for giving them warmth, and to stomachic infusions in dyspepsia, flatulent colic, diarrhœa, the costiveness of old people, and of cold phlegmatic habits. The dose for operating as a purgative is fʒvj, and from fʒj to fʒiij for producing their stomachic effects.

Pilulæ rhei compositæ, Edinb., compound rhubarb pills. See PILLS.

Vinum rhei palmati, Edinb., wine of rhubarb, is prepared by macerating for seven days two ounces of rhubarb root sliced, a drachm of canella bark bruised, in two ounces of proof spirit, and fifteen ounces of Spanish white wine, and filtering through paper. This wine, when newly prepared, has the same properties, and may be applied to the same uses, as the tincture; but it is liable to undergo decomposition. The dose is from f℥ß to f℥j, or more. Rhubarb is also an ingredient in a variety of compositions. Woodv. Med. Bot. Thomson's Lond. Disp.

The Indian rhubarb sown in our gardens has this peculiar property, that it yields a fine and clear gum. This is perfectly white and pellucid, and in the months of June and July is so plentiful, that an ounce may sometimes be gathered at a time from one plant of it. It exudates of itself from all parts of the stalks and ribs of the leaves, and sometimes from the under part of the leaves themselves. It stands in some places in large drops, and in others the stalks, &c. seem only to be covered with a thin layer of it; and the under part of the leaves in some have it in form of twisted wires or long icicles. The plant may always be seen wounded by a sort of caustic in the places where the germen makes its way out, and these may be followed with any pointed instrument through the skin. In some parts of the plant this juice is found to be turned gummy within it, and looks like clear ice. As this is the only known herbaceous plant that yields a true gum like that of trees, it would be worthy of observation, whether or not some of our own plants have some tendency of nature to form a juice of the same kind. It would be most proper to look for this in the plants of the same genus, and as nearly related to the rhubarb as we can. The docks, so common about our fields, are of the same genus; and the sorrel shews, by its taste, that it is particularly allied to the plant; for both are alike of the dock kind, and both alike sour. It would be proper to look carefully about the leaves of sorrel a little before it flowers, to see whether any thing like the same gum appears on it.

There is yet this farther analogy between this rhubarb and our common sorrel; that the husks of our sorrel, boiled in water, with a little alum, turn it to a fine red colour; and the husks of rhubarb do the same, and both the one and the other often turn red in decaying.

The juice of the roots of this rhubarb, extracted by bruising and steeping it in common water, when the liquor is strained and evaporated, becomes only a clear uninflammable gum, and melts in the flame of a candle. This gum, as well as that of the stalks and leaves, is of an insipid taste; and it is observable, that though the plant naturally yields it in so large a quantity, yet it will not flow from wounds made by art in any part of the plant. Upon the consideration of the insipid taste of this gum, and its solubility in water, we may found some probable conjecture, in regard to the different virtues of this plant in purging and binding.

The woody fibres have a strong taste; and, in all probability, are alone endued with the astringent quality. An infusion of rhubarb is said to purge, and a powder of it to bind: the reason is easily seen on this consideration. The water in infusion takes up all this gummy juice, and its other juices, but leaves the fibrose part behind, in consequence of which, it ought to purge without binding; but in case of giving the powder, the juices are in great part evaporated in the drying, and the woody part left almost alone; it therefore purges but little, and proves powerfully astringent. Phil. Trans. N° 224.

RHUBARB, in *Agriculture*, a plant of the thick, fleshy, tap-rooted, perennial kind, that may in some cases be probably cultivated in the field with advantage. There are two sorts, the *common*, and the *palmated* or true kind. In the first the root strikes to a great depth, and is thick and branching, having

having roundiſh ſmooth heart-ſhaped leaves, and an upright ſtrong ſtem, three feet in height; while, in the latter, the root is thick and fleſhy, and the leaves large and palmated, having the ſtem five, ſix, or more feet in height. Beſides the uſe of the roots as a drug, parts of the young ſtalks of the plants, as well as of the leaves, may be made uſe of, when cut, peeled, and prepared in the ſpring ſeaſon, as an article of food.

This plant is uſually raiſed by ſowing the well ripened ſeed in the autumn or early ſpring ſeaſons, as about September, or in February, on beds of rich, deep, well-manured earth, either in the drill or broadcaſt manner: the plants being afterwards kept clean from weeds, and properly thinned. But the autumn is ſaid to be the better, as the plants are more ſtrong for planting in the ſpring. When the plants have attained four or five inches in growth, they ſhould be planted out on hills, made at the diſtance of four feet, by digging out the earth to the depth of three feet, and filling in with well-rotten manure, and the mould taken out, ſo as to raiſe the plants a little above the natural ſurface of the land. Some, however, direct that a deep, rich, well prepared ſoil, that is neither too moiſt nor too dry, ſhould be choſen for this ſort of culture, the ſeeds being ſown upon it in the early autumn, ſo as to remain without tranſplanting, as by this means the plants ſuffer no check in their growth, and the roots become larger and more fair. The plants, in both modes, muſt be conſtantly kept clean and free from all ſorts of weeds, and in the latter they ſhould be ſet out in the different hoeings to the diſtance of ſix or eight inches at firſt, and afterwards to two or three feet, or more. When the leaves and ſtems decay in the autumn, the ground ſhould be well cleaned; and in the ſpring, on the plants protruding, be dug well, or hoed between them. In the third year the roots will, in moſt caſes, be in a ſtate to be taken up for uſe.

Another method has been ſuggeſted for raiſing theſe plants, as being more eaſy, ſecure, and expeditious, which is by planting the off-ſets, eyes, or buds, ſeparated from the upper parts of the roots, with a ſmall proportion of the old root, having ſome root fibres to them; theſe may be taken from the old roots of three or four years' growth. In this way a year is ſaved, and the plants leſs expoſed to danger from ſlugs, as well as more certain in growing, leſs tender, and the ſize of the roots equal. In Mr. Hayward's practice in this mode, the off-ſets were ſlipped from the heads of large plants in the ſpring, and ſet, by means of a dibble, at the diſtance of about a foot. And on further experience, when he took up his roots in the ſpring or autumn, he divided the head into many parts, which he planted directly at two feet diſtance, where intended for further removal, but if to remain for a crop, at four feet and a half.

It may be noticed, that in the culture of this root, a gentle declivity is the beſt ſituation; it ſhould not be too much ſhaded, either on the ſouth or weſt. But it is eſſential that there be a great depth and richneſs of ſoil, which is beſt when of the light loamy kind, and perfectly free from any ſtagnation of moiſture. Where the ſituation is flat, the land is beſt raiſed into ridges or beds, with deep furrows or trenches between them.

And when the ſeed-ſtems are removed in the autumn, the crowns of the plants ſhould be well covered over with mould, ſo as to form a ſort of hillock, as by this means the moiſture will be more effectually kept from the plants.

But where the tranſplanting method is practiſed, it is adviſed that great care ſhould be taken that the nurſery beds are well watered, and protected from inſects, as the ſtronger the plants are here, the better they ſucceed afterwards. In forming plantations, and filling up vacancies in them, the fineſt and moſt healthy plants are always to be made uſe of. Where the chief bud is deſtroyed, they never anſwer well.

The particular injuries to which theſe young plants are expoſed, are the attacks of ſlugs and inſects, and too much expoſure to froſt in their more early growth; but afterwards they are ſufficiently hardy.

In general the roots are proper for being taken up about the third or fourth year, or as ſoon as the plants have flowered perfectly. And the autumn is the beſt ſeaſon for the purpoſe, when the ſtems decay, when they ſhould be well dried, cleaned, and cut into thin pieces, ſtringing them upon packthread, and hanging them up to dry in a gradual manner.

It has been obſerved by the writer of the Perthſhire Agricultural Report, that it is ſurpriſing the culture of rhubarb has not claimed more attention, and been adopted on a more extenſive ſcale, as it is calculated to bring large profits.

The palmated rhubarb has been cultivated in Suſſex by the earl of Egremont, for medicinal purpoſes, who has it dried and cured in as good order and preſervation as any imported from abroad. It is taken out of the ground in autumn, after ſtanding ſeven or eight years, and then waſhed clean, and dried, either in the ſun, or on the flue of a hot-houſe, after being cut into thin pieces. In uſing it, no difference is found between it and the foreign, and great ſaving might be made in this way in the importation of the article.

Rhubarb, *Monk's*, is a ſpecies of dock. See Rumex.

The root of this plant is more aſtringent than rhubarb, but is much inferior in its purgative virtue, though given, as uſually directed, in double its doſe; nauſeating the ſtomach, without producing any conſiderable evacuation. It communicates a deep yellow tincture, both to water and ſpirit. Lewis.

Rhubarb, *White*. See Mechoacan.

RHUBRA, in *Ancient Geography*, a town ſituated on the ſouthern coaſt of the iſland of Corſica, between the port of Syracuſe and the promontory Graniacum. Ptolemy.

RHUBRICATA, a town of Hiſpania, in the Tarragoneſe, in the country of the Lacetanians. Ptolemy.

RHUBUNA, a town of Africa, on the northern bank of the river Gira, between Artagira and Lynxama. Ptolemy.

RHUDA, a town of Aſia, in Parthia, between Paſacarta and Simpſimida. Ptolemy.

RHUDDLAN, or Rhyddlan, in *Geography*, a borough town in the cwmwd of Rhuddlan, cantref of Tegeing (now called the hundred of Rhuddlan), county of Flint, North Wales, is ſituated on the eaſtern bank of the river Clwyd, at the diſtance of five miles N. from the city of St. Aſaph, and 215 miles N.W. from London. It is a town of great antiquity, and, as appears from tradition, and likewiſe from the remains of its caſtle, was a place of conſiderable importance in early times. A large common in the immediate vicinity was the theatre of a dreadful battle fought between the Welſh, under prince Caradoc, and the Saxons, commanded by Offa, king of Mercia. In this action the Welſh were defeated, and their leader ſlain; and to add to their misfortunes, Offa put to death all the men and children who fell into his hands, but ſpared the women. The memory of the above tragical occurrence is commemorated in a ballad called "Morfa Rhuddlan," the air of which is characteriſed by Pennant as being "moſt tenderly plaintive." This town was conſtituted a free borough by king

Edward I., who held a parliament here in 1284, when the ſtatute of Rhuddlan was paſſed. At a private houſe is ſtill ſhewn a "Gothic window," which is ſaid to have been part of the building uſed on the occaſion of theſe parliamentary meetings. Another houſe is alſo pointed out as having been honoured by the reſidence of the monarch himſelf during his ſtay at Rhuddlan, but it is more likely that he occupied the caſtle; and certain it is, that queen Eleanor's accouchment of a daughter occurred there in 1283. A copy of the roll of the king's expences, while at Rhuddlan, is printed in the Archæologia, and exhibits ſeveral intereſting and curious particulars relative to the prices of proviſions and labour at that early period. Rhuddlan caſtle is built of a reddiſh free-ſtone, and is nearly ſquare in form. At two of the oppoſing corners were formerly two towers, though the other corners had only one each. Of theſe, the three on the northweſt ſide of the fortreſs are tolerably entire, but the remainder is much dilapidated. By whom this caſtle was originally built is uncertain; ſome writers attributing it to Llewellin-ap-Sitſyllt, about the commencement of the 11th century, and others to Robert de Rodelent, who lived towards the cloſe of the ſame century. Be this as it may, however, it was deſtroyed by Gruffydd-ap-Crinan in the reign of Henry II., and was ſubſequently re-erected and fortified by that monarch. In 1399 it was ſeized and garriſoned by the earl of Northumberland, previous to the depoſition of the unfortunate king Richard II., who dined here on his way to Flint caſtle. During the civil wars between king Charles I. and his parliament, Rhuddlan caſtle was at firſt occupied by the royaliſts, but, after a ſhort ſiege, the garriſon were forced to ſurrender to the parliamentary troops, commanded by general Mytton. This event happened in July 1646, and in the following December, the fortreſs was diſmantled by order of parliament. It was ſurrounded by a deep ditch, and had an additional one on the north ſide: both of theſe ditches are ſtill remaining. The walls are very ſtrong, and well calculated for defence. South from the caſtle is a fortification, commonly ſuppoſed to have been conſtructed by the parliamentary troops as a battery during the ſiege above-mentioned; but though it may have been uſed for that purpoſe, it is doubtleſs of much higher antiquity. Near this ſpot formerly ſtood a houſe of Black friars, which muſt have been founded previous to 1268, as it is recorded, that in that year, Anian de Schonan, one of its priors, was made biſhop of St. Aſaph. It ſuffered greatly in the wars between king Edward I., and prince Llewellin ab Gruffydd; but it recovered and ſubſiſted till the reign of Henry VIII. when it was diſſolved, and its buildings granted to Henry ap Harry. Tanner ſtates that there was another religious houſe in the immediate vicinity of Rhuddlan, as old as the year 1281, but no traces of its ſcite can now be diſcovered.

Edward I., in his charter conſtituting Rhuddlan a borough, appointed the conſtable of the caſtle mayor, and ordered that two bailiffs ſhould be choſen annually, as his aſſiſtants, from among the burgeſſes. Since the time of Oliver Cromwell, there having been no conſtable, there has conſequently been no mayor, ſo that the bailiffs are now the chief officers of the town. The burgeſſes contribute towards the new election of a repreſentative in parliament for the borough of Flint. The voters muſt either inhabit the town itſelf, or that part of the pariſh called Rhuddlan Franchiſe, which extends to the diſtance of a mile. At preſent no regular market is held here, but there are fairs for cattle on the 2d of February, 25th of March, and the 8th of September. The pariſh, according to the parliamentary returns of 1811, contains 131 houſes, and 831 inhabitants.

The river Clwyd, upon which Rhuddlan is ſituated, is only navigable for veſſels of about twenty tons burden as high up as the town; but about two miles below it is a port, into which veſſels of conſiderable magnitude can enter and remain with ſecurity. Carliſle's Topographical Dictionary of Wales, 4to. 1813. Pennant's Tour in Wales, 1770, Lond. 2 vols. 4to. 1778.

RHUDEN, or Ruthen, a town of Germany, in the duchy of Weſtphalia; 64 miles E. of Duſſeldorp.

RHUDIANA, in *Ancient Geography*, a country of Aſia, in Carmania. Ptolemy.

RHULA, in *Geography*, a town of Saxony, in the principality of Eiſenach, famous for its manufacture of knives; four miles S.S.E. of Eiſenach.

RHUMB, Rumb, or *Rum*, in *Navigation*, a vertical circle of any given place; or the interſection of a part of ſuch a circle with the horizon.

Rhumbs, therefore, coincide with *points* of the world, or of the horizon.

And hence the mariners diſtinguiſh the rhumbs by the ſame names as the points and winds. But we may obſerve, that the rhumbs are denominated from the points of the compaſs in a different manner from the winds: thus, at ſea, the north-eaſt wind is that which blows from the north-eaſt point of the horizon towards the ſhip in which we are; but we are ſaid to ſail upon the north-eaſt rhumb, when we go towards the north-eaſt.

They uſually reckon 32 rhumbs, which are repreſented by the 32 lines in the roſe, or card, of the compaſs.

Aubin defines a rhumb to be a line on the terreſtrial globe, ſea-compaſs, or ſea-chart, repreſenting one of the 32 winds which ſerve to conduct a veſſel. So that the rhumb a veſſel purſues is conceived as its route, or courſe.

Rhumbs are divided and ſubdivided like points. Thus, the whole rhumb anſwers to the cardinal point. The half rhumb to a collateral point, or makes an angle of 45° with the former. The quarter rhumb makes an angle of 22° 30′ with it. And the half-quarter rhumb makes an angle of 11° 15′.

Sometimes navigators divide the 32 points into four quarters, and call the rhumb next the eaſt the firſt rhumb, the next to that the ſecond rhumb, &c.

For a table of the rhumbs, or points, and their diſtances from the meridian, ſee Wind.

Rhumb-*Line*, *Loxodromia*, is a line prolonged from any point of the compaſs in a nautical chart, except the four cardinal points; or it is the line which a ſhip, keeping in the ſame collateral point, or rhumb, deſcribes throughout its whole courſe. See Loxodromy.

The great property of the rhumb-line, or loxodromia, and that from which ſome authors define it, is, that it cuts all the meridians under the ſame angle.

This angle is called the *angle of the rhumb*, or the loxodromic angle.

The angle which the rhumb-line makes with any parallel to the equator, is called the *complement of the rhumb*.

An idea of the origin and properties of the rhumb-line, the great foundation of navigation, may be conceived thus: a veſſel beginning its courſe, the wind with which it is driven makes a certain angle with the meridian of the place; and as it is ſuppoſed, the veſſel runs exactly in the direction of the wind, it makes the ſame angle with the meridian which the wind makes.

Suppoſing then the wind to continue the ſame, as each point

point or inſtant of the progreſs may be eſteemed the beginning, the veſſel always makes the ſame angle with the meridian of the place where it is each moment, or in each point of its courſe, which the wind makes.

Now a wind, *e. gr.* that is north-eaſt, and which, of conſequence, makes an angle of 45° with the meridian, is equally north-eaſt, wherever it blows, and makes the ſame angle of 45° with all the meridians it meets. A veſſel, therefore, driven by the ſame wind, always makes the ſame angle with all the meridians it meets with on the ſurface of the earth.

If the veſſel ſail north and ſouth, it makes an angle infinitely acute with the meridian, *i. e.* it is parallel to it; or rather ſails in it. If it run eaſt and weſt, it cuts all the meridians at right angles.

In the firſt caſe, it deſcribes a great circle; in the ſecond, either a great circle, *viz.* the equator, or parallel to it. If its courſe be between the two, it does not then deſcribe a circle; ſince a circle, drawn in ſuch a manner, would cut all the meridians at unequal angles, which the veſſel cannot do.

It deſcribes, therefore, another curve, the eſſential property of which is, that it cuts all the meridians under the ſame angle. This curve is what we call the *loxodromic curve, rhumb-line,* or *loxodromy.*

It is a kind of ſpiral, which, like the logarithmic ſpiral, makes an infinity of circumvolutions without ever arriving at a certain point, to which it yet ſtill tends, and towards which it approaches at every ſtep.

This aſymptotic point of the rhumb-line is the pole: at which, were it poſſible for it to arrive, it would find all the meridians conjoined, and be loſt in them.

The courſe of a veſſel then, except in the two firſt caſes, is always a rhumb-line; which line is the hypothenuſe of a right-angled-triangle, whoſe two other ſides are the ſhip's way or diſtance run in longitude and latitude. Now, the latitude is uſually had by obſervation, and the angle of the rhumb, with one or other of the two ſides, by the compaſs. See LATITUDE, and COMPASS.

All, therefore, that is required by calculation in ſailing, is the value of the length of the rhumb-line, or the diſtance run.

But as ſuch curve line would prove very perplexing in the calculation, it was neceſſary to have the ſhip's way in a right line; which right line, however, muſt have the eſſential porperty of the curve line, *viz.* to cut all the meridians at right angles. See CHART.

If P A, P F, P G, &c. (*Plate* II. *Navigation, fig.* 5.) be ſuppoſed meridians, A I the equator, and E B, K L, M N, parallels; A O will repreſent a rhumb-line, which makes equal angles with the meridians, and conſequently different from thoſe made by a great circle, which cuts the meridians at unequal angles; whence it follows that the rhumb is not a great circle of the ſphere. If a ſhip, therefore, be at firſt directed towards E, and conſtantly perſiſt in the ſame rhumb, it will never arrive at the place E, but at the place O, which is farther from the equator A I.

Hence, as on the ſurface of a ſphere the ſhorteſt way between A and O is an arc of a great circle between A and O; the rhumb-line is not the ſhorteſt way, or leaſt diſtance from one place to another.

RHUMB-*Lines, Uſe of the.* 1. If the meridians P A, P B, P C, P D, &c. (*fig.* 6.) be not very far apart, the rhumb-line A I H G is divided by the equidiſtant parallels L E, M F, N G, &c. into equal parts.

Hence, 1. The parts of the rhumb A I and A G are as the latitudes A L and A N of the places A and G. 2. Since the arcs A B, I K, H F, are equal in magnitude, and therefore unequal in number of degrees; the ſum of the arcs, called the *latus mecodynamicum,* or *miles of longitude,* is not equal to the difference of longitude A D of the places A and G.

2. The length of the rhumb-line A G is to the change or difference of latitude G D, in the ſame ratio as the whole ſine to the co-ſine of the angle of the rhumb.

Hence, 1. The rhumb ſailed on being given, together with the difference or change of latitude, turned into miles, the length of the rhumb-line, or the diſtance from the place A to the place G upon the ſame rhumb, is had by the rule of three. 2. The rhumb being given, together with the quantity of the ſhip's way on the ſame rhumb, *i. e.* the length of the rhumb A G; the difference of latitude D G is had, by the rule of three, in miles, to be converted into degrees of a great circle. 3. The difference of latitude D G being given in miles, as alſo the length of the rhumb-line A G, the angle of the rhumb, and conſequently the rhumb ſailed on, is had by the rule of three. 4. Since the co-ſine of an angle is to the whole ſine, as the whole ſine to the ſecant of the ſame angle; the difference of latitude G D is to the length of the rhumb-line A G, as the whole ſine to the ſecant of the angle of the rhumb.

3. The length of the rhumb-line, or of the ſhip's way in the ſame rhumb, A G, is to the latus mecodynamicum or mecodymanic ſide A B + I K + H F, as the whole ſine to the ſine of the loxodromic angle G A P.

Hence, 1. The rhumb, or angle of the rhumb, being given; as alſo the ſhip's way in the ſame rhumb-line A G, the mecodynamic ſide is had, by the rule of three, in miles, *i. e.* in the ſame meaſure in which the length of the rhumb is given. 2. In like manner, the mecodynamic ſide A B + I K + H F being given, as alſo the rhumb-line or ſhip's way A G, the rhumb ſailed is found by the rule of three.

4. The change of latitude G D is to the mecodynamic ſide A B + I K + H F; as the whole ſine to the tangent of the loxodromic angle P A G or A I B.

Hence the rhumb or loxodromic angle P A G, and the change of latitude G D being given, the mecodynamic ſide is found by the rule of three.

5. The mecodynamic ſide A B + I K + H F is a mean proportional between the aggregate of the rhumb A G, and the change of latitude G D, and their difference.

Hence the change of latitude G D, and the rhumb-line A G being given in miles, the mecodynamic ſide is found in the ſame meaſure.

6. The mecodynamic ſide A B + I K + H F being given, to find the longitude A D.

Multiply the change or difference of latitude G D by ſix, which reduces it into parts of ten minutes each; divide the mecodynamic ſide by this product, and the quotient gives the miles of longitude, anſwering to the difference of latitude in ten minutes; reduce theſe miles of longitude in each parallel into differences of longitude from a loxodromic table, and the ſum of theſe is the longitude required.

7. If a ſhip ſail on a north or a ſouth rhumb, it deſcribes a meridian; if on an eaſt or weſt rhumb, it deſcribes either the equinoctial, or a parallel to it. Wolfii Elem. Math. tom. iv. cap. 11.

1. *To find the rhumb between two places by calculation, or geometrically,* we have two canons, or proportions: the firſt, as the radius is to the co-ſine of the middle latitude, ſo is the difference of longitude to the whole departure from the meridian, in the courſe between the two places propoſed.

The fecond, as the radius is to the half fum of the co-fines of both latitudes, or (rather for geometrical fchemes) as the diameter is to the fum of the co-fines of both latitudes, fo is the difference of longitude to the departure from the meridian. For the application of thefe principles, fee SAILING.

RHUN, PULO, in *Geography*. See POOLAROX.

RHUNE, a river which rifes in the New Foreft, and runs into the Seine; two miles N.W. of Nordheim.

RHUS, in *Botany*, an ancient name, ῥοῦς, or ῥοῦς, of the Greeks, generally fuppofed of doubtful etymology. De Theis deduces this, and many fimilar words, which have a reference to a red colour, from the Celtic *rhudd* or *rub*, red. Hence, according to him, we have not only *Rubia*, but *Rofa*. The fruit of the original ῥοῦς of Diofcorides, *Rhus Coriaria*, well juftifies this explanation.—Linn. Gen. 146. Schreb. 197. Willd. Sp. Pl. v. 1. 1477. Mart. Mill. Dict. v. 4. Sm. Prodr. Fl. Græc Sibth. v. 1. 206. Purfh 204. Ait. Hort. Kew. v. 2. 161. Juff. 369. Lamarck Illuftr. t. 207. Gærtn. t. 44.—Clafs and order, *Pentandria Trigynia*. Nat. Ord. *Dumofæ?* Linn. *Terebintaceæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five deep, erect, permanent fegments. *Cor.* Petals five, ovate, moderately fpreading. *Stam.* Filaments five, very fhort; anthers fmall, fhorter than the corolla. *Pift.* Germen fuperior, roundifh, as large as the corolla; ftyles fcarcely any; ftigmas three, heart-fhaped, fmall. *Peric.* Berry roundifh, of one cell. *Seed* folitary, roundifh, bony.

Obf. Some fpecies have dioecious flowers.

Eff. Ch. Calyx in five deep fegments. Petals five. Berry fuperior, with one feed.

An extenfive fhrubby or arborefcent genus, whofe fpecies are found in North America, Japan, China, the Cape of Good Hope, and a few in the fouth of Europe. Their qualities are of a cauftic nature, in certain inftances highly virulent, whence fome fpecies have acquired the name of Poifon-trees. Others are celebrated for producing valuable refins for varnifh. Willdenow has collected together the characters of thirty-three fpecies; but many of them he had not feen, particularly thofe found by Thunberg at the Cape. The genus is divided into three fections, by the ftructure of the leaves, of which we fhall give a few examples. Purfh has two fpecies not in Willdenow. Twenty-one are cultivated in the Englifh gardens. *Aiton.*

Section 1. *Leaves pinnate.* Thirteen fpecies, to which the two defcribed by Purfh are to be added; fee hereafter.

R. *Coriaria.* Elm-leaved Sumach. Linn. Sp. Pl. 379. Willd. n. 1. Ait. n. 1. Sm. Fl. Græc. Sibth. t. 290, unpublifhed. Woodv. Med. Bot. t. 261. Ger. Em. 1474. (Rhus; Matth. Valgr. v. 1. 195.)—Leaves pinnate; leaflets oval, bluntly ferrated, downy beneath; their common ftalk winged in the upper part.—Native of the Levant. Frequent in our gardens and fhrubberies, ever fince the days of Gerarde, (though lefs common than the American *R. typhinum*,) flowering in July, and retaining its denfe, branched, ample, upright *clufters*, of deep-red, rough, coriaceous *berries*, even till winter, after the leaves are fallen. The tree is of a dwarf bufhy habit, with fpreading, afcending, round, downy branches, of a foft fpongy texture. *Leaves* from eight inches to a foot long, of about five pair of leaflets, with an odd one; paler, downy, and veiny beneath. *Flowers* greenifh, each with a large hoary *germen*, which becomes a globular, crimfon, hairy *berry*, the fize of an Elder-berry. The tafte of this fruit is very acid and aftringent. It has been ufed in Greece, from the moft remote antiquity, for tanning leather; as have alfo the leaves, to the prefent day. Both have likewife been employed in medicine, either for their tonic or cooling qualities, nor do they appear to poffefs any of the dangerous qualities for which fome fpecies of this genus are remarkable. Dr. Woodville's figure of this plant ought to have been quoted in Hort. Kew. as not cited by Willdenow, and being moreover an Englifh publication.

R. *javanicum.* Java Sumach. Linn. Sp. Pl. 380. Willd. n. 3. Ait. n. 3. Thunb. Jap. 121.—Leaves pinnate, ovate, pointed, ferrated; very downy and foft beneath.—Native of Japan, flowering in September. Introduced into the ftoves at Kew, by fir Jofeph Banks, in 1799. The *branches*, and all the *ftalks*, as well as the backs of the *leaves*, are clothed with extremely foft, denfe, velvet-like pubefcence, as is the upper fide of the foliage in fome degree. Each *leaf* has three pair, with an odd one, of ftalked, ovate, taper-pointed leaflets, ftrongly ferrated, and about an inch and a half long. *Flowers* very fmall, in long, flender, lax, fimple, axillary clufters.

R. *glabrum.* Smooth Sumach. Linn. Sp. Pl. 380. Willd. n. 4. Ait. n. 4. Purfh n. 2. Kalm's Travels, v. 1. 66. 75. (R. virginicum, paniculâ fparfâ, ramis patulis glabris; Dill. Elth. 323. t. 243. f. 314.)—Leaves numeroufly pinnate, lanceolate, ferrated, fmooth on both fides; glaucous beneath.—Common in North America, flowering in July and Auguft, nor is it rare in our fhrubberies. Kalm fays that neglected corn-fields are foon overrun with this tree, whofe roots fubfequently render ploughing the ground very difficult. The *leaves* confift of from eight to twelve pair of longifh taper-pointed leaflets, fmooth and naked on both fides. The *fruit* much refembles the firft fpecies in colour and mode of growth, but is lefs hifpid. According to Mr. Purfh, the *R. elegans*, Ait. Hort. Kew. n. 5. Willd. n. 5, is only a variety of this, with dioecious *flowers*, and a more fcarlet-coloured *fruit*.

R. *viridiflorum.* Green-flowered Sumach. Lamarck Dict. v. 7. 504. Purfh n. 3. (R. canadenfe; Mill. Dict. ed. 8. n. 5.)—Leaves numeroufly pinnate, ovato-lanceolate, ferrated; glaucous, and fomewhat downy beneath. Clufters erect.—On the edges of woods in dry funny fituations, in Pennfylvania and Virginia, flowering in July and Auguft. This is one of the fpecies added by Mr. Purfh, after Poiret in Lamarck, but not without a doubt of its being diftinct from the laft. We can find no important difference in a fpecimen from the French gardens, except that the *leaflets* are rather more ovate. The *flowers* are yellowifh-green. *Leaves* not always downy.

R. *pumilum.* Dwarf Poifon Sumach. Michaux Boreal-Amer. v. 1. 182. Purfh n. 4.—Leaves numeroufly pinnate, oval, fcarcely pointed, deeply toothed; downy beneath. Branches and footftalks downy. Fruit clothed with velvet down.—Native of Upper Carolina, flowering in July. The *ftem* is not above a foot high. This fpecies is unknown in our gardens. Mr. I. Lyon, who gathered it, affured Mr. Purfh, that it was the moft poifonous of the genus, he having been "poifoned all over his body, and lamed for a confiderable time," in confequence of collecting the feed.

R. *Vernix.* Varnifh Sumach. Linn. Sp. Pl. 380. Willd. n. 6. Ait. n. 6. Purfh n. 5. Kalm's Travels, v. 1. 68. 77. (Toxicodendron, foliis alatis, fructu rhomboide; Dill. Elth. 390. t. 292. f. 377.)—Leaves pinnate, very fmooth, as well as the branches; leaflets elliptical, entire, fomewhat abrupt, pointed. Clufters compound, lax. Flowers dioecious. Fruit polifhed.—Found in low copfes, from Canada to Carolina, flowering in July. *Purfh.* It has been in our

our gardens for a century paſt, but is not common. Kalm ſpeaks of its dangerous effects, to various perſons, whoſe ſkin, and whole body, in ſome caſes, are affected with inflammation, ſwelling and pain, in conſequence of their touching any part of this tree, or expoſing themſelves to its effluvia; whilſt others, even of the ſame family, can cut or handle it with impunity. Kalm himſelf was generally unhurt by this poiſon, but on one occaſion he did not entirely eſcape its effects. The whole *tree* is very ſmooth. *Leaflets* about ſix pair with an odd one. *Berries* the ſize of a pea, white and remarkably poliſhed, both in a freſh and dry ſtate. Miller contended that this was the ſame with the true Varniſh-tree of Japan, deſcribed in Kæmpfer's Am. Exot. 791. t. 792; which opinion was combatted by Ellis, in the Philoſophical Tranſactions, n. 112. We believe the latter to be in the right. The two trees, indeed, ſeem very nearly akin, but the *leaflets* in Kæmpfer's plate are broader than thoſe of the American plant, nor does his deſcription of the fruit exactly anſwer. Yet Thunberg calls the Japaneſe plant *Rhus Vernix*. Nothing ſeems to be known in America, as to the tree in queſtion affording any varniſh, though that point is certainly worth enquiry, conſidering its near relationſhip, at leaſt, to one whoſe produce is ſo valuable. Kæmpfer ſpeaks of the poiſonous effects of the effluvia of his varniſh-tree, like what we have related of the other.

Section 2. *Leaves ternate or quinate.* Eighteen ſpecies.

R. *Toxicodendron.* Trailing Poiſon-oak, or Sumach. Linn. Sp. Pl. 381. Willd. n. 17. Ait. n. 11. Purſh n. 7. (Edera trifolia canadenſis; Cornut. Canad. 96. t. 97. Barrel. Ic. t. 228.) *β*. R. radicans; Linn. Sp. Pl. 381. Willd. n. 16. Ait. n. 10. Kalm's Travels, v. 1. 67. 177. (Toxicodendron triphyllum glabrum; Duham. Arb. v. 2. 341. t. 98.)—Leaves ternate; leaflets ſtalked, ovate, angular, cut, or crenate. Stem creeping.—Common in woods, fields, and hedges, from Canada to Georgia, flowering in June and July. *Purſh.* We readily concur with Mr. Purſh, in conſidering theſe two Linnæan ſpecies as mere varieties. The *leaves* when young are more downy beneath, in ſome inſtances than in others; but that character, as well as their notches, is certainly variable. We ſpeak with confidence on this ſubject, having been at no ſmall trouble formerly, to determine which was the plant recommended in paralytic and rheumatic complaints, by ſome eminent phyſicians in England and France; and after much examination, finding no certain or permanent difference between the two. Kalm ſpeaks of the poiſonous qualities of the preſent ſpecies, as like thoſe of *R. Vernix*; but it had no effect on him, even when he made the raſh experiment of dropping the juice into his eye. The *ſtem* never grows erect, but when it meets with ſupport, will climb, like ivy, to the tops of the loftieſt trees. The *leaflets* are of a broad, ovate, or rhomboidal form, pointed, always more or leſs downy, at leaſt about the ribs, and ſometimes quite covered with ſoft down at the back; their margin occaſionally almoſt entire, but moſt generally, in the downy variety, ſtrongly crenate, cut, or lobed. *Flowers* in compound axillary cluſters, greeniſh, dioecious. *Berries* white. Both varieties have long been known in our gardens, but have nothing to recommend them to general culture, even were they unexceptionable as to danger.

R. *tomentoſum.* Woolly-leaved Cape Sumach. Linn. Sp. Pl. 382. Willd. n. 24. Ait. n. 15. (Vitex trifolia minor indica ferrata; Commel. Hort. v. 1. 179. t. 92.)—Leaves ternate; leaflets ſtalked, rhomboid, ſomewhat angular; white and very downy beneath.—Native of the Cape of Good Hope. It was introduced very early by the Dutch, into the European gardens, but we know not whether it has been preſerved, or noticed, though an extremely handſome evergreen ſhrub, the backs of whoſe *leaves* are elegantly white and downy, with reddiſh veins. We know nothing of the *flowers* or *fruit*. Commelin miſtook this plant for the Eaſt Indian *Vitex trifolia*.

Several other three-leaved ſpecies of *Rhus*, from the Cape, elegant evergreen ſhining-leaved ſhrubs, are cultivated in our more curious collections, as may be ſeen in Aiton. We ſubjoin one ſpecies to this ſection, which Willdenow has not admitted here.

R. *pentaphyllum.* Five-leaved Morocco Sumach. Deſfont. Atlant. v. 1. 267. t. 77. (Rhamnus pentaphyllus; Jacq. Obſ. faſc. 2. 17. Linn. Syſt. Veg. ed. 14. 233. R. ſiculus; Syſt. Nat. ed. 12. v. 3. 229. R. ſiculus pentaphyllos; Bocc. Sic. 43. t. 21.)—Leaves ternate or quinate; leaflets linear-lanceolate, dilated upwards, obtuſe, nearly ſmooth; cut or undivided. Stem thorny.—Native of uncultivated hills in Morocco and Sicily. A thorny *ſhrub*, or ſmall *tree*, with numerous, round, ſmooth, grey *branches*. *Leaves* alternate, ſtalked, digitate, of from three to five narrow-wedge-ſhaped, obtuſe *leaflets*, above an inch long; ſomewhat downy when young; either quite entire, or unequally toothed, ſometimes pinnatifid. *Flowers* pale yellow, in axillary compound cluſters, dioecious. *Berry* red, reſembling hawthorn, but with three tubercles at the top; its flavour ſlightly acid, not unpleaſant. The *bark* is uſed for tanning, and for dyeing red. *Deſfont.*

Section 3. *Leaves ſimple.* Two ſpecies.

R. *Cotinus.* Venice Sumach, or Coccygria. Linn. Sp. Pl. 383. Willd. n. 32. Ait. n. 21. Jacq. Auſtr. t. 210, Coggygria Theophraſti, and Cotinus coriarius Plinii; Ger. Em. 1476. Cotinus; Duham. Arb. v. 1. t. 78.)—Leaves ſimple, obovate, or orbicular.—Native of Auſtria, Switzerland, Italy, and Greece, in hilly ſituations. Common with us in plantations, for the ſake of the very ſingular and ornamental appearance of its elongated feathery fruit-ſtalks. The *ſtem* is buſhy, the height of a man. *Leaves* ſmooth, orbicular, entire. *Flowers* greeniſh, ſmall, in terminal compound panicles. *Fruit* gibbous. The *leaves* and *ſtalks*, when bruiſed, have an aromatic but pungent and acid ſcent. The whole plant is uſed for tanning in Italy, and called *Scotino*; ſee Smith's Tour. The wood is much uſed by the modern Athenians, according to Dr. Sibthorp, for dyeing wool of a moſt beautiful and rich yellow.

R. *atrum.* Black Sumach. Forſt. Prodr. 23. Willd. n. 33.—"Leaves ſimple, ovate-oblong. Flowers polygamous."—Found by Forſter in New Caledonia. A *ſhrub* or *tree*. We know nothing more of this ſpecies, the only one, except *Cotinus*, with ſimple *leaves*.

Rhus, in *Gardening*, contains plants of the tree and ſhrub kinds, ſumach and toxicodendron; of which the ſpecies cultivated are, the elm-leaved ſumach (R. coriaria); the ſtag's-horn Virginian ſumach (R. typhinum); the ſcarlet ſumach (R. glabrum); the Carolina ſumach (R. elegans); the lentiſcus-leaved ſumach (R. copallinum); the Venice ſumach (R. cotinus); the trailing poiſon-oak, or ſumach (R. toxicodendron); the varniſh ſumach (R. vernix); the rooting poiſon-oak, or ſumach (R. radicans); the woolly-leaved ſumach (R. tomentoſum); the narrow-leaved ſumach (R. anguſtifolium); and the ſhining-leaved ſumach (R. lucidum).

The branches in the firſt ſort are uſed inſtead of oak bark for tanning leather, and it is ſaid that Turkey leather is all tanned with this ſhrub.

In the third ſort there are ſeveral varieties; as the New England ſumach, in which the ſtem is ſtronger, and riſes higher than that of the ſecond ſort; the branches ſpread more horizontally, they are not quite ſo downy, and the

down

down is of a brownifh colour; the leaves are compofed of many more pairs of leaflets, and are fmooth on both fides: the flowers are difpofed in loofe panicles, and are of an herbaceous colour. The Canada fmooth red fumach, which has fmooth branches of a purple colour, covered with a grey pounce; the leaves are compofed of feven or eight pairs of leaflets, which are four inches and a half long, and one inch broad in the middle, terminating in acute points, and a little ferrate, of a lucid green on their upper furface, but hoary on their under, and fmooth: panicle large, compofed of feveral fmaller, each on feparate footftalks, the whole covered with a grey pounce; the flowers are of a deep red colour.

In the fixth fort the root is ufed for dyeing: the leaves and young branches dye black; and the bark is ufed for tanning leather.

In the eighth fpecies Martyn fays, that the milky juice ftains linen a dark brown. The whole fhrub is, in a high degree, poifonous; and the poifon is communicated by touching or fmelling any part of it.

The ninth fpecies having, in common with ivy, the quality of not rifing without the fupport of a wall, tree, or hedge, it is called in fome parts of America creeping ivy. It will climb to the top of high trees in woods, the branches every where throwing out fibres that penetrate the trunk. When the ftem is cut, it emits a pale brown fap of a difagreeable fcent, and fo fharp, that letters or marks made upon linen with it cannot be got out again, but grow blacker the more it is wafhed. Like rhus vernix it is poifonous to fome perfons, but in a lefs degree. Kalm relates, that of two fifters, one could manage the tree without being affected by its venom, whilft the other felt its exhalations as foon as fhe came within a yard of it, or even when fhe ftood to leeward of it, at a greater diftance; that it had not the leaft effect upon him, though he had made many experiments upon himfelf, and once the juice fquirted into his eye; but that on another perfon's hand, which he had covered very thick with it, the fkin, a few hours after, became as hard as a piece of tanned leather, and peeled off afterwards in fcales.

There is a variety with a ftraight and ftout trunk, having a brownifh afh-coloured bark: the leaves fmooth, veined, bright green above, fomewhat paler underneath, pendulous, and fomewhat bent back: in the male plant the leaves are rather wider and longer, and are drawn more to a point; in the female they are fhorter and blunter, and the petioles are reddifh, whereas in the others they are green: the flowers axillary, in racemes; the males larger, whitifh-yellow; the females fmaller, herbaceous, on the germ inftead of the ftyle there are two, fometimes three black dots: fruits round, the fize and form of coriander feeds, ftreaked with five lines, remaining on the tree till new flowers come out; when the outer rind comes off, and a cretaceous fubftance comes into view, in which an afh-coloured, hard, horny feed is involved, flightly divided on the upper part, and fomewhat kidney-fhaped.

Method of Culture.—The firft nine forts of thefe plants are capable of being raifed by feeds and layers, and fome of them alfo by fuckers, or their rooting branches. In the firft method fuch of them as do not fend up fuckers fhould have the feed procured from abroad, and fown in pots of a large fize, or in beds of light mould, being covered in about the depth of half an inch in the autumn. Thofe in pots fhould be protected from the frofts during the winter, and if plunged in a moderate hot-bed in the early fpring, they will be rendered more forward, letting the plants have a free air when they appear. Thofe in the open ground often remain long before they vegetate; they fhould be kept free from weeds, be well watered in fummer, and have the protection of mats the firft winter. When the plants have had the growth of a year or two, they may be planted out in nurfery-rows till fit to be fet out in the places where they are to remain. The potted plants fhould have the protection of the frame the fecond winter, air being freely admitted in mild weather; and in the fpring following they may be fhaken out of the pots without injuring the roots, and be fet out in nurfery-rows, three feet apart, and a foot diftant in the rows, where they may remain two years, and then be planted out where they are to remain.

Such forts as have young branches fufficiently low, may have them laid down in the flit method; when they will moftly have ftricken root in the courfe of a year, and may be taken off and planted out where they are to remain, or in the nurfery.

And all thofe forts that fend up fuckers from the roots fhould have them taken up during the winter, and planted out in nurfery rows, in the manner of the feedlings, till of a proper growth to be planted out.

The feventh and ninth forts may likewife be increafed by their trailing branches, which have ftricken root as they reft on the ground, which fhould be taken up with their roots entire in the autumn, winter, or in early fpring, and be planted out, either where they are to remain, or in nurfery rows, till of fufficient growth for the purpofe they are intended.

The firft and fourth forts, being the moft tender, require the moft fheltered fituations.

Moft of thefe plants afford a milky juice, which is extremely acrid and corrofive.

The three laft forts may be raifed by cuttings and layers with great facility. In the firft method, the cuttings of the young fhoots fhould be planted out in pots of light frefh mould, in the fpring and early fummer months, plunging them in a moderate hot-bed, where they readily ftrike root, being occafionallly watered and fhaded: and when they have formed good roots, they may be potted off into feparate pots. And in the latter mode, any of the young wood may be laid down in the ufual manner, in the early fpring, when by the autumn they will moftly have ftricken good root, and may be taken off, and be potted out the fame way as the cuttings.

All the firft nine forts have a fine effect in mixture with other deciduous fhrubby plants, in the borders, clumps, and other parts of pleafure grounds, and the three laft afford variety among other potted greenhoufe plants of the lefs tender kinds.

Rhus *Cobbe*, in *Botany*. See Schmidelia.

Rhus, in the *Materia Medica*. This genus comprehends a variety of fpecies, which are known to be poifonous; but the *rhus coriaria*, or elm-leaved fumach, is perfectly innocent, and its leaves have been ufed occafionally for culinary purpofes. Its medicinal qualities are owing to its ftypticity or aftringency, which property renders it ufeful in dyeing, and alfo in tanning of leather, to which purpofe it was applied in the time of Diofcorides. The leaves and berries have been ufed in medicine; but the leaves are more aftringent and tonic, and have been commonly employed in complaints which indicate remedies of this clafs. The berries, which are of a red and compreffed figure, contain a pulpy matter, in which is lodged a brown, hard, oval feed, manifefting a confiderable degree of aftringency. The pulp, even when dry, is gratefully acid, and has been found to contain an effential falt fimilar to that of wood-forrel, or perhaps more nearly allied to cryftals of tartar. An infufion of the dry fruit is not blackened by a folution of iron, ſo that it appears to be deſtitute of aſtringency; but its acidity is very grateful, and hence the French have called it "le vinaigrier." Like many other acid fruits, theſe berries, which in eaſtern countries are uſed as a pickle, may be advantageouſly taken to allay febrile heat, and to correct bilious putreſcency. The *rhus toxicodendron* and *radicans* have of late been recommended in paralytic affections; the latter by M. Freſnoi, and the former by Dr. Alderſon of Hull: but the caſes in which theſe virulent plants were employed are but few and indeciſive. They excite, however, a ſenſe of heat and pricking, and irregular twitches in the affected limbs. It is ſuggeſted that ſome advantage has been derived from their uſe in herpetic eruptions. The doſe of the powdered leaves may be gr. ſs, given twice or thrice a day, and gradually increaſed to grs. iv, in the form of a bolus. The ſtems of the toxicodendron, when cut or broken, exude a milky juice, which inflames the ſkin whereever it touches, and becomes black when it is expoſed for a ſhort time to the action of atmoſpheric air. This juice forms an indelible black ſtain on linen cloth, and is uſed in Japan, where it is a native, as a varniſh. (Phil. Tranſ. vol. xlix. p. 158. See Varnish.) The leaves are inodorous, and their taſte is mawkiſh and ſubacrid. Their virtues are completely extracted by water, and partially by alcohol. The aqueous infuſion reddens litmus paper; precipitates the ſolution of iron black, that of nitrate of ſilver brown, and throws down a precipitate with gelatine. Hence it contains gallic acid and tannin; but its effects chiefly depend on a narcotic principle. Woodv. Med. Bot. Thomſon's Lond. Diſp. See Sumach and Toxicodendron.

RHUSELNIUM, in *Botany*, a name given by ſome authors to the ranunculus.

RHUSTICANA, or Rusticana, in *Ancient Geography*, a town of Hiſpania, in the interior of Luſitania, between Talebriga and Mendeculia. Ptolemy.

RHUSUNCORÆ, or Rusucurrum, a town of Africa, in Mauritania Cæſarienſis. Ptolemy. It had the title of a Roman colony.

RHUTHYN, or Ruthin, in *Geography*, a borough and market-town in the cwmwd of Llannerch, cantref of Dyffryn-Clwyd, (now called the hundred of Rhuthyn,) county of Denbigh, North Wales, is ſituated on the ſlope of a conſiderable hill, which riſes near the centre of the delightful vale of the Clwyd, at the diſtance of 205 miles N.W. from London. This town, from the etymology of its name, appears to have derived its origin from a caſtle, called Rhyddin, or the red fortreſs, in alluſion to the colour of the ſtone of which it is conſtructed. Although there was probably a walled fortreſs here anterior to the reign of king Edward I., yet the laſt caſtle erected here was moſt probably by this monarch. Camden, however, aſſigns its origin, as well as the town, to a baron named Roger Gray. Its hiſtory affords only a few events worthy of notice. In the year 1400 Owen Glyndwr attempted to take it by aſſault, but was unſucceſsful; ſo that after pillaging the inhabitants, and ſetting fire to the town, he retreated precipitately to the mountains. In the reign of king Charles I. it was garriſoned in the royal cauſe, till about the middle of April, A.D. 1646, when it was compelled to ſurrender, after having ſuſtained a ſiege of two months. Not long ſubſequent to that period, it was diſmantled by order of parliament, and has ſince gradually fallen into its preſent ruinous ſtate; only a few fragments of walls remaining to mark its ſcite and character.

Rhuthyn is deſcribed as having been formerly a populous town, and as poſſeſſing the beſt market of any in the vale. This pre-eminence, however, is now loſt; though it is yet a reſpectable and flouriſhing place, containing, according to the parliamentary reports of 1811, 271 houſes, and a population of 1292 perſons. The government is veſted in two aldermen and ſixteen common council-men, choſen annually in the lord's court. The number of burgeſſes is unlimited. Rhuthyn is a borough both by preſcription and by charter, and joins with Denbigh in returning a repreſentative to the national ſenate. It has two markets, weekly; one on Saturday for proviſions, and another on Monday for corn, &c.; beſides which, there are ſix annual fairs. The lordſhip of Rhuthyn, a manorial right belonging to the Middleton family of Chirk-Caſtle, compriſes three comots, *viz.* Coleigon, Dogfeilyn, and Llannerch; and is diſtinct with reſpect to government from the hundred, the lord appointing a ſteward to it. Here is a free-ſchool of equal, if not greater, celebrity than any other in North Wales. It was founded and endowed by Gabriel Goodman, D.D., who was dean of Weſtminſter in the reign of queen Elizabeth. His deſcendant, Godfrey Goodman, was likewiſe a benefactor to the town. From this ſchool young men are ſometimes admitted into orders, without having graduated at any univerſity. It has two maſterſhips, the head one of which is in the gift of Jeſus college, Oxford. The town-hall is ſituated near the market-place, and is fitted up with apartments for holding the hundred courts, the county aſſizes, and the quarter ſeſſions; which laſt are held alternately here and at Denbigh. The new gaol is a handſome and commodious building, erected according to deſigns furniſhed by Mr. Joſeph Turner. The debtors' apartments and thoſe of the felons are divided by a lofty wall; and both have ſpacious yards, with baths, attached to them. The church is a large ſtructure of conſiderable antiquity. It was originally conventual, having been attached to a religious houſe of the order of monks denominated Bonhommes. In the year 1310, however, it was made collegiate by John de Gray, who placed in it a chapter of ſeven regular canons, and conferred upon them conſiderable landed poſſeſſions, and numerous privileges. The apartments for the canons were connected with the church by a cloiſter, of which a portion is ſtill remaining, converted into a reſidence for the warden of an hoſpital, which was founded and endowed by Gabriel Goodman, the founder of the free-ſchool, as an aſylum for twelve decayed houſekeepers, *viz.* ten men and two women. The warden is *ex officio* rector of the pariſh of Rhuthyn, and has, beſides, the government of the free-ſchool. The interior of the church is much admired, and particularly its roof, which is a very curious piece of workmanſhip, conſiſting of ſmall ſquares, adorned with various ſculptures, and bearing the names of the different workmen employed in their formation. The collegiate eſtabliſhment here was diſſolved at the period of the general ſuppreſſion, when its lands were granted to William Winlove and Richard Fyld. There are no remarkable monuments in this church, excepting that of Dr. Gabriel Goodman, which diſplays a buſt of the deceaſed, in marble. The doctor was a native of Rhuthyn, where he was born in 1583. He was ſucceſſively advanced to be canon of Windſor, dean of Rocheſter, and biſhop of Glouceſter. See Fuller's Church Hiſtory, book xi. Worthies, and Chalmer's General Biographical Dictionary.

The vicinity of Rhuthyn preſents ſome objects worthy of notice. At a ſhort diſtance from the town is the neat village of Llanrhydd, which is noted for the fine ſculptural monuments and decorations in its church. Near this village is the Bathafarn, anciently a ſeat belonging to the lord Gray; and more to the ſouth-weſt lie Pool-Park and Bachymbyd, both ſeats of the lord Bagot. Stretching towards

wards the north is the vale of Clwyd, which is deſervedly celebrated by all travellers. Commencing at Rhuthyn, it extends not leſs than twenty-four miles in length, and from ſix to eight in breadth, exhibiting a rich ſcene of cultivation, happily blended with many of thoſe objects which conſtitute the picture ſque. On a ſmall eminence in this vale ſtands the village of Llan-Rhaiadar; and near it is a well, called Ffynnon Ddyfnog, which is much eſteemed by the inhabitants for its medicinal quality in the cure of rheumatiſm. The church here is an elegant ſtructure in the pointed ſtyle, and has a beautiful eaſt window, ornamented with ſtained glaſs. The ſubject is the root of Jeſſe, who is repreſented as extended upon his back, with the genealogical tree iſſuing from his loins, compriſing all the kings of Iſrael and Judah, down to the birth of Chriſt. Above is an outline roſe, including an eye ſurrounded with a radiance, and another roſe of Lancaſter to correſpond; which laſt emblem indicates that the work was executed after the acceſſion of Henry VII. to the throne. Here is a ſplendid but taſteleſs monument to the memory of Maurice Jones, eſq., who founded an alms-houſe in this pariſh, A.D. 1720; and in the church-yard is a ſtriking inſtance of genealogical vanity, in an inſcription to the memory of John ap Robert, whoſe pedigree is traced up to Cadel, king of Powis. Carliſle's Topographical Dictionary of Wales, 4to. 1813. A Tour in South Wales, by the Rev. W. Bingley, 8vo. 1801. Pennant's Tour through Wales, 1770, 2 vols. 4to.

RHYAS, from ῥεῖν, *to flow*, in *Surgery*. See RHŒAS.

RHYDDA, in *Ancient Geography*, a town of Paleſtine, belonging to the Arabs, according to Joſephus.

RHYME, RHIME, *Ryme*, or *Rime*, in *Poetry*, the ſimilar ſound or cadence and termination of two words which end two verſes, &c.

Or, rhyme is a ſimilitude of ſound between the laſt ſyllable or ſyllables of one verſe, and the laſt ſyllable or ſyllables of a verſe ſucceeding either immediately, or at a diſtance of two or three lines.

Rhyme is a modern invention, and the product of a Gothic age: Milton calls it the *modern bondage*. Yet ſome authors will have it, that the Engliſh, French, &c. borrow their rhyme from the Greeks and Latins. The Greek orators, they ſay, who endeavoured to tickle the ears of the people, affected a certain cadence of periods, which ended alike, and called them ὁμοιοτέλευτα. The Latins, who imitated them, called theſe chiming terminations, *ſimiliter deſinentia*.

This affectation increaſed as the Latin tongue declined; ſo that, in the later Latin writers, ſcarcely any thing is more common than rhyming periods.

The French, and from them the Engliſh, &c. adopted this cadence of rhyme, which ſeemed to them more pretty and agreeable than the metrical verſes of the Greek and Roman poets.

This kind of Latin poetry in rhyme was much in vogue in the twelfth century; and the verſes thus running were called Leonine verſes, for what reaſon Camden owns he does not know (for a lion's tail, ſays he, does not anſwer to the middle parts, as theſe verſes do); but, doubtleſs, they had their name from a French monk of St. Victor at Marſeilles, about the year 1135, called Leoninus, who firſt compoſed them with ſucceſs, and of whom we have ſeveral pieces in them remaining, addreſſed to pope Adrian IV. and Alexander III. It is certain, however, (ſays Dr. T. Warton, Hiſt. of Engliſh Poetry, vol. i.) that rhymed Latin verſes were in uſe at a much earlier period. Pelloutier (Mem. ſur la Lang. Celt. part i. vol. i. ch. 12.) has given a very early ſpecimen of Latin rhymes, occurring in the beginning of the ſeventh century. Latin rhymes ſeem to have been firſt uſed in the church hymns, but Leonine verſes are properly the Roman hexameters or pentameters rhymed, and it is not improbable, that they had their name from the above-mentioned monk, who was the moſt popular, and almoſt only Latin poet of his time in France. He wrote many Latin pieces not in rhyme, and in a good ſtyle of Latin verſification. The early French troubadours mention a ſort of rhyme in their vernacular poetry partly diſtinguiſhed from the common ſpecies, which they call Leonine or Leonime.

Camden has given us a collection of Latin rhymes of our ancient Engliſh writers; among whom, Walter de Mapes, archdeacon of Oxford, in the time of king Henry II. makes a principal figure, eſpecially for two pieces, the one in praiſe of wine beginning,

> "Mihi eſt propoſitum in taberna mori,
> Vinum ſit appoſitum morientis ori;
> Ut dicant, cum venerint, angelorum chori,
> Deus ſit propitius huic potatori."

The other againſt the pope, for forbidding the clergy to have wives, beginning,

> "Priſciani regula penitus caſſatur,
> Sacerdos per *hic* et *hæc* olim declinatur;
> Sed per *hic* ſolummodo nunc articulatur,
> Cum per noſtrum præſulum *hæc* amoveatur."

Since the reſtoration of learning in the ſixteenth century, attempts have been made to baniſh rhyme out of the modern poetry, and to ſettle the Engliſh and French verſes on the footing of the ancient Greek and Latin ones, by fixing the quantities of the ſyllables, and truſting wholly to thoſe, and to the numbers or meaſure.

This Milton has done, with great ſucceſs, in his Paradiſe Loſt, and other pieces; and after him Philips, Addiſon, and ſome others. Verſes of this kind we call *blank verſes*. See VERSE.

The French have attempted the ſame, but not with the ſame ſucceſs. Jodelet made the firſt eſſay, and after him Paſquier; but they both failed. Paſſerat and Rapin followed them, and failed, like them. Their hexameter and Sapphic verſes were neither imitated nor approved; and the cadence of rhyme was generally preferred to quantity, or the uſe of long and ſhort ſyllables. Des Portes, likewiſe, made ſome eſſays of verſes, conſtructed of long and ſhort lines, without rhyme, but the attempt only ſerved to convince the world, that this kind of meaſure is inconſiſtent with the genius of the French tongue.

To ſucceed in ſuch kind of verſes, there muſt be a liberty of varying the order of the words, or of changing their ſituation, as may beſt ſuit the occaſions of the poet; of making the ſubſtantive either go before or follow after the verb, as the verſe requires, &c. Now none of the modern tongues will admit of ſuch an arbitrary ſituation of the words, equally with the ancients; yet none will allow this more than the Engliſh, nor any leſs than the French.

The principal defect in rhyme is the full cloſe which it forces upon the ear at the end of every couplet; and in this reſpect it is far inferior to *blank verſe*; (which ſee.) Beſides, the conſtraint and ſtrict regularity of rhyme are unfavourable to the ſublime, or to the highly pathetic ſtrain.

An epic poem, or a tragedy, would be fettered and degraded by it. It is beſt adapted to compoſitions of a temperate ſtrain, where no particular vehemence is required in the

the ſentiments, nor great ſublimity in the ſtyle; ſuch as paſtorals, elegies, epiſtles, ſatires, &c. To theſe it communicates that degree of elevation, which is proper for them, and, without any other aſſiſtance, ſufficiently diſtinguiſhes the ſtyle from proſe. He who ſhould write ſuch poems in blank verſe, would render his work harſh and unpleaſing. In order to ſupport a poetical ſtyle, he would be obliged to affect a pomp of language unſuitable to the ſubject. Dr. Blair farther obſerves, that though he coincides in opinion with thoſe, who think that rhyme finds its proper place in the middle, but not in the higher regions, of poetry, can by no means join in the invectives which ſome have poured out againſt it, as if it were a mere jingling of ſounds, fit only for children, and owing to nothing but the corruption of taſte in the monkiſh ages. Rhyme might indeed be barbarous in Latin or Greek verſe, becauſe theſe languages, by the ſonorouſneſs of their words, by their liberty of tranſpoſition and inverſion, by their fixed quantities and muſical pronunciation, could carry on the melody of verſe without its aid. But it does not follow, that it muſt, therefore, be barbarous in the Engliſh language, which is deſtitute of theſe advantages. Rhyme was barbarous in Latin; and an attempt to conſtruct Engliſh verſes, after the form of hexameters and pentameters, and Sapphics, is as barbarous among us. It is not true, that rhyme is merely a monkiſh invention. On the contrary, it has obtained under different forms in the verſification of moſt known nations. It is found in the ancient poetry of the northern nations of Europe; and it is ſaid to be found among the Arabs, the Perſians, the Indians, and the Americans. This ſhews, that there is ſomething in the return of ſimilar ſounds, which is grateful to the ears of the greateſt part of mankind. And if any one, after reading Mr. Pope's Rape of the Lock, or Eloiſa to Abelard, ſhall not admit our rhyme, with all its varieties of pauſes, to carry both elegance and ſweetneſs of ſound, his ear muſt be pronounced to be of a very peculiar kind.

The preſent form of our Engliſh heroic rhyme in couplets is a modern ſpecies of verſification. The meaſure generally uſed in the days of queen Elizabeth, king James, and king Charles I., was the ſtanza of eight lines, ſuch as Spencer employs, borrowed from the Italian; a meaſure very conſtrained and artificial. Waller was the firſt who brought couplets into vogue; and Dryden afterwards eſtabliſhed the uſage. Waller firſt ſmoothed our verſe; Dryden perfected it. Mr. Pope's verſification has a peculiar character. It is flowing and ſmooth in the higheſt degree; far more laboured and correct than that of any who went before him. He introduced one conſiderable change into heroic verſe, by totally throwing aſide the triplets, or three lines rhyming together, in which Mr. Dryden abounded. Dryden's verſification, however, has great merit; and, like all his productions, has much ſpirit mixed with careleſſneſs. If not ſo ſmooth and correct as Pope's, it is however more varied and eaſy. He ſubjects himſelf leſs to the rule of cloſing the ſenſe with the couplet, and frequently takes the liberty of making his couplets run into one another, with ſomewhat of the freedom of blank verſe. Blair's Lect. vol. iii. See Verse.

Rhymes are either *ſingle*, or *double*, or *triple*, though the two laſt are now much diſuſed.

Rhymes, *Single*, are divided into perfect or whole rhymes, and imperfect or half rhymes. *A whole* or *perfect* rhyme is where there is a ſimilitude of ſound without any difference; or where a thorough identity of ſound appears in the pronunciation of the two ſyllables, notwithſtanding that there may be ſome difference in the orthography. *A half* or *imperfect* rhyme is where there is a ſimilitude, with a difference either in reſpect of the pronunciation, or the orthography, but chiefly the former.

Rhyme, *the feminine*, is that where the laſt ſyllable of the rhyme ends with an *e* mute, or quieſcent, as in *dove*, *belle*, &c.

Rhymes, *Maſculine*, are thoſe of all other words.

Menage obſerves, that the maſculine rhymes cloſe the periods better; but the feminines, being the ſofter and more languiſhing, end more agreeably, eſpecially in mournful ſubjects.

Rhymes, *Double*, by the French called *rich* rhymes, are thoſe where the two words terminate alike through the whole two laſt ſyllables, as *ſquabble* and *rabble*, &c.

Rhymes, *Plain*, are thoſe where the two rhyming verſes ſucceed immediately to each other.

Rhymes, *Croſs*, are thoſe where the verſes are ſo diſpoſed, as that the firſt rhymes with the third, and the ſecond with the fourth, &c.

Rhymes, *Aſſonant*. See Assonant.

RHYMNICI Montes, in *Ancient Geography*, mountains of Scythia, on this ſide of Imaus, in which the river Rhymnus had its ſource. The mouth of this river was in the Caſpian ſea, between that of the river Rha and that of the river Daïs.

RHYNBECK, or Rhinbeck, in *Geography*, a poſt-town of America, in Dutcheſs county, New York, on the E. ſide of Hudſon's river, oppoſite to Kingſton; 103 miles N. of New York. The townſhip is bounded S. by Clinton, and N. by Beckman. A curious cavern has been diſcovered, in 1792, at a place in this town, called by the Indians Sepaſcot.

RHYNCHÆ, in *Ancient Geography*, a country of Greece, in the iſle of Eubœa. Steph. Byz.

RHYNCHOSPORA, in *Botany*, ſo called from ῥύγχος, *a beak*, and σπορὰ, *ſeed;* becauſe the permanent baſe of the ſtyle forms a beak to the ſeed.—Vahl. Enum. v. 2. 229. Brown Prodr. Nov. Holl. v. 1. 229. Ait. Hort. Kew. v. 1. 127.—Claſs and order, *Triandria Monogynia*. Nat. Ord. *Calamariæ*, Linn. *Cyperaceæ*, Brown.

Eſſ. Ch. Glumes chaffy; the lower ones empty. Corolla none. Seed one, crowned with the hardened permanent ſtyle, whoſe baſe is as broad as the ſeed.

Vahl, the founder of this genus, deſcribes nineteen ſpecies, among which are *Schoenus albus* and *fuſcus* of Linnæus, and Sm. Fl. Brit. Mr. Brown adopts it, adding to the character, that "the ſeed is accompanied at its baſe by toothed briſtles, ſhorter than the glumes." He remarks, that it differs from Dichromena, (ſee that article,) in having theſe briſtles. This writer defines three New Holland ſpecies, one the *R. aurea* of Vahl, and other two nondeſcripts. The infloreſcence is ſaid to be very various, ſome ſpecies having the flowers panicled, whilſt in others they are either corymboſe, or capitate. We do not ſee the neceſſity of eſtabliſhing this genus; at leaſt, as it concerns the Britiſh Flora, we beg leave to ſuſpend our opinion. See Schoenus.

RHYNCOSIA, from ῥύγχος, *a beak*, becauſe the keel terminates in a long ſharp point.—Loureir. Cochin. 460. Claſs and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Eſſ. Ch. Corolla papilionaceous. Keel rhomboid, beaked. Legume membranous, with two ſeeds.

1. R. *volubilis*.—Found wild near Canton in China. *Stem* herbaceous, round, twining. *Leaves* ternate, roundiſh, downy. *Flower-ſtalks* axillary, in pairs, many-flowered. *Calyx* two-lipped. *Corolla* yellow. *Seeds* black and ſhining.

In

In ſo difficult a tribe, we dare not anſwer for the permanency of this genus, not having ſeen a ſpecimen. The plant may poſſibly be known to botaniſts, under ſome other name and genus.

RHYNCOTHECA, from ῥυγχος, *a beak*, and θηκη, *a capſule*, on account of its beaked or pointed ſeed-veſſel. De Théis Gloſſaire de Botanique, 402. Fl. Peruv. 71.

RHYNDACUS, in *Ancient Geography*, a river of Aſiatic Myſia, according to Pomponius Mela, who places its ſource in mount Olympus. According to Pliny it had been denominated Lycus.—Alſo, a town of Aſia, between Phrygia and the Helleſpont. Steph. Byz.

RHYNE, in *Botany*, a name uſed by ſome authors for the camphor tree.

RHYPÆ, RIPE, or *Rhypes*, in *Ancient Geography*, a town of the Peloponneſus, in Achaia, the territory of which was denominated Rhypidis. According to Strabo it was N. of Helice, and at ſome diſtance from the coaſts of the gulf of Corinth. Pauſanias ſays that in his time they could only perceive the ruins of Rhypæ, 30 miles from Ægium. Homer calls this town Répe.

RHYPARA, an iſland ſituated near that of Samos. Pliny.

RHYPTICS, RHIPTICS, Ῥυπτικα, in *Medicine*, detergent remedies, or cleanſers. See DETERGENT.

RHYSSADIUS, in *Ancient Geography*, a mountain of Africa, in Lybia interior, in which Ptolemy places the ſource of the river Stachir.

RHYSTROM, in *Geography*, a river of Holſtein, which runs into the Elbe at Gluckſtadt.

RHYTHM, RHYTHMUS, Ῥυθμος, in *Muſic*, the variety in the movement, as to the quickneſs or ſlowneſs, and length and ſhortneſs, of the notes.

Or the rhythmus may be defined, more generally, the proportion which the parts of a motion bear to each other.

In *ancient poetry* rhyth or rhythm denotes the meaſure of the feet, or the number and combination of long and ſhort ſyllables, called alſo *metre* and *quantity*.

A continued motion in every organized body that is capable of rhythm, is ſuſceptible of ſome kind of meaſure. This meaſure marks the ſeveral parts of motion, and enables us to judge of their proportions. It is to point out theſe proportions that the Greeks, among many other terms, have made uſe of ῥυθμος, *rhythm*, which they have applied to different purpoſes. They have not only expreſſed by it the kind of cadence, or vibration of the wings, in the flight of birds; the movement of the feet in the progreſſive motion of animals; and the geſtures, figures, and ſteps of dancers; but every ſpecies of regular motion, ſuch as is obſervable in the beating of the pulſe, and in reſpiration. They have even abuſed the original import of the word ſo far as to apply it to things abſolutely motionleſs and inanimate; ſuch as works in painting and ſculpture, in which they have called that ſymmetry and juſt proportion which reigns in all the parts by the name of rhythm.

But the moſt common application of this term has been to expreſs the *time* or duration of many ſounds heard in ſucceſſion; whether theſe ſounds are muſical, and ſuch as are produced by voices and inſtruments, or without any determinate tone, as in the ſtrokes of a hammer upon an anvil; in the beating of a drum; and in the articulations of the voice in common ſpeech, in repeating poetry, or pronouncing an oration.

But our enquiries here ſhall be confined to that ſpecies of rhythm, which more particularly concerns melody, and which merits diſcuſſion the more, on account of its great importance in muſic, and of the darkneſs in which it is uſually involved by writers on the ſubject.

From the ſtrict union of poetry and muſic among the ancients, which ſeem to have been almoſt inſeparable, an offence againſt time or rhythm was unpardonable, as it not only deſtroyed the beauty of the poetry, but ſometimes even the meaning of the words of which it was compoſed. Το παν παρα μουσικοις ὁ ῥυθμος, ſay the Greeks; it was the principal point in their muſic, without which they regarded melody as wholly unmeaning and lifeleſs. Hence Plato refuſed the title of muſician to every one who was not perfectly verſed in rhythm, as we ſhould now to a bad *timeiſt*. It is of ſuch importance, that, without it, muſic can have no power over the human paſſions. Pythagoras, according to Martianus Capella, uſed to call rhythm, in muſic, the *male*, and Melos the *female*; and Doni has compared rhythm with *deſign*, in painting, and Melos to *colouring*. It is certain that an ordinary melody, in which the time is ſtrongly marked, and the accents are well placed, has more effect than one that is deficient in thoſe particulars, though more refined and uncommon, and ſet off with all the richneſs of harmony, and learning of modulation.

Iſaac Voſſius, in his Diſſertation "De Poematum Cantu, et viribus Rhythmi," has attributed to rhythm all the miraculous powers of ancient muſic.

As vocal muſic was chiefly cultivated among the ancient Greeks, the firſt part of theſe rhythmical obſervations ſhall be confined to lyric poetry.

Ariſtides Quintilianus defines muſical rhythm συστημα εκ χρονων κατα τινα ταξιν συγκειμενων; "the aſſemblage of many parts of time, which preſerve a certain proportion with each other;" which, ſince the uſe of bars in muſic, may be called aliquot parts of a meaſure, or a given portion of time. For the better underſtanding of this definition, it is neceſſary to remember that the muſic in queſtion was conſtantly ſung to verſes, the words of which were all compoſed of *long* and *ſhort* ſyllables; that the ſhort ſyllable was pronounced as quick again as the long, and the ſhort ſyllable being regarded as one part or portion of this meaſure, the long was equal to two; ſo that, conſequently, the ſound which was applied to the long ſyllable, was equal in duration to two ſuch ſounds as were ſung to ſhort ſyllables, or, in other words, that one note was equal to two portions of time, and the other to one. It muſt likewiſe be remembered that the verſes thus ſung, were compoſed of a certain number of feet, formed by theſe long and ſhort ſyllables differently combined, and that the rhythm of the melody was regulated by theſe feet; as, whatever was their length, they were always divided into two parts, equal or unequal, the firſt of which was called αρσις, *elevation*, and the ſecond θεσις, *depreſſion*. A *foot* in poetry ſeems to anſwer to a *bar* in muſic. A *time*, among the ancients, was a proportion of that foot or bar; as, with us, a bar is divided into accented and unaccented parts. In like manner the rhythm of the melody, correſponding with theſe feet, was divided into two parts, equal or unequal, which we now call the *down* and *up* parts of a bar, expreſſed by *beating down* the hand or foot, and *lifting it up*. Thus far concerns *vocal* rhythm; what follows belongs to *inſtrumental*.

As the notes of the ancient muſic were conſtantly written over each ſyllable of the verſes which were to be ſung; as the quantity of each of theſe ſyllables was perfectly known to muſicians; and as the duration of each ſound was regulated by the ſyllables; it did not ſeem neceſſary that the time ſhould be marked by any particular ſign or character. However, for the eaſe and convenience of the muſician, a canon,

canon, or rule, was given of the rhythm at the beginning of a lyric poem. This canon consisted of nothing but the numbers 1 and 2, that is, the alpha and beta of the Greek alphabet, disposed according to the order of the breves and longs which composed each verse, and divided according to the number of its feet. The alpha, or unit, marked a breve, because it contained only one portion of time; and the beta, or binary, marked a long, being equal to two portions. Some of these poetical, or rhythmical canons, are still to be found in the Manual of Hephæstion.

Rhythm in Latin was called *numerus;* and this term, in process of time, was extended to the melody itself, subjected to certain numbers or rhythms, as appears from this line of Virgil:

"Numeros memini, si verba tenerem:"

"If I knew the words, I could remember the tune well enough."

The Romans had signs for rhythm, as well as the Greeks; and these signs were not only called *numerus*, but *æra*, that is, *number*, or the mark for time. *Numera nota*, says Nonius Marcellus. In this sense we find the word used in a verse of Lucilius:

"Hæc est ratio? perversa æra? summa subducta improbè?"

"Do you call that settling accounts? such a confusion of figures? and the sum falsely cast up?"

Though the word *æra* was at first only applied by musicians to the time, or measure of the melody, they afterwards made the same use of it as of *numerus*, to express the tune or melody itself; and it has been thought that the word *air*, or, as the Italians call it, *aria*, which includes a certain piece of music of a peculiar rhythm, or cadence, is derived from *æra*.

Such was the manner in which the ancients marked the measure in their written music; but to make it still more sensible in the execution, they beat time in several different ways. The most common was by the motion of the foot, which was lifted up and beat down alternately, according to what we call common, or triple time. To regulate the time was generally the office of the music master or director, called μεσοχορος and κορυφαιος, *coryphæus*, because he was placed in the middle of the orchestra, among the musicians, and in an exalted and conspicuous situation, in order to be seen and heard the more easily by the whole band.

The directors of the time were likewise called in Greek ποδοκτυποι and ποδοψοφοι, from the noise of their feet. In Latin they were called *pedarii*, *podarii*, and *pedicularii*, for the same reason. Their feet were generally furnished with wooden or iron sandals, in order to mark the time in a more distinct manner; these implements the Greeks called κρουπεζια, κρουπαλα, κρουπετα; and the Latins *pedicula*, *scabella*, or *scabilla*, because they resembled little pattens, or clogs.

But it was not only with the feet that the ancients beat the time, but with all the fingers of the right hand upon the hollow part of the left; and he who marked the time or rhythm in this manner, was called *manu-ductor*. For this purpose they sometimes used oyster-shells, and the shells of other fish, as well as the bones of animals, in beating time, as we do of castanets, tabors, &c. Both Hesychius, and the scholiast of Aristophanes, furnish passages to confirm this assertion. What a noisy and barbarous music! All rhythm, and no sound. The drums and systrums of the Idæi Dactyli could not have been more savage.

Many ancient instruments were monotonous, and of little use, but to mark the measure; such were the cymbalum and systrum; and it was for this reason, perhaps, that the cymbal was called *æra*, by Petronius. But it would afford us no very favourable idea of the abilities of modern musicians, who should require so much parade and noise in keeping together. The more time is beat, says M. Rousseau, the less it is kept; and, in general, bad music, and bad musicians, stand most in need of such noisy assistance.

However, if any thing like the power which ancient music is said to have had over the passions can be credited, it must have derived this power chiefly from the energy and accentuation of the rhythm. Aristides Quintilianus gives a long list of different metres, with their several properties of calming or agitating the mind, according to the nature of the syllables, or feet of the verses, as well as the sentiments which they were intended to express; and as it will afford the reader an opportunity of seeing how much stress was laid on this part of music, and how fanciful and ideal many of the distinctions seem to have been, we shall give the whole passage in English.

"Measure, which begins by a *down part* of the metrical division, is calm and gentle; whereas that which begins by an *up part*, expresses trouble and agitation. Full time, that is, always accompanied with melody, is noble in its effect; and that arising from catalectic verses, deficient in a syllable or note, if it be supplied by a rest or pause, has more simplicity. Time of equal proportions, is graceful; and that of odd numbers, or sesquialterate proportion, is more proper to excite commotion. Double time is a kind of mean betwixt the graceful and the turbulent. Among the movements of two even notes, if they are short, their effect is lively, impetuous, and proper for military dances, called *Pyrrhics*, in which the dancers are armed; and time, of which the movement is regulated by poetic feet composed of long syllables, is more grave, serious, and fit for hymns which are sung in honour of the gods, at festivals, and in sacrifices; the measure composed of a mixture of long and short notes, participates of the qualities of both these last mentioned.

"Among the duplicate proportions, the Iambic and Trochaic have the most vivacity and fire, and are peculiarly proper for dancing. Those called ορθιοι and σημαντοι, of which the arsis answers to two long syllables, are full of dignity. Compound measures are more pathetic than simple; and such as are confined to one genus, move the passions much less than those which pass from one genus to another."

After giving these characteristics of time, Aristides proceeds to prove their reality and foundation in nature, by drawing a parallel between some particular species of rhythm, and the gait and actions of man. He pretends, for instance, "that the motion which answers to the Spondaic measure, is a sign of moderation and fortitude; that Trochaics, or Pæans, indicate a greater degree of fire and vivacity; that the Pyrrhic has something low and ignoble in it; that an irregular velocity implies dissoluteness and disorder; and finally, that a movement resulting from all these, is wild and extravagant."

With respect to the excellence and effects of ancient music, it is very difficult to steer between the extremes of credulity and scepticism. Such enthusiasts as Aristides Quintilianus, by asserting too much, have thrown a ridicule upon the subject, and inclined us, perhaps, to believe too little. The simplicity of ancient melody, and its slavish dependence upon poetry, may probably have given birth to some of these fancies.

In addition to the account already given of the poetic feet under their respective articles, we shall here introduce a short

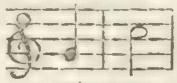
short description of each as they more immediately relate to music, at the same time rendering our dissertation on rhythm more complete.

A poetical foot consists of a certain number of syllables, which constitutes a distinct part of a verse, as a bar does of an air in music. An hexameter verse consists of six of these feet, a pentameter of five.

The Spondee, Iambus, Trochee, and Pyrrhic or Periambus, are dissyllabic feet, or of two syllables each.

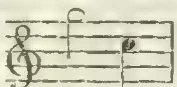
The Spondee consists of two long syllables, as *vertunt*. ¯ ¯

An Iambic foot has one short and one long syllable. Θεὸς, λέγω. *potens*, *amas*. ˘ ¯



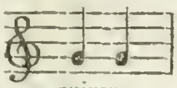
return.

The Trochee has one long and one short syllable, as *gratus*, *musa*. ¯ ˘



silent.

The Pyrrhic, or Periambus, two short syllables, as *mare*, *probus*. ˘ ˘



quiver.

The Dactyl, Anapæst, Molossus, Tribrach, Bacchius, Antibacchius, Amphibrachys, and Creticus, are trisyllabics, or of three syllables. To some of these we have no equivalents; however, the Dactyl, consisting of one long and two short syllables ¯ ˘ ˘  is very common in our language, as *tenderly*, *hastily*; and we have verses composed of dactyls as well as the Greeks and Romans:

> Mȳ | bānks thĕy wĕre | fūrnĭsh'd wĭth | bēes,
> Whōse | mūrmŭrs ĭn- | vīte ōne tŏ | slēep.

These may be compared with the following celebrated passages in Homer and Virgil, where the sound is manifestly, and intentionally, an *echo to the sense*. Homer (Odyssey, book xi.) after he has described in labouring Spondees the slow and painful manner in which Sysiphus rolled the stone up hill, makes use of nimble Dactyls in describing its swift descent:

> Αὖτις ἔπειτα πέδονδε κυλίνδετο λᾶας ἀναιδής.

And Virgil, lib. viii. v. 596, describes, in pure Dactyls, the galloping of the horse:

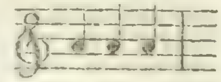
> " ———— It clāmŏr, ĕt āgmĭnĕ fāctō
> Quādrŭpĕdāntĕ pŭtrēm sŏnĭtū quătĭt ūngŭlă cāmpūm."

The Anapæst has two short and one long syllable; as *sapiens*, *recubans*, ˘ ˘ ¯ . Isaac Vossius, "De Viribus Rhythmi," p. 56, has said, that the French have no Dactyls, nor the English a perfect Anapæst in their language. Let the French speak for themselves; but as to our own part of the charge, it is easily confuted by the mere mention of the words *recommend* and *disappoint*.

We shall enumerate the rest of the poetic feet of the ancients, merely to shew what resources they had in varying their melody by different combinations of two kinds of notes.

The Molossus has three long syllables, ¯ ¯ ¯

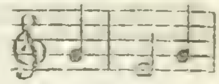
The Tribrach, three short, ˘ ˘ ˘



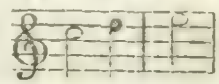
The Bacchius, which is the reverse of the Dactyl, has one short, and two long syllables, ˘ ¯ ¯

The Antibacchius, two long and one short, ¯ ¯ ˘

Amphibrachys, one short, one long, and one short, or one long between two short, ˘ ¯ ˘



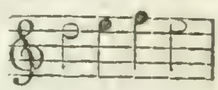
Creticus, one short between two long, ¯ ˘ ¯



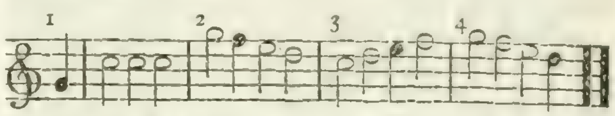
The quadrisyllabics are compounded of feet already mentioned.

The Proceleusmaticus is composed of four short syllables, or of two Pyrrhics, ˘ ˘ ˘ ˘

The Choriambus, two short between two long, or the junction of the Trochæus and Iambus, ¯ ˘ ˘ ¯



Epitrite; of this foot there are four species: 1. The Iambus and Spondee ˘ ¯ ¯ ¯: 2. The Trochee and Spondee ¯ ˘ ¯ ¯: 3. The Spondee and Iambus ¯ ¯ ˘ ¯: and 4. The Spondee and Trochee ¯ ¯ ¯ ˘.



The Pæan or Pæon, which is the contrary of this last, consists of one long syllable, and three short: ¯ ˘ ˘ ˘, ˘ ¯ ˘ ˘, ˘ ˘ ¯ ˘, ˘ ˘ ˘ ¯.

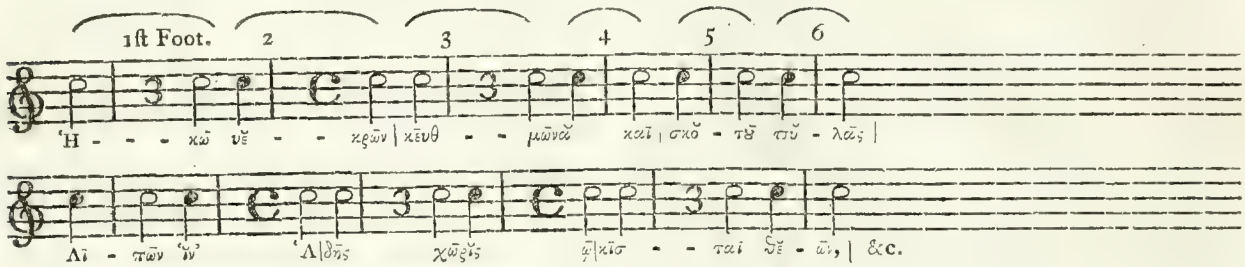
Servius reckons more than a hundred different kinds of verse among the Latins; and, according to Hephæstion, the number was still more considerable among the Greeks; consequently their melody might have been varied in as many different ways. There is not, however, the least appearance of the ancients having had in their vocal music that kind of measure which we call pointed; nor did they admit rests in the middle of a verse, though at the end of catalectic, or broken verses, the singer was allowed to make up the deficiency by a silence, equivalent to a rest in modern music; and though they had so great a variety of feet in their poetry, many of those already instanced are unfit for modern melody.

"After all the researches," says Dr. Burney, "which I have been able to make, it must be acknowledged that the subject of ancient music, in general, still remains, and probably ever will remain involved in much difficulty and uncertainty. It is fortunate, however, for those who wish to view as near as possible this dark angle of antiquity, that the prospect happens to be the clearest just in that part where all its admirers assure us it is best worth examining; for

for however ignorant we may be of the melody of ancient muſic, the rhythm, or time of that melody, being regulated entirely, as has been already obſerved, by the metrical feet, muſt always be as well known to us as the proſody and conſtruction of the verſe; ſo that we have nothing to do but to apply to the long and ſhort ſyllables any two notes, one of which is double the length of the other, in order to know as exactly as if we heard, in what manner any particular kind of metre was ſet by the ancients with reſpect to time and cadence, that boaſted rhythm, which we are ſo often told was *every thing* in their muſic. It may, therefore, afford ſome gratification to the curioſity of thoſe who have never conſidered the poetry of the ancients in this point of view, if I produce a few examples, which will, perhaps, help to throw a little light upon the *dramatic* muſic of the Greeks, and give ſome idea of the rhythmical reſources of the *poet-muſician* in one of the moſt intereſting provinces of his art.

"The firſt example ſhall be of the Iambic verſe, which chiefly prevails in the Greek tragedies, and in which the dialogue and ſoliloquy, indeed all but the chorus and ode, were generally written. I ſhall content myſelf with applying notes of correſpondent lengths to the ſyllables, and marking the time; leaving the melody to the imagination of the reader. Should I preſume to ſupply it, I might expect to be reproached as another Salmoneus for my temerity.

"Demens! qui nimbos et non imitabile fulmen, &c."



This meaſure, when pure and unmixt, conſiſted of ſix Iambic feet, as,

ĕquēs | ſŏnān|tĕ vēr|bĕrā|bĭt ūn|gŭlā.

Such verſes, however, ſeldom occur. The laws of this metre only required that the ſecond, fourth, and laſt feet ſhould be Iambics; in the other places, Spondees, Anapæſts, and Dactyls, were admitted. This metre anſwers to our Alexandrine, or verſe of twelve ſyllables; but more exactly in the *number* and *kind* of feet, than in its cadence, or general effect upon the ear. The pauſe after the third foot, ſo eſſential to a melodious Alexandrine, has no place but by accident, in the Iambic, which runs more ſwiftly, and has a more proſaic effect. This, undoubtedly, led the ancients to meaſure it *per dipodiam*, or by *double* feet (ſee Hor. Art. Poet. v. 252. pes citus: unde, &c.), which anſwer to double bars in modern muſic. Arioſto wrote ſome comedies in this Iambic meaſure. One of his lines will, perhaps, be as exact a repreſentation of the ancient Iambic as can be produced, in point of cadence.

Per dio ſon qua|ſi in penſier di | tornarmene.

The following Alexandrine of Spenſer may alſo ſerve for the ſame purpoſe.

"So in his angry courage fairly pacified."

The above Greek lines are the beginning of the Hecuba of Euripides, and were ſung by the ghoſt of Polydorus. The bars in the verſe are only to ſhew how the ancients divided it into three portions of two feet in each; but the bars of time, the theſis, or beat, muſt always fall in the middle of the foot: ˘ | ¯ | . For the ſake of diſtinguiſhing the feet more clearly, Dr. Burney barred them ſingly; though it would have been more conformable to the ancient manner of ſcanning this kind of verſe, and probably more expreſſive of its cadence and *effect*, to have made but three bars in each line. The Iambics of Greek comedy differ from theſe only in a little more liberty of conſtruction; thoſe of the Roman, in Plautus and Terence, are ſo licentious, as often not to differ perceptibly from proſe, even in the judgment of Cicero himſelf: "propter ſimilitudinem ſermonis, ſic ſæpe ſunt abjecti, ut nonnunquam vix in his numerus et verſus ſentiri poſſit." Orator, cap. 55.

Beſides this metre, the dialogue admitted, occaſionally, Trochaic verſes. They are generally introduced in ſcenes of hurry and diſorder; being, as Ariſtotle has deſcribed them, and as their name implies, a voluble and *dancing* meaſure. A character which the reader will not be inclined to diſpute, when he compares the ancient Trochaic with a meaſure exactly correſponding to it in our own language, but which we have not yet admitted into our tragedy.

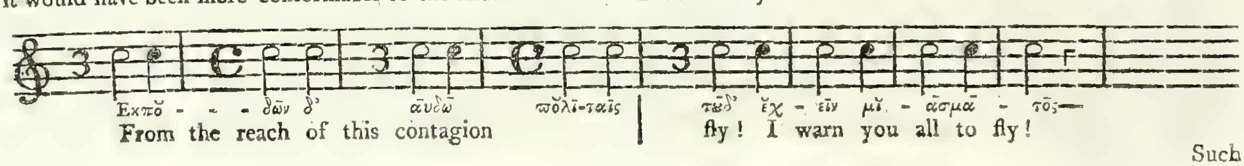
Πᾶ 'στιν οὗτος, ὃς πέφυκε | τοὐμὸν ἐκ δόμων ξίφος;

This is a pure Trochaic, and is preciſely in the meaſure of our

"Jōllў mōrtăls fīll yoūr glăſſĕs,
Nōblĕ deēds ăre dōne by wīne."

The whole difference is, that the ancient Trochaics were written in one line; but this is merely to the eye; for they really conſiſt of two verſes; the laſt ſyllable of the *fourth* foot being, as Dr. Burney believes, conſtantly, the end of a word.

Mr. Weſt, in his tranſlation of the "Iphigenia in Tauris" of Euripides, has given a whole ſcene of Trochaics in the correſpondent Engliſh meaſure. A ſingle line of the original, with his tranſlation, will be a ſufficient example of Trochaic rhythm.



Such

Such were the metres appropriated to the dialogue of the ancient tragedy, and ſuch muſt have been the rhythms or times of the muſic to which they were ſet.

We ſhall cloſe theſe obſervations with one example more, taken from the *choral* part of the drama, that part which was more particularly *muſical*, and the circle marked out for the muſician, where all the magic of his art, with all the wonders of rhythm, were to be diſplayed. Of the metre of this part, we ſhall only obſerve, in general, that it ſeems to have admitted of ſuch an unbounded variety in the mixture and arrangement of feet, and to have been fettered by ſo few reſtraints, that, to a modern ear, it is frequently not to be diſtinguiſhed from a ſmooth and elegant proſe. We can therefore be certain of nothing, concerning the muſic applied to the ancient chorus, except the *relative lengths* of the notes as they are determined by the proſody: in what manner the ancients divided them by beats, we do not even preſume to gueſs; and we believe it may be propoſed to the muſical reader as a problem, worthy, for its difficulty at leaſt, if not for its importance, to exerciſe his ſagacity, how the following ſpecimen ſhould be *barred*, in order to render it as little tormenting to the ear as poſſible.

The moſt ſtriking circumſtance in all theſe examples, is the perpetual change of time, occaſioned by the mixture of unequal feet. To the eye, indeed, the recitative of the old French opera preſents a ſimilar appearance; but where no ſtrict time is obſerved, the changes are leſs perceptible to the ear. No circumſtance relative to ancient muſic has been more frequently and triumphantly oppoſed to the modern, in proof of ſuperiority, than its inviolable adherence to the *fixed quantity* of ſyllables. It is, perhaps, equally difficult to diſprove this, and to conceive how ſuch a muſic could be rigorouſly executed, without throwing both the hearers and performers into convulſions. If, however, this was the caſe, we need no longer wonder at the noiſy expedients, to which the ancients had recourſe in beating time; for we believe the beſt modern band would find it difficult, if not impoſſible, to keep exactly together in the execution of a Greek chorus, though aſſiſted by all the clatter of an ancient coryphæus.

Upon the whole, perhaps, even the imperfect view which we have here attempted to give of the rhythmical reſources of ancient muſic, may be ſufficient to warrant ſomething more than a doubt, whether, after all that Iſaac Voſſius, and many others, have ſaid, a *fixed* proſody, and the rigorous, unaccommodating length of ſyllables, be any recommendation of a language *for muſic;* that is, whether a muſic formed and moulded cloſely upon ſuch a language, muſt not neceſſarily be cramped and poor, in compariſon of that free, unſhackled variety; that independent range of rhythmical phraſe, which conſtitutes ſo conſiderable a part of the riches of *modern* muſic. Let the moſt inventive compoſer try to ſet half a dozen Hexameters, pure Iambics, or any other verſes that will fall into regular common or triple time, and he will ſoon find that no reſources of melody are ſufficient to diſguiſe or palliate the inſipid and tireſome uniformity of the meaſure; and as for any thing like expreſſion, we may as well expect to be affected by the mechanical ſtrut of a ſoldier upon the parade. In other metres, ſuch as thoſe already given in the preceding examples, where feet of different times are intermixed, *ſome* variety is indeed acquired; but it is a miſplaced variety, which, without obviating the tireſome effect of a confinement to no more than *two* lengths of notes, adds to it that of an aukward and uncouth arrangement; the ear is ſtill fatigued with uniformity where it requires change, and diſtracted by change where it requires uniformity.

Modern muſic, on the contrary, by its diviſion into *equal* bars, and its *unequal* ſubdiviſion of theſe bars by notes of various lengths, unites to the pleaſure which the ear is by nature formed to receive from a regular and even meaſure, all the variety and expreſſion which the ancients ſeem to have aimed at by ſudden and convulſive changes of time, and a continual conflict of jarring and irreconcileable rhythms.

Nothing ſeems more eſſential to muſical pleaſure, than the diviſion of melody into equal portions of time, or bars. Quintilian attributed to this natural menſuration of the ear, the firſt production of poetry: "Poema—aurium menſurâ, et ſimiliter decurrentium ſpatiorum obſervatione eſſe generatum."[1] Hexameters and Iambics appear to have been the moſt ancient Greek metres; and the latter, if we may credit Horace, Art. Poet. 253, were at firſt *pure* and uncompounded. The mixture of *unequal* feet, and the Dithyrambic licence of lyric poetry, were later refinements. The progreſs of muſical rhythm was, of courſe, the ſame. Plutarch expreſsly ſays, in the dialogue de Muſicâ, that the compoſitions of Terpander, and other old maſters, were ſet to Hexameters, chiefly of Homer; that is, they were in regular common time. The change and intermixture of rhythms is ſpoken of as the innovation of modern artiſts. Plato rejects theſe complicated meaſures from the muſic of his republic; and even Iſaac Voſſius, the great champion of ancient rhythm, who aſſerts that "no man can be a good muſician, that is not a *good drummer*," owns, p. 11, that "vitioſum et incompoſitum imprimis, fiet carmen, ſi duorum, trium, quatuor, pluriumve temporum pedes, veluti Pyrrichii, Iambi, Dactyli, Pæones, Ionici, ſimul copulentur;" though this is done continually, not only in the lyric part, but even in the dialogue of the ancient drama.

It is evident, from the proofs already given, that the Greeks and Romans had but two different degrees of long and ſhort notes; and even the old lozenge and ſquare cha-

 racters

racters ſtill uſed in the canto fermo of the Romiſh church, under the denomination of Gregorian notes, are but of two kinds; the time of theſe may, indeed, have been accelerated or retarded, but ſtill the ſame proportion muſt have been preſerved between them; and all their variety muſt have ariſen from different combinations of theſe two kinds of notes, ſuch as any two of ours could afford; as ſemibreves and minims, minims and crotchets, or crotchets and quavers.

This accounts for the facility with which even the common people of Greece could diſcover the miſtakes, if any were committed, in the length and ſhortneſs of the ſyllables, both with reſpect to the poetry, and the muſic, a point of hiſtory in which all writers agree; for beſides the intervals peculiar to the melody, rhythm, or time, muſt have contributed to characterize the modes, though it has no kind of connection with our flat and ſharp keys; and this gives an idea quite different from what our modern modes, taken as keys, and our muſic, in general, furniſh. Tartini, upon this ſubject, ſays, that we make the proſody ſubſervient to the muſic, not the muſic to the proſody; and adds, "that as by the laws preſcribed to the ancient muſicians, they were obliged to preſerve rigorouſly in their muſic the quantity of ſyllables, it was impoſſible to protract a vowel, in ſinging, beyond the time which belonged to a ſyllable; we, on the contrary, prolong the vowels through many bars, though in reading they are oftentimes ſhort."

Tartini, however, in pure courteſy, allows to the ancients a diſcretionary power of making ſyllables longer or ſhorter than rigorous time would admit, in order to diverſify expreſſion, and to enforce the paſſion implied by the words; but if time was rigorouſly beaten, in the manner the ancients have related, it is not very eaſy to ſubſcribe to this opinion.

Having explained the nature, difference, and properties of ancient rhythm, Dr. Burney beſtows a few words on an examination of the modern, and endeavours to ſhew what it has, in common with the ancient, and what peculiar to itſelf.

We no longer know rhythm now under its ancient name; however, it has been continued, with a ſmall change of pronunciation, merely to expreſs the final cadence of verſes, or the agreement and ſimilarity of ſound in the laſt ſyllables of two or more lines in poetry; being at preſent what we call *rhyme;* whereas the proportion ſubſiſting between the different parts of a melody are called *time*, *meaſure*, *movement.*

And when we come to examine this proportion, we find that it only conſiſts of two kinds, differently modified; and theſe two are known by the names of *common time*, conſiſting of equal numbers, and *triple time*, of unequal.

Tartini has deduced all meaſure from the proportions of the octave and its fifth. "Common time, or meaſure," ſays he, "ariſes from the octave, which is as 1 : 2; triple time ariſes from the fifth, which is as 2 : 3. Theſe," adds he, "are the utmoſt limits within which we can hope to find any practicable proportions for melody. Indeed many have attempted to introduce other kinds of meaſure, which, inſtead of good effects, have produced nothing but the greateſt confuſion; and this muſt always be the caſe. Muſic has been compoſed of five equal notes in a bar, but no muſician has yet been found that is able to execute it."

By the improvement of inſtrumental muſic, and indeed by the liberties which we have taken with poetry in ſinging, we have multiplied notes, and accelerated the meaſure. Inſtead of one ſound to one ſyllable, or one portion of time for a ſhort ſyllable, and two for a long one, we frequently divide and ſubdivide the time of theſe ſeveral portions into all their aliquot parts, and ſometimes into incommenſurable quantities.

After the invention of muſical characters for time, different from thoſe in poetry, the ſtudy of their relations became one of the moſt laborious and perplexed parts of a muſician's buſineſs. Theſe characters were of different value and velocity, according to other characters placed at the beginning of a muſical compoſition, and likewiſe frequently occurring in the courſe of a piece, to announce a change of meaſure; as from common time to triple, from quick to ſlow, or the contrary. Theſe characters were called *moods*, but they were ſo extremely embarraſſing and ill underſtood, till the invention of bars, by which muſical notes were divided into equal portions, that no two theoriſts agreed in the definition of them.

Theſe modes, by which the kind of movement, with reſpect to quick and ſlow, as well as the proportions of the notes, uſed to be known, ſince the uſe of technical terms, chiefly taken from the Italian language and muſic, has been adopted, ſerve no other purpoſe than to mark the number and kind of notes in each bar.

But by this invention of muſical characters for time, and the uſe of bars, we have certainly advanced in the performance of inſtrumental muſic, by giving to it more energy and accentuation; it has now a cadence and feet of its own, more marked and ſenſible than thoſe of poetry, by which it uſed to move.

We have alſo, in our *airs*, a diſtinct ſpecies of muſic for poetry, wholly different from recitative and chanting; for in theſe we are no more tied down to ſtated meaſure than the ancients, but are governed by the accent and cadence of the words. However, our florid-ſong, it cannot be diſſembled, is not always ſufficiently ſubſervient to poetry; for in applying muſic to words, it frequently happens that the fineſt ſentiments and moſt poliſhed verſes of modern languages are injured and rendered unintelligible, by an inattention to proſody. Even the ſimple and plain rules of giving a ſhort note to a ſhort ſyllable, a long to a long; and of accentuating the muſic by the meaſure and natural cadence of the verſe, which the mere reading would point out to a good ear and underſtanding, are but too frequently neglected.

Modern melody requires, perhaps, more than a ſingle ſound to a ſingle ſyllable; and a fine voice deſerves, now and then, a long note to diſplay its ſweetneſs; but this ſhould be done upon long ſyllables, and to open vowels, and, perhaps, in general, after the words have been once ſimply and articulately ſung, for the hearer to know what paſſion is intended to be expreſſed, or ſentiment enforced, by future diviſions.

Expletives, particles, and words of ſmall importance, are forced into notice by careleſs or ignorant compoſers, who, only intent upon mere muſic, pay no regard to her ſiſter, poetry. But then, poetry, in revenge, is as little ſolicitous about muſical effects; for ſymmetry of air, or ſimplicity of deſign, are generally ſo little thought of, that every heterogeneous idea, which can be hitched into rhyme, is indiſcriminately crowded into the ſame ſong. Indeed muſic and poetry, like man and wife, or other aſſociates, are beſt aſunder, if they cannot agree; and on many occaſions, it were to be wiſhed, that the partnerſhip were amicably diſſolved.

Salinas tells us, from St. Auguſtine, that poets and muſicians have ever been at ſtrife concerning long and ſhort ſyllables, accents, and quantity, ſince they have ceaſed to be united in one and the ſame perſon, and have ſet up different intereſts.

There is ſome poetry ſo replete with meaning, ſo philoſophical, fophical, inftructive, and fublime, that it becomes wholly enervated by being drawled out to a tune, which affects no part of the head, but the ear.

And there is, again, fome kind even of inftrumental mufic, fo divinely compofed, and fo expreffively performed, that it wants no words to explain its meaning; it is itfelf the language of the heart and of paffion, and fpeaks more to both in a few notes, than any other language compofed of clafhing confonants, and infipid vowels, can do in as many thoufand.

And, upon the whole, it feems as if poetry were more immediately the language of the head, and mufic that of the heart; or, in other words, as if poetry were the propereft vehicle of inftruction, and modulated found that of joy, forrow, and innocent pleafure. "Let the mufician," fays M. Rouffeau, "have as many images or fentiments to exprefs as you pleafe, with few fimple ideas; for the *paffions* only *fing*, the *underftanding fpeaks*."

But, notwithftanding both poetry and profody are fo frequently injured by injudicious compofers, it muft not be imagined that in our fimple airs of the gavot and minuet kind, we have no mufical rhythm, or that it always clafhes with the poetical. Innumerable inftances may be given from well-known Englifh fongs, where the cadence of the verfe, and even the pronunciation of each fyllable, is carefully preferved by the air. For though our time-table furnifhes fix different degrees of long and fhort notes, without points, yet, if the divifions in fongs defigned to difplay a particular talent for difficult execution be excepted, we feldom ufe more than *two* kinds of notes in the fame air.

"Mirth, admit me of thy crew," by Handel, as well as feveral popular fongs by Dr. Arne, Mr. Jackfon, and others, are fufficiently conformable to poetical numbers and rhythm, to fatisfy the greateft admirers of ancient fimplicity, or even fuch as love poetry better than mufic, from whom complaints of non-conformity generally proceed.

Ifaac Voffius fays it is now above a thoufand years fince muficians have loft that great power over the affections, which arofe only from the true fcience and ufe of rhythm; and he accufes modern mufic of fuch a want of time and accent, as to be all of one ftyle and colour. We will not defend the age in which Voffius wrote from the charge, nor the mufic of the prefent ferious opera in France; but the compofitions of Italy and Germany are certainly free from the cenfure, as mufic is now more divided into phrafes, and fentences, than it was; time is more marked, and more eafily felt than it has ever been fince the days of Guido. What it was before, is not very well known; but to confefs the truth, it is our opinion, that whatever it has comparatively loft in fome particulars, it has gained in others.

RHYTHMICA, Rhythmice, Ῥυθμικη, in the *Ancient Mufic*, that branch of mufic which regulated the rhythmus. See the preceding article.

RHYTHMOPŒIA, one of the mufical faculties, as they are called, which prefcribes rules for the motions, or rhythm.

The ancient rhythmopœia is very defective. We find nothing of it in the books of the ancients, but fome general hints, which can fcarcely be called rules. In their explications there appears nothing but what belongs to the words and verfes of their fongs, which is a ftrong prefumption they had no other. See Rhythm.

RHYTIDOSIS, formed of ῥυτιδοω, *to wrinkle*, the name of a diftemper of the eye, in which it waftes and wrinkles up.

RHYTIS, in *Botany*, from ῥυτις, *a channel*, or *furrow*, fo named by Loureiro, becaufe it has a furrowed berry.—Loureir. Cochinch. 660.—Clafs and order, *Polygamia Dioecia*. Nat. Ord. . . .

Gen. Ch. Perfect Flowers, *Cal.* Perianth inferior, cloven into from three to fix, obtufe, fpreading fegments. *Cor.* none. *Stam.* Filaments three, thread-fhaped, erect, longer than the calyx, attached to the receptacle; anthers two-lobed. *Pift.* Germen fuperior, rather long; ftyle none; ftigmas three, cloven, reflexed. *Peric.* Berry flatly ovate, rugofe, flaccid, with one cell, and three, ovate, fmall *feeds*.

Female Flowers on a feparate plant, *Cal.* Perianth inferior, cloven into numerous, lanceolate, hairy, fpreading fegments. *Cor.* none. *Stam* none. *Pift.* and *Peric.* as in the perfect flowers.

Eff. Ch. Calyx from three to fix-cleft. Corolla none. Stamens three. Stigmas three. Berry three-feeded.

Female, Calyx cloven into many fegments.

1. R. *fruticofa*. Shrubby Rhytis. Loureir. Cochinch. 660.—Native of woods in Cochinchina.—A *fhrub* about fix feet high. *Stem* nearly erect, branched in a fpreading manner. *Leaves* alternate, ovate-oblong, flightly pointed, fmooth, entire. *Flowers* in long, flender, crowded, terminal *fpikes*. *Berry* channelled.

RHYTIUM, in *Ancient Geography*, a town of the ifland of Crete.

RHYZELIUS, Andrew, in *Biography*, a learned Swedifh bifhop, was born in Weft Gothland in 1677, and ftudied at Upfal. In 1711 he was appointed profeffor of theology at Abo, from thence he proceeded to Upfal, where he was ordained, and appointed under paftor of the congregation of St. Nicholas at Stockholm. In 1713 he was nominated by Charles XII. to be one of his chaplains, whom he afterwards accompanied to Norway. He obtained other high offices, and at length, in 1743, he was raifed to the epifcopal bench. He died in the year 1761, leaving behind him a high character for deep learning and accurate judgment. His works are numerous, fome of which are, 1. "Svio-Gothica munita," or an hiftorical defcription of the towns, fortreffes, caftles, and royal palaces in the kingdoms of Sweden and Gothland. 2. "Monafteriologia Svio-Gothica," or a defcription of monafteries. 3. "Mnemonica Hiftoriæ Svio-Gothica Epitome." 4. "Epifcopofcopia Svio-Gothica," or a chronicle of the Swedifh bifhops. Gen. Biog.

RIAÇA, or Riaza, in *Geography*, a river of Spain, which rifes in the mountains which feparate Old and New Caftile, and runs into the Duero near Roa.

RIADHIAT, in *Modern Hiftory*, a fuperftitious practice among the Mahometans, and chiefly among thofe of Hindooftan, which confifts in fhutting themfelves up for fifteen days, without any other nourifhment than bread and water, in a place where there is no light; during which time, the devout Muffulman inceffantly repeats the word *hou*, which denotes one of the attributes of God.

RIAITTE', in *Geography*, a town of France, in the department of the Lower Loire, and chief place of a canton, in the diftrict of Ancenis; 12 miles N. of Ancenis. The place contains 613, and the canton 5555 inhabitants, on a territory of 150 kiliometres, in 5 communes.

RIAL, in *Commerce*. See Real.

Rial, or *Royal*, is alfo the name of a piece of gold anciently current among us for ten fhillings.

In 1 Henry VI. by indenture of the mint, a pound weight of gold of the old ftandard was coined into 45 rials, paffing for ten fhillings a-piece, or a proportional number of half rials, paffing at five fhillings a-piece; or rial farthings, which went at two fhillings and two-pence.

In

In 1 Henry VIII. the gold rial was ordered to pass at eleven shillings and three-pence. In 2 Elizabeth, gold rials were coined at fifteen shillings a-piece, when a pound weight of old standard gold was to be coined into 48 rials. In 3 James I. rose-rials of gold were coined at thirty shillings a-piece, and spur-rials at fifteen shillings.

RIALEJO, in *Geography*, a town on the W. coast of the island of Teneriffe.

RIALEJO, or *Ria Lexa*. See REALEJO.

RIALP, a town of Spain, in the province of Catalonia.

RIANA, in *Botany*, a genus of Aublet's; but that author gives no account, or reason, why it is so called. We presume this may be its common name in Guiana.—Aubl. Guian. 237. Juss. 287. Lamarck Illustr. t. 135.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Berberides*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, cloven into five, roundish, acute segments. *Cor.* Petals five, ovate, acute, joined at the base. Nectary of five scales. *Stam.* Filaments five, very short, inserted at the base of the nectary; anthers ovate-oblong, nearly sessile, two-celled. *Pist.* Germen superior, ovate, villous, with five streaks; style fleshy; stigma capitate, obtuse. *Peric.* Capsule oblong, of one cell, and three valves, compressed in the middle. *Seeds* three.

Obs. Aublet describes the five-scaled nectary, as five inner petals.

Ess. Ch. Calyx deeply five-cleft. Petals five. Nectary composed of five scales. Anthers nearly sessile. Capsule of one cell and three valves. Seeds three.

1. R. *guianensis*. Aubl. Guian. t. 94.—Native of woods in Aroura, where it flowers in August. This *shrub* is ten feet high, and has a branched *trunk*. *Branches* erect, knobbed. *Leaves* opposite, stalked, ovate-oblong, acute, toothed, smooth, rigid. *Stipulas* short, twin, opposite, acute, deciduous. *Flowers* white, arranged in an alternate manner, forming a terminal *spike*; each flower on a short *stalk*, which has four scales or bracteas at the base.

Jussieu suspects that this plant may be akin to *Passoura*, Aubl. Guian. t. 380.

RIANANTLA, in *Geography*, a town of Mexico, in the province of Tlascala; 60 miles S. of Puebla de los Angelos.

RIANJO, a town of Spain, in Galicia, at the mouth of the Ulla; 23 miles S.W. of Compostella.

RIANO, a town of Italy, in the Patrimonio; 13 miles N. of Rome.—Also, a town of Naples, in Abruzzo Ultra; 8 miles W. of Teramo.

RIANS, a town of France, in the department of the Var; 10 miles N.W. of St. Maximin.

RIAO, an island in the East Indian sea, about 25 miles in circumference, near the W. coast of Morty. N. lat. 2° 25'. E. long. 128° 2'.

RIAPA CREEK, a river of West Florida, which runs into the Missisippi, N. lat. 31° 2'. W. long. 91° 17'.

RIAVIA, a mountain of Africa; 60 miles W. of Tripoli.

RIAZAN, a town of Russia, and capital of a government, on the Oka; 80 miles S.S.E. of Moscow. N. lat. 34° 45'. E. long. 38° 54'.

RIAZANSKOE, a government of Russia, bounded on the N. by Vladimirskoi, on the E. and S. by Tambovskoi, and on the W. by Moskovskaia and Talskoe; 108 miles from N. to S. and 100 from E. to W. N. lat. 54° 40' to 55° 20' E. long. 38° to 41°.

RIAZSK, a town of Russia, in the government of Riazan; 56 miles S.E. of Riazan. N. lat. 54°. E. long. 40° 4'.

RIB, in *Rural Economy*, the small arched bones forming the chests of animals. Cattle and most other animals should be full in the rib.

In horses the chest or barrel formed by the ribs should be full and circular, taking their fullness quite from the back-bone. See HORSE.

RIB-*Furrowing*, in *Agriculture*, a mode of ploughing somewhat similar to that of ribbling.

RIB-*Grass*, a sort of grass much cultivated in some districts, and which is said to afford an herbage of which cattle are very fond. It is also asserted to be useful as a grass for milch cows, and also for fattening any sort of stock. It is an indigenous plant in this country, which frequently abounds in pasture or meadow lands where the soil is rather inclined to moisture. See PLANTAGO.

In the mode of cultivating it as a grass for cattle food under the modern system of husbandry, from four to six pounds of seed are stated by Mr. Donaldson to be sown upon the acre. It is a coarse sort of grass, however, that requires to be kept well fed down, in order to render it valuable and prevent its running to seed.

In Cheshire some farmers are fond of it, while others think that its place would be better supplied by some of the other grasses. In some places, some fields are sown with it, nearly without any admixture of grass seeds; and where plentiful crops of it have been produced no animal would eat it, which is supposed probable from its nature. And in the Staffordshire agricultural report, it is said that there is authority for asserting that cattle will not eat its leaves, but it is believed to be grateful in admixture with other herbage.

RIBA, or RIBAS, in *Geography*, a town of Spain, in New Castile, on the Xaramo, founded by William de Ribas of Segovia, a celebrated commander, in the year 1100; 9 miles from Madrid.

RIBA *de Sella*, a small sea-port of Spain, in Asturia, on the coast of the Atlantic; 36 miles E.N.E. of Oviedo. N. lat. 43° 28'. W. long. 5° 18'.

RIBADAVIA, a town of Spain, in Galicia, famous for its vineyards, which are said to produce some of the best wine in Spain; 15 miles S.W. of Orense.

RIBADENEIRA, PETER, in *Biography*, a Spanish Jesuit, was a native of Toledo. He studied at Paris and at Padua, after which he taught rhetoric with reputation at Palermo. He died at Madrid in 1611, aged 81. His works are "Lives of the Saints," folio, 1616; the "Lives of St. Ignatius Loyola, St. Francis de Borgia, and of the Father Lainez and Solmeron;" "A Treatise of the Schism of England;" another entitled "The Prince," which is full of bad political maxims; and the "Library of Writers among the Jesuits," 8vo.

RIBADEO, in *Geography*, a sea-port town of Spain, in Galicia, at the mouth of the Eo, with a good harbour defended by two castles; 15 miles N.E. of Mondonedo. N. lat. 43° 33'. W. long. 7° 5'.

RIBAGNAC, a town of France, in the department of the Dordogne; 5 miles S. of Bergerac.

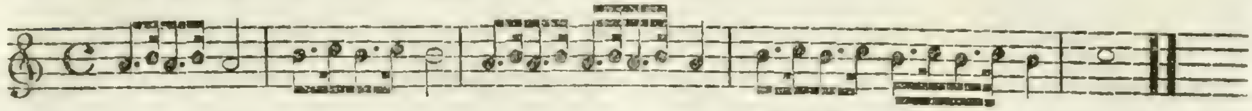
RIBAGORZA, a district of Spain, bordering on the E. part of Aragon, and W. part of Catalonia; watered by the river Noguera de Ribagorza, about 40 miles long and 18 wide, N. of Balaguers.

RIBAN, an island in the Red sea, near the coast of Arabia. N. lat. 17° 12'.

RIBAT-

RIBATTUTA, Ital. in *Muſic*, is iterating, ſtriking, or ſounding the ſame note again.

Ribattuta *di Gola* is one of the graces uſed in ſinging; it is performed by beating or ſtriking two diatonic notes, the one ſlow and the other quick, in the following manner.



It differs from the ſhake and the beat.

RIBAUDEQUEM, in *Ancient Artillery*, a projectile machine uſed in the 11th and 12th centuries, which was a large kind of croſs-bow: the croſs-bow was called in Latin baliſta, and ſometimes manubaliſta.

RIBAUVILLE', in *Geography*, a town of France, in the department of the Upper Rhine, and chief place of a canton, in the diſtrict of Colmar; 6 miles N. of Colmar. The place contains 4950, and the canton 14,219 inhabitants, on a territory of 85 kiliometres, in 9 communes.

RIBBAND, or Ribbond, a narrow ſort of ſilk, chiefly uſed for head ornaments, badges of chivalry, &c.

The knights of the Garter wear a blue ribband; thoſe of the Thiſtle, a green ribband, &c. ſcarfwiſe. See Collar, Garter, &c.

Ribbands, *Figured.* See Figured.

Ribband, or *Ribbon*, in *Heraldry*, is the eighth part of a bend. (See the article Bend.) It is borne a little cut off from the outlines of the eſcutcheon: thus; he beareth or, a ribband, gules.

Ribbands, from *rib* and *band*, in *Ship Building*, are long pieces of fir timber from four to eight inches ſquare, according to the ſize of the ſhip; theſe are nailed on at certain heights to the frame timbers of the ſquare body, as the *harpins*, which are oak of the ſame ſize, are nailed to the frames of the cant-bodies; but the latter are ſhaped to the form of the body by moulds and bevelling. The ends of the harpins forward are faſtened againſt the ſtem, and thoſe abaſt againſt the ſtern-poſt or tranſoms; the ribbands then uniting with the harpins, envelop the ſhip lengthways, and being judiciouſly arranged, with regard to their diſtance from each other, they not only ſupport the filling-timbers, but by being ſhored at every frame, the whole ſhip is ſupported, and kept to her true ſhape, until the plank is brought on, as they are in that caſe removed one at the time, the bottom being ſhored againſt the planks above. The difference between cant-ribbands and horizontal or ſquare ribbands is, that the latter are only ideal, and uſed in the laying-off.

RIBBING Nails. See Nail.

RIBBLE, in *Geography*, a river of Lancaſhire, England, has its ſource in the high moors of Craven, Yorkſhire, and paſſing the lofty mountains of Ingleborough and Pennigaut, enters the county of Lancaſter near the town of Clitherhoe, where it forms a boundary to the county. Taking a ſouth-weſtern courſe, and receiving, in its progreſs through Lancaſhire, ſeveral ſmaller ſtreams, and the tributary rivers of the Hodder, Calder, and Darwent, it paſſes by Ribcheſter and Preſton. Soon after leaving the latter town it gradually expands its ſtream, and in a few miles preſents a broad eſtuary, and unites its waters with the Iriſh ſea. At this place, the ferry from North Theols to Lytham, it is about five miles acroſs at high water. This river is navigable, for ſmall coaſters, as high as Preſton, and was formerly capable of conveying veſſels much higher up the country. At Preſton it is croſſed by an aqueduct, for the Lancaſter canal. See Aiton's Lancaſhire Gazetteer, Beauties of England, vol. ix. and Whitaker's Hiſtory, &c. of Whalley, 4to.

RIBBLING, in *Agriculture*, a term uſed in ſome diſtricts to ſignify a mode of ploughing ſimilar to that of ſlob-furrowing. It is practiſed in ſome northern counties as well as thoſe of the ſouth, and in the former appears to be the only kind of winter fallow which is beneficial to lands of looſe texture. Every furrow that is turned over on a foot of ſolid ground, from the beginning to the end of the ridge, that is every alternate furrow, is left untouched, and the ploughed furrow is turned over above it, ſo that the greateſt ſurface poſſible is expoſed to the ameliorating influence of the atmoſphere, while, at the ſame time, the looſe ſoil is out of the reach of any little rills which may run down in the different ruts. If the ſtubble has been, in ſome meaſure, luxuriant, and the ribbling done ſoon after the crop was taken from the ground, the two ſtrata of ſtubbles meeting and fermenting under cover of the rid furrow, form, it is ſuppoſed, an aid to the ſubſequent manure, while the weeds are no leſs ſmothered than when the whole land is turned over by a complete ploughing. Neverthleſs, it is believed, that when the uſe of green crops becomes general, and the planting and hoeing of them are neatly performed by the plough, this will ſtir the earth more perfectly, and pulverize and clean the ſoil more completely than any winter fallow or ribbling can poſſibly effect. See Tillage.

RIBCHESTER, in *Geography*, a village and pariſh in the hundred of Blackburn, and county palatine of Lancaſter, England, is ſituated at the diſtance of five miles and a half N.N.W. from the town of Blackburn, and eight miles N.E. from Preſton. Though now comparatively an inſignificant place, it was in Roman times an important and flouriſhing town. Much diſpute has taken place among antiquaries with reſpect to the original name of this ſtation. Horſley calls it the Coccium of Antoninus, and Camden the Rigodunum of Ptolemy, the identity of which places is clearly proved by the reaſonings of Dr. Whitaker, in his Hiſtory of Whalley. (See Coccium, in which article for *Rilcheſter* read *Ribcheſter*.) Mr. Whitaker, the author of the Hiſtory of Mancheſter, however, contends that Ribcheſter muſt have been the Rerigonium of Richard of Cirenceſter, and places Coccium at Blackrode. But whatever was the name of this place, it was indubitably among the number of Agricola's ſtations, and appears to have been not merely a military poſt, but the ſeat of manufacturing and commercial proſperity. At that period the river Ribble was navigable as high as Coccium to veſſels of no inconſiderable burden. Of this fact, tradition, the veſtiges of a dock, and numerous nautical relics, afford inconteſtible proof. To the filling up of the river, by the gradual accumulation of ſand, is to be attributed, in part at leaſt, the decay of this place after its abandonment by the Romans. Many votive ſtones, and others with inſcriptions, have been found here. Of theſe Dr. Whitaker has printed nine, but they do not furniſh any thing intereſting either with reſpect to the place or the people. Various ſmaller antiquities have likewiſe been dug up here at different periods; ſuch as ſilver and braſs coins, an intaglio in a ruby, gold rings, &c. "But," to uſe the words of the hiſtorian of Whalley, "the nobleſt diſcovery ever made here, or perhaps in Britain, was in the year 1796, when the ſhelving bank of the Ribble expoſed the following remains, which ſeemed to have been depoſited in an excavation of the earth, filled up with ſoil of a different quality. Theſe were,

were, 1. A large flat earthen veſſel, extremely thick, with the potter's ſtamp very diſtinct, "Boriedof, *Boriedi officina.*" 2. An entire patera of copper, about ſix inches diameter, with a handle. 3. The imperfect remains of a ſimilar veſſel. 4. A column, or colander of the ſame ſize and metal. 5. Several concave and circular plates of copper, with loops behind, which had evidently been intended to faſten them perpendicularly againſt a ſhaft, in order to form a Roman vexillum: ſuch are frequent upon ancient monuments; but for a particular illuſtration, the reader is referred to a monument of Lucius Duccius, ſignifer of the ninth legion, in Horſley, pl. 63. 6. A very fine helmet, of which the creſt was a ſphinx, afterwards unfortunately loſt, the head-piece enriched with baſſo relievos of armed men ſkirmiſhing with ſwords, and a viſor, conſiſting of an entire and beautiful female face, with orifices at the eyes, mouth, and noſtrils." Theſe remains were depoſited in the muſeum of Charles Townley, eſq. The helmet particularly merits attention. From the ſtyle of the head-piece, it is conjectured by the beſt judges not to be prior to the age of Severus; but the viſor is a much more delicate and exquiſite piece of workmanſhip, and is ſuppoſed not only to be Grecian, but, from the boldneſs of its lines, to belong to a period ſomewhat anterior to the laſt perfection of the arts in that wonderful country. For engraving of this helmet, with ſome obſervations thereon, ſee "Vetuſta Monumenta," vol. iv.

The chief remains of this ſtation, now viſible, are a mutilated rampart and foſſe, ſurrounding a ſmall eminence near the church, which is called Anchor-hill, from the circumſtance of ſeveral anchors having been dug up at its baſe. In the ſame place, ſome years ago, an entire veſſel was diſcovered at a great depth beneath the ſurface of the ground. From this place the Roman road, called Watling-ſtreet, ſtretches itſelf in a northern direction over Long Ridge Fell, marked by "a long ſtripe of green interſecting the brown heath of the mountain." Hence it is denominated Green Lane. It enters Yorkſhire a little below Dowford bridge, and proceeds by Newton and Bentham to the celebrated ſtation at Overborough.

The pariſh of Ribcheſter formerly conſtituted a portion of the original pariſh of Whalley, but was ſevered from it at the ſame time with that of Chipping. According to the parliamentary returns of 1811, it contained 649 houſes, and 3544 inhabitants, including the townſhips of Ribcheſter, Dilworth, Dutton, Alſton, and Hotherſal.

At Stede, in the vicinity of Ribcheſter, is a parochial chapel, which Dr. Whitaker ſtates to be the oldeſt building within the boundaries of ancient Whalley. It appears to have formerly belonged to a guild, or hoſpital, and, from the ſtyle of its architecture, was probably erected in the reign of king Stephen. The arches are ſlightly pointed, and are decorated with zigzag, and other Saxon ornaments. In the interior is a "coffin tomb" of high antiquity, placed in front of the pulpit, which is elevated upon an antique ſtone pediment. The floor is covered with ancient grave ſtones, ſome of which are inſcribed with Longobardic or Norman characters. An Hiſtory of the original Pariſh of Whalley and Honor of Clitheroe, in the Counties of Lancaſter and York, by Thomas Dunham Whitaker, L. L. D., F. S. A. 2d edit. 4to. Lond. 1806. A Deſcription of the Country, from thirty to forty Miles round Mancheſter, by J. Aikin, M.D. 4to. Lond. 1795. Hiſtory of Mancheſter, by John Whitaker, B. D., F. S. A. 2. vols. 4to. 1771. Antiquitates Bremetonacenſes; or the Roman Antiquities of Overborough, &c. Lond. 4to. 1746.

RIBECOURT, a town of France, in the department of the Oiſe, and chief place of a canton, in the diſtrict of Compiegne. The place contains 520, and the canton 8805 inhabitants, on a territory of 182½ kiliometres, in 21 communes.

RIBEMONT, a town of France, in the department of the Aiſne, on the Oiſe, and chief place of a canton, in the diſtrict of St. Quentin; ſix miles S.E. of St. Quentin. The place contains 2345, and the canton 12,497 inhabitants, on a territory of 182½ kiliometres, in 17 communes.

RIBENSKOI, a town of Ruſſia, on the Tunguſka; 72 miles E.S.E. of Eniſeiſk.

RIBERA, Francis de, in *Biography*, a learned Spaniſh Jeſuit in the ſixteenth century, was born in the year 1537. He purſued his academical ſtudies at the univerſity of Salamanca, and acquired a high reputation for his intimate acquaintance, not only with the Latin, but with the learned languages alſo. Having been ordained prieſt, he retired to his native place, that he might proſecute his theological ſtudies in uninterrupted privacy, at the ſame time he was able to aſſiſt his brethren in the neighbouring country churches. In the year 1570, when he was thirty-three years of age, he was perſuaded to unite himſelf with the diſciples of Loyola, and become a member of their ſociety. He now ſpent moſt of his time in interpreting the ſcriptures, and filling the chair of profeſſor of divinity, in their ſeminary at Salamanca, till his death, which happened in the year 1591. He was author of numerous works, which are ſtill in eſtimation with the Catholics; among theſe may be mentioned "Commentarii in XII. Prophetas minores, ſenſum eorundem Prophetarum hiſtoricum et moralem, ſæpe etiam Allegoricum complectentes," 4to. "Commentarii Hiſtorici ſelecti in XII. Prophetas minores," 8vo. "De Templo, et iis quæ ad Templum pertinent Lib. V." 8vo. And "The Life of St. Thereſa, Foundreſs of the reformed Order of the barefooted Carmelites," written in the Spaniſh language.

Ribera, Giuseppe. See Spagnoletto.

Ribera, in *Geography*. See *St.* Jago.

Ribera *de Muria*, a town of Portugal, in Eſtramadura; ſix miles N. of Thomar.

RIBERAC, a town of France, and chief place of a diſtrict, in the department of the Dordogne; 17 miles E. of Perigueux. The place contains 2985, and the canton 11,194 inhabitants, on a territory of 85 kiliometres, in 13 communes. N. lat. 45° 14′. E. long. 6° 25′.

RIBERAIRY, a town of Abyſſinia; 25 miles E.N.E. of Axum.

RIBES, in *Botany*, an Arabian name, properly belonging to an acid-leaved ſpecies of Rheum, ſee that article; but which botaniſts, for about 200 years paſt, have, by miſtake, applied to the currant and gooſeberry family, and with theſe it now remains. They conſtitute a natural and very important genus.—Linn. Gen. 111. Schreb. 154. Willd. Sp. Pl. v. 1. 1153. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 263. Prodr. Fl. Græc. Sibth. v. 1. 160. Ait. Hort. Kew. v. 2. 40. Purſh 163. Juſſ. 310. Lamarck Illuſtr. t. 146. (Groſſularia; Tourn. t. 409. Gærtn. t. 28.) —Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Pomaceæ*, Linn. *Cacti*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, tubular, or bell-ſhaped; the limb cut, about half way down, into five oblong, concave, coloured, reflexed, permanent ſegments. *Cor.* Petals five, ſmall, obtuſe, erect, inſerted into the rim of the calyx. *Stam.* Filaments five, awl-ſhaped, erect, inſerted into the rim of the calyx; anthers incumbent, compreſſed, burſting at the edges. *Piſt.* Germen roundiſh, inferior; ſtyle cloven; ſtigmas obtuſe. *Peric.* Berry globoſe, umbilicated, of one cell, with two lateral, oppoſite, longitudinal

tudinal receptacles. *Seeds* numerous, roundifh, flightly compreffed.

Eff. Ch. Calyx fuperior, tubular, five-cleft. Petals inferted, with the ftamens, into the calyx. Style cloven. Berry with many feeds.

The whole genus is fhrubby. *Leaves* deciduous, alternate, ftalked, fimple, lobed and notched. *Flowers* ftalked, generally pale, greenifh or yellow, rarely reddifh. *Fruit* eatable.

Section 1. Currants. *Stem without prickles.*

1. R. *rubrum.* Common Currant. Linn. Sp. Pl. 290. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 1289. Woodv. Med. Bot. t. 74. Fl. Dan. t. 967. (R. vulgaris, fructu rubro; Ger. Em. 1593.)—Clufters fmooth, pendulous. Flowers flattifh. Petals inverfely heart-fhaped. Leaves obtufely five-lobed. Stem erect.—Native of woods and thickets, efpecially about the banks of rivers, in the north of Europe. Undoubtedly wild on the banks of the Tees, Durham. *Mr. Robfon.* Commonly cultivated throughout the cooler parts of Europe, for the fake of its gratefully acid and wholefome berries, of which the white or blufh variety is the fweeteft and mildeft. It flowers in May; the fruit is fcarcely ripe before Auguft. The *ftem* is bufhy, three or four feet high, or more, if trained to a wall, with fmooth blackifh bark. *Leaves* on long ftalks, fpreading, doubly ferrated, veiny, bright green, fomewhat downy. *Flowers* in ftalked, fimple, pale green, drooping clufters. *Petals* yellowifh-green. *Bracteas* ovate, minute, folitary at the bafe of each partial flower-ftalk. *Fruit* quite pendulous.

2. R. *petræum.* Rock Currant. Wulf. in Jacq. Mifc. v. 2. 36. Jacq. Ic. Rar. t. 49. Willd. n. 2. Fl. Brit. n. 4. Engl. Bot. t. 705. (R. n. 818; Hall. Hift. v. 1. 364. R. vulgaris rubro flore; Cluf. Hift. v. 1. 119.)—Clufters erect, fomewhat hairy; pendulous when in fruit. Flowers flattifh. Petals obtufe. Leaves acutely lobed. Bracteas fhorter than the flower-ftalks. Stem erect.—Native of Germany, Switzerland, and the north of England. This was confounded, even by Haller, with the former. The *leaves* are more downy, efpecially about the veins; more acutely lobed and notched. *Clufters* erect when in bloffom; their ftalks lefs elongated in the lower part. *Flowers* often ftained with red. *Berries* bright red, very acid.

3. R. *fpicatum.* Acid Mountain Currant. Robfon Tr. of Linn. Soc. v. 3. 240. t. 21. Fl. Brit. n. 3. Ait. n. 6. Engl. Bot. t. 1290.—Spikes erect. Flowers nearly feffile. Petals oblong. Bracteas fhorter than the calyx. Stem erect.—Native of the mountainous parts of Yorkfhire and Durham, flowering in May. Differs from the laft in having the *inflorefcence* fpiked, not racemofe; upright both in flower and fruit. The *berries* are red and acid.

4. R. *procumbens.* Trailing Currant. Pall. Roff. v. 1. p. 2. 35. t. 65. Willd. n. 3. Ait n. 3.—Clufters erect. Flowers flattifh. Leaves bluntly lobed. Berries fmooth. Stem procumbent. Plentiful, according to Pallas, on the moffy fides of hills in Dauria, where its fruit is much in requeft. The proftrate *ftems* are concealed among the mofs. *Leaves* not bigger than thofe of a goofeberry-bufh, while the fhrub is in bloffom, but afterwards attaining the fize and fhape of the three foregoing fpecies. *Flowers* like *R. rubrum*, but fmaller, in erect *clufters*, which become drooping as the fruit ripens. The *berries* are full as large as a common Black Currant, but of a greenifh-yellow, or, when quite ripe, reddifh.

5. R. *glandulofum.* Glandulous Currant. Ait. n. 4. Willd. n. 4. (R. proftratum; L'Herit. Stirp. v. 1. 3. t. 2. Purfh n. 4.)—Clufters erect, rough with glandular hairs. Flowers flattifh. Leaves acutely lobed, toothed. Bracteas minute. Berries hifpid. Stem creeping, with afcending branches.—Native of rocky moift places, in Newfoundland, Canada, and Pennfylvania, flowering in April and May. *Purfh.* Habit and *leaves* not unlike the laft. The *flowers* are yellow, tinged with red. *Berries* red.

6. R. *rigens.* Stiff-branched Currant. Michaux Boreal-Amer. v. 1. 110. Purfh n. 3.—Clufters lax, erect. Leaves acutely lobed and toothed, reticulated, rugofe; downy beneath. Berries roughifh. Branches ftraight.—On the banks of lake Miftaffins, in Canada. *Michaux.* In the Pennfylvanian mountains, &c. flowering in May and June. *Berries* red, erect, as well as the *flowers*. *Purfh.*

7. R. *trifidum.* Notched-flowered Currant. Michaux Boreal-Amer. v. 1. 110. Purfh n. 2.—Clufters lax, downy. Leaves lobed, fmooth; downy beneath. Flowers flattifh. Segments of the calyx flightly three-cleft. Petals fpatulate. Berries hairy.—Found by Michaux near Quebec, and at Hudfon's Bay; by Purfh on the Pennfylvanian mountains, &c. flowering in April and May. *Flowers* like *R. rubrum*, but fmaller. *Calyx* pale green. *Petals* purple, rounded, and blunt at the end. *Berries* red.

8. R. *albinerve.* White-veined Currant. Michaux Boreal-Amer. v. 1. 110. Purfh n. 1.—Clufters recurved. Berries fmooth. Leaves fhort, acutely lobed, fmoothifh, with pale ribs.—Found by Michaux, about lake Miftaffins, Canada; by Purfh, on the Catfkill mountains, about New York, &c. flowering in April and May. *Flowers* fmall, greenifh-yellow. *Berries* red.

9. R. *alpinum.* Taftelefs Mountain Currant. Linn. Sp. Pl. 291. Willd. n. 5. Fl. Brit. n. 2. Engl. Bot. t. 704. Jacq. Auftr. t. 47. Fl. Dan. t. 968.—Clufters erect. Bracteas longer than the flowers. Leaves fmooth; fhining at the back. Stem erect. Berries fmooth.—Native of mountainous woods and thickets, in Germany, Switzerland, Sweden, Siberia, and the north of England, flowering in April and May. The *leaves* are rounder, and fcarcely half fo large as thofe of our common Currants, befides being quite fmooth on both fides, and remarkably polifhed beneath. *Bracteas* very long, acute, erect. *Flowers* faid to be often dioecious, from which caufe perhaps the *fruit* is feldom perfected in our fhrubberies, where this fpecies often occurs. The *berries* are fomewhat elliptical, of a beautiful red, but infipid and mucilaginous like a folution of gum arabic.

10. R. *refinofum.* Refinous Currant. Purfh n. 5. Curt. Mag. t. 1583.—Whole plant vifcid, with glandular hairs. Leaves with roundifh, notched lobes. Clufters erect. Flowers flattifh. Bracteas tongue-fhaped, concave, as long as the flowers. Berries hairy.—Gathered on the mountains of North America, by Mr. Frafer, from whofe garden we obtained flowering fpecimens, in May 1810. This has more the afpect of a goofeberry-bufh, efpecially in the fize and form of the *leaves*, but the whole herbage is clothed with downy, vifcid, fœtid pubefcence. *Clufters* moft like thofe of *R. alpinum*, but the partial *flower-ftalks* are extremely fhort, and the *bracteas* more obtufe, and elliptical. *Flowers* apparently dioecious, green, with fhort, rounded, yellowifh *petals*.

11. R. *vifcofiffimum.* Glutinous Currant. Purfh n. 6. —Whole plant very glutinous, with vifcid hairs. Leaves heart-fhaped, bluntly three-lobed, ferrated. Clufters fhort, erect. Calyx tubular. Petals oblong. Bracteas linear-fpatulate, fhorter than the partial flower-ftalks. Germen hairy.—Found by the late governor Lewis, on rocky mountains in the interior of North America, flowering in June.

June. Whole plant covered with viſcous hair. *Flowers* large, yellow. This approaches near to *R. glanduloſum*, Fl. Peruv. v. 3. 13. t. 233. f. *b.* It differs principally in the *leaves* being equally lobed, not having the middle lobe projecting; its long ſlender *partial flower-ſtalks*, and its *petals*. *Purſh.*

12. R. *ſanguineum.* Crimſon-flowered Currant. Purſh n. 7.—Leaves heart-ſhaped, three-lobed, ſerrated, veiny; ſmooth above; finely downy and hoary beneath. Cluſters lax, downy, twice the length of the leaves. Calyx tubular. Petals oblong, equal to the limb. Bracteas obovate-ſpatulate, the length of the partial ſtalks. Germen hairy.—Gathered by governor Lewis, on the Columbia river, flowering in March. *Branches* purple. *Flowers* beautiful, blood-red or purple. It nearly approaches *R. albinervium*, Fl. Peruv. v. 3. 12. t. 232. f. *b.* *Purſh.*

13. R. *malvaceum.* Mallow-leaved Currant.—Leaves heart-ſhaped, ſlightly five-lobed, ſerrated, veiny; hiſpid on both ſides; denſely downy beneath. Cluſters hairy, longer than the leaves. Calyx tubular, hairy. Petals rounded, not half ſo long as the limb. Bracteas ovate, acute, jagged, half the length of the calyx.—Gathered in California, by Mr. Menzies. *Branches* dark purple, downy, like every part of the plant. *Leaves* an inch, or inch and half, long; dark green above; white, and denſely downy, beneath; hiſpid on both ſides with glandular briſtles. *Stipulas* beautifully fringed. *Cluſters* denſe, on long, rough, glandular *ſtalks.* *Calyx* red, about half an inch long, hairy, eſpecially its baſe, and the *germen.* *Petals* wedge-ſhaped, rounded, ſomewhat cloven, ſcarcely one-third ſo long as the ſegments of the limb, which are elliptical. *Stamens* the length of the petals. *Bracteas* elegantly jagged and fringed. This fine ſpecies ſeems nearly allied to the laſt. We have not at hand the *Flora Peruviana*, to aſcertain how far it reſembles any in that work.

14. R. *aureum.* Golden-flowered Currant. Purſh n. 8.—Very ſmooth. Leaves with three, obtuſe, ſparingly notched lobes. Footſtalks fringed at the baſe. Cluſters denſe. Calyx tubular, ſlender. Petals linear, half the length of the limb. Bracteas linear, equal to the partial ſtalks. Berry ſmooth.—Found by governor Lewis on the banks of the Miſſouri and Columbia, flowering in April. We received wild ſpecimens from Mr. John Bradbury, three years ago. The *leaves* have the aſpect of Hawthorn. *Flowers* in denſe cluſters. *Calyx* of a beautiful golden yellow, about three-fourths of an inch long, not unlike the flower of a Jonquill in miniature, and reported to have a ſimilar ſcent; its ſegments oblong, obtuſe. *Petals* purple. *Berries* red or brown, conſiderably larger than any garden currants, and peculiarly delicious in flavour. This very deſirable plant is introduced into the gardens about London, but we have not yet heard of its bloſſoming.

15. R. *recurvatum.* Recurve-branched Currant. Michaux Boreal-Amer. v. 1. 109. Purſh n. 9.—"Branches recurved. Leaves dilated, downy, dotted with minute glands, acutely lobed. Cluſters reflexed. Calyx tubular, ſmooth."—Found near Hudſon's Bay. *Michaux.* *Berries* black. We know nothing more of this ſpecies.

16. R. *fragrans.* Fragrant Siberian Currant. "Pallas Nov. Act. Acad. Petrop. v. 10. 377. t. 9." Willd. n. 6.—Stem aſcending. Leaves bluntly three-lobed, glandular beneath.—Flowers bell-ſhaped. Cluſters erect.—Native of Siberia, on mountains bordering on the country of the Mongols, where no woods grow. The *ſtems* are partly procumbent, a foot and a half long; their young *branches* beſprinkled with yellow, prominent, glandular dots. *Leaves* on long ſtalks, ſmooth, ſerrated, ſlightly five-angled, with three or five lobes; very veiny, and moſt glaucous beneath, where alſo they are covered with minute crowded drops of a yellow fragrant exudation, having a ſcent ſtronger than balm, approaching that of *R. nigrum*, n. 18, to which ſpecies indeed the preſent bears altogether a conſiderable reſemblance. *Cluſters* when in flower ſhort, erect, rigid, denſe, of about ten white, highly fragrant, *flowers.* *Calyx* bell-ſhaped, deeply five-cleft. *Petals* lanceolate, acute, ſpreading. *Bracteas* deciduous, ſmaller than in *R. procumbens*, n. 4. *Cluſters* elongated in fruit, ſtill erect, except when bent down by its weight. *Berries* reddiſh, extremely ſweet, the full ſize of *R. rubrum.* *Pallas.*

17. R. *triſte.* Dark-coloured Siberian Currant. "Pallas Nov. Act. Acad. Petrop. v. 10. 378." Willd. n. 7.—Root creeping. Stems erect, leafy in the upper part. Leaves five-lobed. Cluſters ſmooth, pendulous. Flowers flattiſh. Petals revolute.—Native of lofty mountains in Siberia, towards Tartary. The creeping *root* throws up many erect *ſtems*, two or three feet high, bearing at their ſummits a few ſcattered *leaves*, reſembling thoſe of *R. rubrum.* *Cluſters* always pendulous. *Flowers* reddiſh without, yellowiſh within. *Berries* ſmall, black, inſipid; their deep-red juice very uſeful for colouring wines. *Pallas.*

18. R. *nigrum.* Common Black Currant. Linn. Sp. Pl. 291. Willd. n. 8. Fl. Brit. n. 5. Engl. Bot. t. 1291. Woodv. Med. Bot. t. 75. Fl. Dan. t. 556. Lob. Ic. v. 2. 202.—Stem erect. Leaves five-lobed, acute. Cluſters pendulous, downy, with a ſeparate flower-ſtalk at their baſe. Calyx tubular-bell-ſhaped. Berries ſmooth.—Native of wet buſhy iſlands, and banks of rivers, in Sweden, Germany, Switzerland, and England; flowering in May. In gardens it is well known, and valued for the fruit, whoſe flavour indeed, in a recent ſtate, is not acceptable to every body; but its jelly is both agreeable, and uſeful for colds, ſore-throats, &c.; whence this currant has been named Squinancy-berry or Quinſy-berry. The buſh is of a more humble ſtature than *R. rubrum*; the *leaves* have a ſtrong ſcent, if bruiſed, reſembling Savine, and are ſomewhat glutinous when young. The tube of the *calyx* is more elongated than in any other Britiſh ſpecies. *Berries* large, black, each bunch always accompanied at the baſe by a ſolitary ſtalk, whoſe fruit is larger and earlier than the reſt. Dr. Withering made the truly curious obſervation, that the *petals* are ſometimes changed into *ſtamens*, of which we know no other inſtance.

19. R. *floridum.* Penſylvanian Black Currant. L'Herit. Stirp. v. 1. 4. Willd. n. 9. Ait. n. 8. Purſh n. 10. (Ribeſium nigrum penſylvanicum, floribus oblongis; Dill. Elth. 324. t. 244. f. 315.)—Leaves three-lobed, cut; dotted with glands on both ſides. Cluſters pendulous, downy. Calyx ſomewhat cylindrical. Bracteas about as long as the germen.—Found in hedges and woods, from Canada to Virginia; flowering in April and May. *Flowers* pale yellow. *Berries* black. *Purſh.* The reſinous dots on both ſides of the *leaves* diſtinguiſh this ſpecies, and its *flowers* are more oblong than thoſe of *nigrum*, with much larger *bracteas.*

Sect. 2. Gooſeberries. *Stem prickly.*

20. R. *Diacantha.* Two-thorned Cluſter Gooſeberry. Pallas Reiſe v. 3. 722. t. I. f. 2. Roſſ. v. 1. p. 2. 36. t. 66. Linn. Suppl. 157. Willd. n. 10. Ait. n. 9.—Prickles in pairs, in the place of ſtipulas. Leaves wedge-ſhaped, deeply three-cleft, bluntly notched. Cluſters nearly erect. Berries ſmooth.—Native of gravelly, ſtony, ſaline ſoils in Dauria. Introduced into England by Mr. Buſh, in 1781. Hardy, flowering in May and June. *Ait.* Linnæus ſays it flowered every year at Upſal, without bearing fruit.

fruit. Poſſibly the *flowers* may be in ſome meaſure dioecious, like thoſe of *R. alpinum*, a ſpecies which this nearly reſembles, except the prickles.

21. R. *ſaxatile*. Rock Siberian Gooſeberry. "Pallas Nov. Act. Acad. Petrop. v. 10. 376." Willd. n. 11.—Prickles ſcattered, ſetaceous. Leaves wedge-ſhaped, bluntly three-lobed. Cluſters erect.—Native of granite mountains in Siberia. Allied to *R. alpinum* and *R. Diacantha*. *Berries* red, ſouriſh, ſcarcely ſo big as our red currant. *Pallas*.

22. R. *reclinatum*. Procumbent Gooſeberry. Linn. Sp. Pl. 291. Willd. n. 12. Ait. n. 10.—Prickles ſolitary or three together. Branches reclining. Stalks ſingle-flowered, with a three-leaved bractea. Germen hairy.—Native of Germany and Switzerland. Said to have been long known in our gardens. It much reſembles the following.

23. R. *Groſſularia*. Rough Gooſeberry. Linn. Sp. Pl. 291. Willd. n. 13. Ait. n. 11. Fl. Brit. n. 6. Engl. Bot. t. 1292. (R. Uva criſpa; Fl. Dan. t. 546.)—Prickles ſolitary or three together. Branches ſpreading. Footſtalks hairy. Stalks ſingle-flowered, with a two-leaved bractea. Fruit hairy.—Common throughout Europe, but ſo generally cultivated, that we can hardly ſay when we meet with it truly wild. The *ſhrub* is buſhy, of humble growth, armed, as every body knows, with ſmooth awl-ſhaped prickles, either ſolitary or ternate, in the place of *ſtipulas*. *Leaves* bluntly three-lobed and cut, ſlightly downy. *Flowers* drooping, ſolitary, green, on downy ſtalks, with two ſeparate *bracteas*. *Calyx* cup-ſhaped. *Germen* and *fruit* rough with prominent briſtly hairs. The *berries* are either green, yellow, or red.

24. R. *Uva criſpa*. Smooth Gooſeberry. Linn. Sp. Pl. 292. Willd. n. 14. Ait. n. 12. Fl. Brit. n. 7. Engl. Bot. t. 2057. Schmidel Ic. 5. t. 1. (Uva criſpa; Fuchſ. Hiſt. 187. Ger. Em. 1324.)—Prickles uſually three together. Branches ſpreading. Footſtalks hairy. Stalks ſingle-flowered. Bracteas united into a tube. Fruit ſmooth.—Native of Europe, and as commonly cultivated as the laſt, of which we believe it a mere variety. The number and connection of the *bracteas* are certainly variable.

25. R. *aciculare*. Needle Siberian Gooſeberry.—Prickles ſcattered, ſetaceous; thoſe under the buds five together, combined. Leaves bluntly five-lobed and cut. Stalks ſingle-flowered. Bracteas united. Fruit ſmooth.—Gathered by Laxmann in Siberia. We find two ſpecimens in the Linnæan herbarium of this, which ſeems a very diſtinct ſpecies, hitherto neglected by every author. The habit is like the three laſt, but the *branches* are copiouſly armed all over with fine, ſtraight, prominent, needle-like, brown *prickles*, beſides the larger ones, five together, and combined by a broad baſe, which ſtand, like thoſe of common Gooſeberries, under the buds. *Flowers* ſolitary, drooping, on longiſh ſimple ſtalks, with two or three *bracteas*, uſually combined, about the middle. *Calyx* bell-ſhaped, ſmooth, red. *Petals* white, obovate, one-third the length of the limb. *Germen* ſmooth.

26. R. *ferox*. Strong-thorned Californian Gooſeberry.—Prickles ſcattered, ſetaceous, very ſlender; thoſe under the buds three together, combined, awl-ſhaped. Leaves five-lobed, rugoſe, downy beneath. Stalks ſingle-flowered. Segments of the calyx lanceolate, twice the length of its tube. Germen and fruit prickly.—Gathered by Mr. Menzies, near Port Trinidad, in California. A very fine remarkable ſpecies, whoſe *branches* are thickly covered with tawny, ſetaceous, prominent prickles, about a quarter of an inch in length, and armed under each bud, with three very ſtrong and pungent awl-ſhaped ones, an inch long, having ſometimes leſſer reflexed prickles at their baſe. The *leaves* are not unlike our common Gooſeberries, but more rugoſe; and denſely downy at the back. *Flower-ſtalks* ſolitary, ſimple, longer than the leaves. *Bracteas* ſcattered. *Flowers* drooping, large and handſome. *Calyx* three quarters of an inch long, funnel-ſhaped, downy and briſtly; as far as we can judge from the dried ſpecimens it ſeems of a fine crimſon; its ſegments lanceolate, ribbed, erect, full twice as long as the tube. *Petals* half the length of theſe ſegments, erect, pale, obtuſe. *Stamens* the length of the calyx. *Anthers* large, oblong-heart-ſhaped, pointed. *Germen* covered with prominent, glandular briſtles, which harden, as the *fruit* advances, into ſtiff, ſharp ſpines, ſo that whatever its flavour may be, it ſeems perfectly inacceſſible, in the common way of eating gooſeberries.

27. R. *rotundifolium*. Round-leaved Carolina Gooſeberry. Michaux Boreal-Amer. v. 1. 110. Purſh n. 11.—"Prickles ſolitary under the buds. Leaves nearly orbicular, ſlightly downy; lobes roundiſh, obtuſe. Stalks ſingle-flowered. Limb of the calyx tubular. Fruit ſmooth." Native of the high mountains of Carolina. *Michaux*.

28. R. *hirtellum*. Small-leaved Canada Gooſeberry. Michaux Boreal-Amer. v. 1. 111. Purſh n. 12.—Prickles ſolitary under the buds, ſmall. Branches ſomewhat hiſpid. Leaves three-cleft half way down, ſlightly notched. Stalks ſingle-flowered. Fruit ſmooth.—Found among rocks, on the Allegany mountains; from Canada to Virginia, flowering in May and June. *Purſh*. *Leaves* ſmall. *Berries* red.

29. R. *gracile*. Slender-ſtalked Blue Gooſeberry. Michaux Boreal-Amer. v. 1. 111. Purſh n. 13.—Prickles ſolitary under the buds, very ſhort. Leaves acutely lobed and cut, downy on both ſides. Footſtalks ſlender. Flower-ſtalks capillary, erect, moſtly two-flowered. Calyx bell-ſhaped. Fruit ſmooth.—On rocks, and in mountain meadows, from New York to Carolina, flowering from April to June. *Calyx* ſmooth. *Berries* purple or blue, of an excellent taſte. *Purſh*.

30. R. *ſtamineum*. Scarlet-flowered Californian Gooſeberry.—Branches finely hiſpid. Prickles ſeveral under each bud, unequal. Leaves rounded, ſlightly three-lobed, ſmooth. Stalks two-flowered. Calyx hemiſpherical; limb in very long parallel ſegments. Petals equal to the limb. Stamens thrice as long.—Gathered by Mr. Menzies in California. *Branches* brown, clothed with copious, extremely fine, prominent, capillary briſtles. *Prickle* under each bud rigid and ſharp, about one-third of an inch long, with ſeveral ſmaller deflexed ones at the baſe. *Leaves* not an inch long, quite ſmooth, veiny; paler beneath; orbicular and entire, except three very ſlight, ſcarcely notched, obtuſe lobes, at the extremity. *Footſtalks* ſhort, ſmooth. *Flower-ſtalks* longer than the leaves, hiſpid, glandular, two-flowered, with a ſingle roundiſh *bractea*. *Flowers* ſcarlet. *Calyx* with a very ſhort hemiſpherical tube, hiſpid like the *germen*; its limb five times as long, in five oblong, parallel, ſmooth ſegments. *Petals* of the ſame length, but rather paler and more obtuſe. *Stamens* capillary, ſtraight, parallel, projecting (four of them at leaſt) with the *ſtyle*, full an inch out of the flower; the fifth is perhaps abortive. We know nothing of the *fruit* of this beautiful ſpecies, whoſe *flowers* have the aſpect of a *Fuchſia*.

31. R. *triflorum*. Three-flowered Mountain Gooſeberry Willd. Hort. Berol. v. 1. 61. t. 61. Purſh n. 14.—Prickles ſolitary under each bud. Leaves ſmooth, three or five-lobed, notched. Stalks about three-flowered. Petals ſpatulate, undulated. Style prominent, hairy, divided.

Fruit

Fruit smooth.—On the Blue mountains; from Pennsylvania to Virginia, flowering in May and June. *Pursh.* The *partial flower-stalks* are very long. *Bracteas* very short. *Flowers* yellowish-green, with white *petals*. *Berries* pale red, small.

32. R. *oxyacanthoides.* Hawthorn-leaved Gooseberry. Linn. Sp. Pl. 291. Willd. n. 15. Ait. n. 13. Pursh n. 15. (Grossularia oxyacanthæ foliis amplioribus, e sinu Hudsonio; Dill. Elth. 166. t. 139.)—Branches clothed with bristly prickles; those under the buds larger, mostly solitary. Leaves smooth, three-lobed, notched. Stalks one or two-flowered, shorter than the footstalks. Fruit smooth.—Native of rocky places at Hudson's-Bay, Canada, New York, &c. flowering in April and May. It is said to have been cultivated in England in 1705, and was certainly in the Eltham garden near thirty years after. This resembles the common gooseberry in habit, but the *branches* are covered with innumerable, fine, bristly, not very rigid prickles, besides the larger ones, proper to this section of the genus, which are mostly solitary under each bud. *Leaves* larger, more deeply cut than in our gooseberries, smooth. *Flowers* drooping, one or two on each stalk. *Fruit* globose, the size of a black currant, purple, or almost black, with a cærulean bloom on the surface; slightly acid.

33. R. *lacustris.* Swamp Cluster Gooseberry. "Pers. Syn. v. 1. 252." Pursh n. 16. (R. oxyacanthoides; Michaux Boreal-Amer. v. 1. 111.)—Branches clothed with bristly prickles; those under the buds numerous, aggregate, pungent.—Leaves deeply lobed, doubly notched. Clusters downy, drooping, many-flowered. Fruit hispid.—Found in swamps, on the mountains, from Canada to Virginia, flowering from April to June. *Pursh.* Many persons have confounded this with the last, and we are not sure that the two are distinguished by our leading gardeners. We received specimens of the present from the Edinburgh garden, so long ago as 1782, with the name of *R. oxyacanthoides.* Another, in the herbarium of the younger Linnæus, is marked *armatum*; an excellent name, given, we believe, by sir J. Banks or Dr. Solander, who could not overlook the characters which so clearly distinguish this from the true *oxyacanthoides.* These are not only the deeply divided vine-like *leaves*, but the numerous, combined, ascending *prickles*, almost palmate at their base, which stand under each leaf or bud; and also the long hairy glandular clusters of *flowers*, with a prickly *germen* and *fruit.* The *branches* are beset with abundance of rigid prickly bristles, rather stronger than those of *oxyacanthoides.* The *flowers* are of a dull, tawny, yellowish-green. "*Berries* amber-coloured, or brown." *Pursh.*

34. R. *cynosbati.* Thorny-fruited Cluster Gooseberry. Linn. Sp. Pl. 292. Willd. n. 16. Ait. n. 14. Pursh n. 17. Jacq. Hort. Vind. v. 2. t. 123.—Branches smooth. Prickles one or two under each bud, simple. Leaves five-lobed, downy beneath. Clusters drooping, of few flowers. Fruit armed with strong thorns.—On the sides of hills and rocks, in the Allegany mountains, and in Canada, flowering from April to June. *Flowers* green. *Berries* dark brown, and covered with thorns. *Pursh.* Miller cultivated this species at Chelsea, where we believe it still remains. The *leaves* are downy on both sides, but especially beneath. *Prickles* mostly solitary, variable in size; those on the large globular fruit are peculiarly strong.

We have thus more than doubled Willdenow's catalogue of species, in this genus. Some of the newly discovered ones, from North America, are likely to prove great acquisitions to our kitchen gardens, provided they bear fruit in this climate; of which, till the experiment is fairly made, there must always be some uncertainty.

Ribes, in *Gardening*, contains plants of the hardy, deciduous, shrubby kind, of which the species cultivated are; the common currant (R. rubrum); the common black currant (R. nigrum); the rough-fruited gooseberry (R. grossularia); the smooth-fruited gooseberry (R. uva crispa); the procumbent gooseberry (R. reclinatum); the hawthorn-leaved currant (R. oxyacanthoides); and the prickly-fruited currant (R. cynosbati).

It is observed by Martyn, that the first sort is very apt to be infested with the aphis ribes, in which case the green leaves become red, pitted, and puckered. It has been long cultivated in the garden, and greatly improved. There are several varieties; as the common sort, with small red fruit; with white fruit; with pale fruit, commonly called the Champaign currant, differing only in being a pale red or flesh-colour. But since the white and red Dutch currants have been introduced and become common, the old sorts have been almost banished, and are now rarely to be found. And Mr. Forsyth mentions the fine new white Dutch, long-branched red, striped-leaved red-white currant, and large pale and red Dutch.

There are also the sweet currant, the small-fruited currant, and a variety with blotched leaves, which is kept in some plantations; but as the variegation is apt to go off when the plant is vigorous, it scarcely deserves a place in them.

Of the second there is a sort often termed the American black currant. The berries have a very peculiar flavour, which many persons dislike; but are commonly eaten in puddings in some parts, and make a tart little inferior to the cranberry. The juice of which is also frequently boiled down to an extract, with the addition of a small proportion of sugar; in this state it is called rob, and used in sore throats and other diseases.

Currants in general are by some supposed the most useful of all the small fruits, as serving either for table or culinary uses, as well as for wine, and continuing long in succession with due management. The black sort is seldom sent to table as a fruit for that purpose. But it is a sort which may be infused in spirit of any kind, in which way they make a good liquor.

The third, or rough-fruited, sort is a low branching shrub, which has the berries pendulous and hairy. And it is observed by the editor of Miller's Dictionary, that if the bracteas do not distinguish this from the following, the roughness or smoothness of the berries will hardly do it, as Mr. Robson has found that seeds from the same plant will produce both rough and smooth fruit. He cannot regard them as different species.

The fourth, or smooth-fruited, sort has the berry pulpy, subdiaphanous, pale, amber-coloured, red or purple, smooth, and the pulp watery and sweet. And Martyn remarks, that the gooseberry seems to have been formerly a fruit in very little esteem, but has received so much improvement, that it is now become valuable, not only for tarts, pies, and sauces, both fresh and preserved in bottles, but as an early desert fruit, and preserved in sugar for winter use to answer the same purpose.

It may be noticed, that the most important varieties of the red kind are, the hairy, smooth, deep red, damson or dark red, blueish, red raspberry, early black-red, Champaigne, &c. Of the green kind; the hairy, smooth, Gascoigne, raspberry, &c. Of the yellow kind; the great oval, great amber, hairy amber, early amber, large tawny or great mogul, &c. And of the white kind; the common, white-veined, and large crystal. But besides these, there is the rumbullion, large ironmonger, smooth ironmonger, hairy globe, and innumerable

innumerable others, fome of very large fize, annually raifed from feed, weighing from ten to fifteen pennyweights; however, there are fmall ones better tafted. There are faid to be upwards of two hundred, at leaft in name.

And Mr. Forfyth has given the following lift from the catalogue of Meffrs. Kirk, nurferymen, at Brompton, near London.

The fupreme red, perfection red, high fheriff of Lancafhire, royal George, unicorn, rough amber, white walnut, Ackerley's double bearer, royal oak, Mifs Bold's, fparkler, Ackerley's Rodney, Hampfon's Cæfar, Monk's Charles Fox, St. John, pigeon egg, Worthinglowe's conqueror, golden eagle, Royder's triumph, Williamfon's yellow hornet, Swingham, Jackfon's golden orange, Goliah champion, hairy amber, Nixon's golden eagle, Worthington's white lily, Laylord's feedling, Nixon's white heart, Riding's old England, Bakeley's Swingham, Tillotfon's St. John.

The fame writer alfo adds another lift of the largeft new forts which were fhewn in Lancafhire, in the fummer of 1800, with their colour and weight, as communicated by Meffrs. M'Niven, nurferymen, Manchefter.

Red Sorts of Goofeberries.

	dwt.	gr.
Alcock's king	16	15
——— duke of York	16	1
Boardman's royal oak	15	4
Brundrit's atlas	17	1
Chapman's peerlefs	15	21
Dien's glory of England	16	2
Fairlow's lord Hood	14	5
Fifher's conqueror	17	19
Fox's jolly fmoker	15	8
Hall's porcupine	13	20
Lomax's victory	16	11
Mafon's Hercules	13	16
Taylor's volunteer	16	17
Worthington's glory of Eccles	14	10

Yellow Sorts of Goofeberries.

Brundrit's fir Sidney	15	22
Davenport's defender	15	12
———— creeping Ceres	16	0
Hamnet's Kilton	15	9
Hill's golden gourd	13	17
—— royal fovereign	17	10
Leigh's prince of Orange	15	0
Parkinfon's goldfinder	14	5
Robinfon's crudus	13	17
Withington's fceptre	13	7

Green Sorts of Goofeberries.

Blakeley's chiffel	17	0
Boardman's green oak	14	1
Brundrit's tickle Toby	14	6
Chadwick's hero	13	10
Dean's lord Hood	15	10
Mill's Langley-green	16	2
Read's fatisfaction	15	4
Robinfon's ftump	13	21
Smith's green mafk	13	20
Yates's duke of Bedford	14	11

White Sorts of Goofeberries.

	dwt.	gr.
Adam's fnow-ball	12	22
Atkinfon's white hall	14	8
Chapman's Highland white	12	0
Davenport's lady	15	0
Gibfon's Apollo	14	20
Holding's white muflin	13	0
Kenyon's white noble	13	6
Moor's white bear	14	12
Woodward's white fmith	17	2

It is obferved, that in favourable feafons, many of the above forts have been known to weigh more by feveral pennyweights.

In all the fouth-eaftern parts of Lancafhire there are a great number of little focieties held by the labouring and manufacturing workmen, and the gardeners; where thefe forts of fruits are annually exhibited, under many different arbitrary names and defignations, as *Goliahs, golden drops*, &c. and their merits and capabilities of improvement finally fettled and decided upon.

The fifth fort has the fruit when ripe commonly dark purple, but fometimes red or even yellow.

In the fixth kind the fruit is fmall and round, the fize and fhape of a currant; the colour at firft purple, but when ripe, dark purple with a blue bloom; it is fmooth, on a fhort flender ftalk.

Method of Culture in the Currant Kind.—In general thefe may be raifed with great facility from layers, feed, cuttings, and in other ways. In the firft of thefe modes, when the trees are cut low, Mr. Forfyth advifes the laying down fome of the branches either in the winter or fpring feafons, when the ground in the quarters or rows is dug, which fhould always be done annually. In the autumn following, thefe layers will have made fine roots; then they may be taken off, and planted out where they are to ftand, and they will moftly bear fine fruit in the following fummer.

But in the fecond method, the cuttings fhould be chofen of the ftrongeft and ftraighteft fhoots, which fhould be cut fix or eight inches in length, and be planted out on an eaft or north border, in the early autumn, at the diftance of a foot from row to row, leaving only a few inches out of the ground. In this way they may be kept perfectly free from weeds. In dry weather, during the fpring, they fhould be often refrefhed with water. Some alfo raife thefe plants from fuckers; but this is a method that fhould be avoided as much as poffible, as they never grow handfome, and are apt to throw out fuckers afterwards.

With refpect to the feed, it fhould be fown on a border where the mould is fine, either in the autumn or early in the fpring; and the young plants, when they appear, be kept free from weeds. When they have attained fufficient growth, they may either be planted out where they are to remain, or be fet out in nurfery-rows. However, Mr. Forfyth obferves, that under the bufhes that have been covered for late fruit, plenty of felf-fown plants may conftantly be found, which he advifes to be planted out by themfelves. And thofe who make currant-wine may, he thinks, fave the feed, after the fruit is fqueezed, and dry it: it may then be fown in the manner directed above, by which, moft probably, fome fine varieties may be obtained. As in many gardens there ftill remains, the fame writer remarks, a fmall fort of red and white currant not worth cultivating, he would advife thofe who have any of them to root them up, and plant in their room the large red and white Dutch, the long-bunched red, and Champaigne large pale red. Thefe kinds of plants may be planted out, it is fuggefted, either in the quarters, or fingle rows round the edges of the quarters, in the gardens or other places. And he would particularly

particularly recommend planting a few against a south or west wall, or paling, which will produce fruit much earlier than in the quarters, &c.: also to plant some between other fruit-trees, on north walls, or palings, for later crops. These may be covered with double nets, to preserve them from birds; tucking in a few fern branches between the two nets, which will prevent the heat of the sun and drying winds from shrivelling the fruit. In the quarters they should be covered with mats, for the same purpose; at the same time permitting all the leaves to remain on the bushes, to shade the fruit, and make it keep the longer in a proper state.

In what respects the pruning of the bushes, the work may, according to the above author, be begun in the month of November, and continued till March, as it suits the planter's convenience. And they should never be left too thick of wood; but a great deal depends on the management of them in summer, to have strong and fine wood for the following season. If they have been neglected for some years, and suffered to run up to long naked wood, they must, in his opinion, be cut down near the ground: they will then send forth fine strong shoots. In this case, he would recommend heading down every other tree, and cutting the others partially, by taking out every other branch as near as can be to the ground, unless they are trained up with single stems; in which case, it will be necessary to cut them as near as possible to where the branches begin to break out and form the head. And in the winter pruning, the strongest and finest shoots should be preserved, leaving them from nine to eighteen inches long, according to their strength, and from eight to ten inches apart, and as regular as possible from top to bottom of the tree; taking care to cut out all the dead and weak shoots. And particular attention should be paid in summer, keeping the middle of the bush open to admit the sun and air; preserving the finest and strongest shoots that are nearest the stem. Some, he remarks, are fond of training them up with single stems, to a considerable height, to form fine round heads, which are very ornamental, if not suffered to run up too high; as, in that case, they are liable to be broken by the wind, if not well supported by stakes. Care must be taken not to let the shoots run to more than six inches long, because such short shoots will not be so liable to be damaged by the wind as long and weak ones are, especially when loaded with fruit. He prefers dwarfs from three to four feet high.

Further it is added, that the same manner of pruning, &c. will do for black currants; but as they grow stronger than the red or white, the shoots should be left thinner, and laid in longer, which will make them produce larger and finer fruit. And those against walls and palings should have the shoots laid in thinner than those in the quarters, and trained as horizontally as possible; shortening them, in the winter pruning, to a foot or eighteen inches, according to the strength of the shoots.

As this sort of fruit is very liable to be devoured by earwigs, which take shelter under their leaves and branches, bundles of bean-stalks should, he suggests, be hung up some time before the bushes are covered with mats or nets. If proper attention be not paid to this, the fruit will generally suffer very much from these insects. After the bushes are covered, take the mats off once in three or four days, and kill the earwigs that have got in the bean-stalks, which it will be necessary still to keep hung up. As there is a sweetness in the inside of bean-stalks, which attracts the earwigs, they very readily take shelter in them from rain. By proper attention to these directions, these destructive insects may be kept under, and the greater part of the fruit be preserved. It is also necessary to carefully stock up all suckers at the roots of the trees, and keep them as clean as possible; otherwise they will prevent the sun and air from penetrating to the roots, and greatly weaken and injure the trees.

These plants are very liable to be infested with aphides, and other insects, from which they should be freed as soon as possible, by proper picking, washing, and liming.

Culture in the Gooseberry Kind.—All these are capable of being raised by cuttings and layers, as well as seeds for new varieties. They are likewise sometimes increased by suckers; but this last is not an adviseable method, as the plants raised in this way are more apt to throw out suckers than those from cuttings or seed. The cuttings should be made from the strongest and cleanest shoots, and have the length of seven or eight inches, being planted out in the early autumn, in a border which has an eastern or northern aspect, at the distance of about a foot from row to row, and having only about three or four inches of each cutting above the ground; as by this means they may be kept clean by hoeing. They require to be frequently watered in the spring season, when the weather is dry.

Also the layers may be laid down any time in the autumn or spring season, in the common way, when they readily strike root; and in the following autumn, may be taken off, and planted out where they are to remain, or in nursery-rows, to get strength to be finally planted out.

And the seed obtained from the ripened berries should be sown in the autumn, or very early spring, in a bed of fine light mould. The plants come up readily, and should be kept perfectly clear from weeds; and when they have had one or two years' growth, may be removed into nursery-rows, in the same manner as the currants, to remain till they become fit for being planted out. In this way good new varieties may be procured. Mr. Forsyth remarks, that the gardeners in the vicinity of Manchester have made great additions to the varieties of this fruit; and by mixing up a rich soil to plant them in, carefully watering, shading, and thinning the fruit, have brought the berries to a size much larger than had been before met with in this country; but that those of some of the layers are much thicker in the skin, and not so well flavoured as many of the old sorts.

In most parts of Lancashire, this is indeed a kind of fruit which is uncommonly fine, and of a very large size, in both the red and white kinds; and in many of the southern and south-eastern parts, very great attention, in numerous instances, is bestowed in the cultivation and improvement of it, so as to render it of an unusual magnitude and fine appearance. This is chiefly effected by much more pruning and thinning than that which is generally had recourse to with these sorts of plants, frequent digging about them, and a very liberal use of well rotted stable dung incorporated with the mould which is applied near their roots.

As to the methods of planting out this sort of plants, they are extremely various. According to Mr. Forsyth, the market gardeners in the vicinity of the metropolis set them out in rows from eight to ten feet apart, and six from plant to plant. In cases of this sort, he recommends that they should be pruned in the autumn, as about the beginning of October, when the ground between them may be planted with coleworts, or beans for a spring crop; and by so doing, there will be no occasion to tread over the ground, and hurt the coleworts, in pruning the bushes; as, before the gooseberries begin to shoot, the coleworts will be all cleared off the ground. And after this time, (or before, if you find it convenient,) a good coat of rotten dung should be laid on the ground; then dig it, and plant early potatoes, but not so near as to hurt the gooseberries by their growth. He likewise advises that the roots of gooseberries should be kept clear to admit the sun and air. In small gardens, he would recommend planting them in a quarter by themselves, at the distance of six feet between the rows, and four feet from plant to plant: they may be planted round the edges of the quarters, about three feet from the path; in which case, the ground will be clear for cropping, and a man, by setting one foot on the border, can gather the gooseberries, without injuring the crop that may be on the border. Also that, as they like a rich soil, they should be dunged every year, or at least have a good coat of dung once in two years. They should never be planted under the shade of other trees, as it injures the flavour of the fruit.

And in respect to the pruning of the bushes, it is a practice too common, Mr. Forsyth thinks, to let them branch out with great naked stems, suffering them to remain in that state for years. When that is the case, they should be cut down near to the ground in the winter pruning, as it will make them throw out fine strong healthy shoots, which will bear fruit the second year; and as gooseberry bushes, in general, bear their fruit on the second year's wood, great care should be taken in summer to keep the middle of the bush clear, to admit a free air, leaving the finest and strongest shoots from six to ten inches distant from each other. This will, he conceives, help to ripen and harden the wood. It is a practice with some to shorten the shoots in the autumn or winter pruning, which should be always near to a wood-bud; which may be known by its being single, whereas fruit-buds are in clusters. The shoots may, he thinks, be shortened to eight or ten inches, according to their strength. Some leave them at full length for three or four years, thinning out those that are superfluous. He advises always to leave a proper number to be trained up between the full length shoots, to succeed them when they are tired of bearing; and then to cut the old ones down to the young ones that are to succeed them. By these means, the bushes may always be kept in a constant state of bearing. Those branches which were cut the first year will, in the second, throw out short dugs, or spurs, which produce the fruit; and these should by no means be cut off, unless the branches are in a sickly state, and require to be cut close down, when the bushes are overloaded with fruit. It will then, in his opinion, be necessary to cut out a good deal of the old wood, to assist nature to recover herself, after producing so great a quantity of fruit.

He likewise advises that great attention be paid to the cultivation of the early and late sorts. In some old gardens, in particular, there are, he observes, very valuable sorts that have been of late too much neglected; he would therefore recommend to those who live in the neighbourhood of such gardens, to observe their time of ripening, and to cultivate those especially which are early and late. And he adds, that it is a practice with some to clip the tops of gooseberries with a pair of garden shears, as they would clip a thorn hedge; this he by no means approves of, as the fruit will not be half the size, nor of so fine a flavour, as when the bushes are kept clear of such wood as is unnecessary.

Farther it is recommended that great care should be taken in spring and summer to stock, or grub up, all the suckers from the roots of the bushes, leaving their stems clear and unencumbered. And as many of the Lancashire sorts are apt to grow horizontally, and the branches frequently trail on the ground, which renders them liable to be broken by high winds, especially when they are loaded with fruit, he would recommend two or three hoops to be put round them, to which the branches may be tied, to support them, and prevent their being broken by the wind, or any other means.

In cases where it is wished to have them late, they should be planted on north walls and palings, between the other trees, when they may be removed as the trees begin to meet. If laid in thin, they will bear very fine and handsome fruit. He would advise to plant the finest late sort; as by this method the table will be supplied much longer than by the common custom of planting in quarters of the garden.

Also immediately after pruning, he always applies the plaster composition to the ends of the shoots and cuttings; and he finds it of great use in preventing the exhalation of the sap, and preserving the cuttings till they take root, and become established.

It may be observed that these sorts of plants are very much infested with a small green caterpillar, which frequently devour both leaves and fruit: great attention is of course necessary to observe their first appearance on the bushes; as, if not destroyed early, they increase so fast, that they soon devour all the leaves, and the fruit is good for nothing. It is noticed, that they first appear generally on the edges and under-sides of the leaves. In order to destroy them, he advises to take some sifted quick-lime and lay it under the bushes; but not at first to let any of it touch the branches or leaves; then shake each bush suddenly and smartly, and the caterpillars will fall into the lime; if the bush be not shaken suddenly, the caterpillars, on being a little disturbed, will take so firm a hold as not easily to be shaken off. After this is done, some of the lime should be sifted over the bushes; this will drive down those which have lodged on the branches. The caterpillars ought, in his opinion, to be swept up next day, and the bushes well washed with clear lime-water mixed with urine; this will destroy any caterpillars that may still remain, and also the aphides, if there are any on the bushes at the time.

Forcing.—It may be stated, that sometimes trees of the gooseberry and currant kinds are forced for early fruiting, by means of artificial heat in fruit-forcing-houses, hot-walls, or forcing-frames, &c. For this purpose, some young trees should be planted in largish pots, one plant in each, and being advanced to a full state of growth for plentiful bearing, should be introduced in any of the above forcing departments that are in work by fire, or hot-bed heat, or both, in forwarding any principal sorts of fruit-trees, plants, or flowers, at the proper season, as about January or February, in which the same culture, in regard to the degree of heat, and other requisites, necessary for the other trees, &c. is suitable for these. Water should be given occasionally to the earth in the pots, and sometimes after the fruit is set, throwing it lightly over the branches on a warm sunny day; and they will thus produce ripe fruit in April or the following month.

However, the forcing of this sort of fruit is now seldom much attended to, in consequence of other finer sorts being so common.

Ribes, in the *Materia Medica.* The *ribes rubrum* or *rutilum, i. e.* the red currant, and the *ribes album*, or white currant, are varieties of the same species, and therefore the fruit of both, considered in both a botanical and medical sense, is perfectly analogous. The red currant is abundantly cultivated in our gardens, from which we are supplied with the fruit; and this, on account of its grateful acidity, is universally acceptable, both in its natural state, and as variously prepared by art with the addition of sugar. The juice is a most agreeable acid in punch. If equal weights of picked currants and pure sugar are put over the fire, the liquor

liquor that separates spontaneously is a most agreeable jelly. The juice of red currants, with sugar, is a common beverage at Paris, where it is generally preferred to orgeat or lemonade. Dr. Cullen classes this fruit with the alimentary plants, and being generally and exclusively considered as such, it was not received in the British catalogues of the Materia Medica till that published in a late collection of the London Pharmacopeia: but it is omitted in the last edition. The medicinal qualities of red currants appear to be similar to those of the other subacrid fruits, which are esteemed to be moderately refrigerant, antiseptic, attenuant, and aperient. Hoffman and Boerhaave had great confidence in the efficacy of these fruits in obstinate visceral obstructions. They may be used with considerable advantage to allay thirst in most febrile complaints; to lessen an increased secretion of bile; and to correct a putrid and scorbutic state of the fluids, especially in sanguine temperaments; but in constitutions of a contrary kind they are apt to occasion flatulency and indigestion,

The *ribes nigrum*, or black currant, has berries larger than those of the red; and besides possessing the properties in common with the "fructus acido-dulces," they are also said to be peculiarly useful in sore throats; and to manifest a diuretic power in a very considerable degree. In cases of inflammatory angina, they may be advantageously employed to answer the same intentions as gargles, and from their efficacy in this respect they have acquired the name of "Squinancy berries," but the proofs of their diuretic powers seem to want confirmation. With respect to their former application and utility we may observe, that the black currant jelly in common domestic use is rendered less efficacious by having too much sugar in its preparation. The fruit both of this, and of the red currant, afford a pleasant wine; and that made of the former is mentioned by Haller, "ex eo optimum vinum fieri non deterius vinis verioribus viteis, quando annuum est." The leaves of the black currant are extremely fragrant, and have been recommended for their medicinal virtue, which Bergius states to be "mundificans, pellens, diuretica." An infusion of these leaves is said to have the taste of green tea, and when prepared from the young leaves, is to some people very agreeable. The official preparations of the black currant berries in the late London Pharmacopeia (but omitted in the last edition) were the "Syrupus ribis nigri," and the "Succus ribis nigri inspissatus." Woodv. Med. Bot. See CURRANTS.

RIBIERS, in *Geography*, a town of France, in the department of the Higher Alps, and chief place of a canton, in the district of Gap; four miles N.W. of Sisteron. The place contains 1301, and the canton 3939 inhabitants, on a territory of 180 kiliometres, in nine communes.

RIBNA, a town of Russia, in the government of Kolivan, on a river of the same name; 112 miles S.E. of Krasnoiarsk.

RIBNIK, a town of Silesia, in the principality of Ratibor; 13 miles E. of Ratibor. N. lat. 50° 3′. E. long. 18° 30′.—Also, a town of European Turkey, in Walachia, on the Alaut; 44 miles S. of Hermanstadt. N. lat. 45° 19′. E. long. 24° 8′.—Also, a town of European Turkey, in Walachia, on the Ribnik, otherwise Rymnick, as it is called by the Russians; the see of a Greek bishop. From a severe battle fought here in 1789, between the Austrians and Russians against the Turks, Suwarrow, who commanded the Russians, and defeated them, was created by the emperor Leopold, a count of the empire, invested with the order of St. Andrew, and honoured with the title of Rymniski by the empress Catharine; 100 miles S. of Jassi. N. lat. 45° 36′. E. long. 27° 4′.—Also, a river of Walachia, which runs into the Siret, near Dubravitza, on the borders of Moldavia.

RIBNITZ, a town of the duchy of Mecklenburg, situated on a large lake, near the mouth of the Reckenitz; 12 miles N.N.E. of Rostock. N. lat. 54° 17′. E. long. 12° 35′.

RIBNITZY, a town of Poland, in the palatinate of Braclaw; 64 miles S. of Braclaw.

RIBNO, a town of Prussia, in the province of Oberland; 15 miles N.N.E. of Ortelsburg.

RIBNOI, a town of Russia, in the government of Jaroslavl; 40 miles W.N.W of Jaroslavl. N. lat. 57° 45′. E. long. 39° 14′.

RIBS, in *Anatomy*, the bones forming the sides of the chest, attached to the spine behind, and terminating in front in portions of cartilage, some of which are fixed to the sternum, the others not. The former are called *true*, the latter *false* ribs. They are described in the article LUNG of this Cyclopædia.

RIBS, *Fractures of the*, in *Surgery*. See FRACTURE.

RIBS *of Fish*. There is a very great variety in the shape and other peculiarities of the ribs of fish. They are in some smooth, and flattened sideways, as in the cyprini; in others they are rounded, as in the cotti and gadi. In the cyprini the several species have from thirteen to nineteen ribs on a side, and the vertebræ are from thirty-seven to forty-nine in number, differing greatly in number in the several species of the same genus. The ribs in many fish adhere to the vertebræ, by means of cartilages, and seem only continued parts of them; but in others they are free and loose, and do not so much as touch the vertebræ. We find instances of the first sort of structure in the cyprini, salmons, &c. and of the other in the perch, the gadi, and the pleuronectæ. In the spinose fishes, the last vertebra always is terminated by a pair of broad apophyses placed perpendicularly, and touching one another, and by means of cartilages these are fixed to the bones of the tail. Artedi Ichthyolog. See *Anatomy of* FISH.

RIBS, a figurative expression for the timbers or frames of a ship, arising from the comparison of it with the human body, as the keel with its keelson, to the back-bone, and the timbers to the ribs; for the former unite and support the whole fabric, since the stem and stern-frame, which are raised on the ends of the keel, may be said to be a continuation of it, and serve to connect and inclose the extremities by the hawse-pieces forward, and the transoms abaft, as the keel forms and unites the bottom by the floor-timbers. The idea, if carried further, may in a manner represent the muscular parts of the human fabric; for the wales, clamps, and thickstuff, at the different heads of the timbers, are as so many muscles or strong ligaments to connect the ribs together, while the planking of the bottom and top-sides, which is thinner, may be compared to the skin or covering of the whole; and hence planking is often termed, *skimming* the ship.

RIBS *of a Parrel*, short flat pieces of wood hollowed on the back, having a hole near each end, through which the parrel rope is reeved. See PARREL.

RIBS, among *Jewellers*, the lines or ridges which distinguish the several parts of the work, both of brilliants and roses.

RIB-WORT, in *Botany*. See PLANTAIN.

RICA, among the Romans, a veil with which the ladies covered their heads.

RICÆ, ῥικαι, surgical bandages for the head.

RICARD, DOMINIC, in *Biography*, was born at Toulouse in 1741, and entered into the congregation of the Christian

Chriſtian doctrine, and became a diſtinguiſhed profeſſor in it. He quitted the ſociety after ſome years, and took up his reſidence at Paris, where he employed himſelf in inſtructing youth, and in literary purſuits. He was celebrated for his deep knowledge in the Greek language, and engaged in the great taſk of tranſlating the whole works of Plutarch. Between the years 1783 and 1795 he publiſhed his verſion of that philoſopher's moral works, in 17 vols. 12mo.: of the Lives he only publiſhed 4 vols. 12mo. He publiſhed likewiſe a poem, entitled "La Sphere," in eight cantos, 8vo. 1796, which contains a ſyſtem of aſtronomy and geography, enriched with notes, and notices of Greek, Latin, and French poems, treating on aſtronomical ſubjects. Ricard died in 1803. He was diſtinguiſhed by modeſt merit, and the practice of all the ſocial virtues.

RICAUT, *Sir* Paul, was the youngeſt ſon of ſir Peter Ricaut, knight, ſuppoſed to be a merchant in London. The time and place of the birth and education of the ſubject of this article are not known, but he appears to have travelled during ſeveral years in Europe, Aſia, and Africa. In the year 1661 he went out as ſecretary to the earl of Winchelſea, the ambaſſador extraordinary to the Ottoman Porte. Here he remained eight years in that poſt. In 1663 he publiſhed the treaty or capitulation concluded between Charles II. and the Turkiſh ſultan, in which was the favourable article, that Engliſh ſhips ſhould be exempted from ſearch for foreign goods. When his connection with the Porte was expired, he was appointed Engliſh conſul at Smyrna, an office which he held about eleven years, to the entire ſatisfaction of the Turkey company, and with the reſpect and attachment of all the Europeans in that city. Upon his return, he employed himſelf in literary occupations till the year 1685, when he accompanied the earl of Clarendon, lord-lieutenant of Ireland, as his ſecretary for Leinſter and Connaught. He was nominated by James II. one of his privy-council for Ireland, and judge of the admiralty court, and received the honour of knighthood. After the revolution, he was ſent by king William as his reſident to the Hanſe towns, in which poſt he continued ten years. He died in England, in the year 1700, literally worn out with age and long ſervices. Independently of his high character as a diplomatiſt, he was celebrated for his knowledge of the learned languages, and alſo of the modern Greek, the Turkiſh, the Italian, Spaniſh, and French. As an author, he is known by "The preſent State of the Ottoman Empire;" "The preſent State of the Greek and Armenian Churches;" "A Continuation of Knolles' Hiſtory of the Turks." He continued "Platina's Lives of the Popes" to his own time. He tranſlated from the Spaniſh, "The Royal Commentaries of Peru, by Garcilaſſo de la Vega." A paper of this author is inſerted in the Tranſactions of the Royal Society, of which ſociety he was a member. Biog. Brit.

RICCATI, Vincent, a learned Italian Jeſuit, was born at Caſtel-Franco, in the territory of Treviſo, about the year 1707. His genius inclining him chiefly to the ſtudy of the mathematical ſciences, he cultivated them with ſo much ſucceſs, that his ſuperiors ſelected him as a proper perſon to teach them to others. He accordingly was choſen profeſſor in the college at Bologna, which he filled with reputation till the ſuppreſſion of the order in 1773. He died in 1775, leaving behind him ſeveral works that teſtify his high merit as a ſcholar, among which is "A Treatiſe on the Integral Calculus," in 3 vols. 4to. He did not confine himſelf to the abſtract mathematics, but paid much attention to the ſtudy of hydraulics; a branch of ſcience of the utmoſt importance in all the northern Italian ſtates, where the many and rapid rivers expoſe the country to continual inundations. In this line he appears to have rendered conſiderable ſervice to the Venetian territories; ſo much ſo, that in 1774 a gold medal was ſtruck in his honour.

RICCI, Bartholemew, a learned Italian, was born at Lugo, in Romagna, in the year 1490. He ſtudied under Amaſeo in Bologna, and for further improvement viſited Padua and Venice. He paſſed ſome years in the houſe of Giovanni Cornaro, as preceptor to his ſon, who was afterwards a cardinal; and for ſome time kept a ſchool at Ravenna. Through the recommendation of Calcaquini, he was invited, in 1539, to the court of duke Hercules II. of Ferrara, to undertake the education of the princes Alfonſo and Luigi. He there acquired the affection of his pupils, and the eſteem of the learned. He died at the age of 79, in the year 1569. The principal works of Ricci are "Orations," and "Epiſtles," the Latin ſtyle of which has been much applauded, as a happy imitation of that of Cicero. The moſt laborious of his works is entitled "Apparatus Latinæ Locutionis," being a Latin lexicon, in two parts; the firſt containing the verbs, and the ſecond the nouns with which they are joined. It was printed at Venice in 1535. Ricci alſo wrote a comedy in Italian proſe, entitled "Le Balie," which is well ſpoken of; and ſome Italian poems, which have appeared in collections.

Ricci, Matthew, an eminent miſſionary, was born of a good family at Macerata, in 1552. He was ſent to ſtudy the law at Rome, where, at the age of 19, he entered into the ſociety of Jeſuits. He had not completed his theological ſtudies, when he followed to the Eaſt Indies his preceptor, father Valignan. During his abode at Goa, he applied aſſiduouſly to the language of China, to which country he was deſtined. In 1583 he arrived at Caoquin, in the province of Canton, where he ſettled with ſome brethren. To ingratiate himſelf with the Chineſe, he made a map of the world, in which, whilſt he corrected their prejudices with reſpect to the relative dimenſions of their country, he complied with them by altering the meridian, ſo as to place it in the centre. It was not till 1600 that he was able to gain acceſs to the emperor at Peking, employing the pretext of bringing him a preſent of curioſities from Europe. He was well received, and permitted to ſettle in that capital, where his mathematical ſkill rendered him acceptable to the court and men of letters. He purchaſed a houſe there, and built a church; and the progreſs, ſuch as it was, which Chriſtianity made in the metropolis of China, was greatly owing to his exertions. He died there in 1610, leaving curious memoirs on China, of which father Trigault made uſe in his work "De Chriſtiana Expeditione apud Sinas."

Ricci, Michael-Angelo, an Italian cardinal, and able mathematician, in the 17th century, was deſcended from a noble family originally from Bergamo, and born at Rome in the year 1619. In the courſe of his ſtudies, he conceived a powerful inclination for the mathematics, which was confirmed by Torricelli, during the temporary reſidence of that philoſopher at Rome. Under his directions, Ricci's genius was carefully cultivated, and his progreſs reflected great honour both on the tutor and pupil. After Torricelli left Rome, he maintained a regular correſpondence with Ricci, who proved and illuſtrated in a happy manner ſeveral of his new theorems. In the year 1666 Ricci publiſhed a little work, entitled "Exercitatio Geometrica," &c. in which he determined, in a purely geometrical manner, the tangents, and the maxima and minima of curves, chiefly compared with conic ſections of the firſt order. This piece was reprinted by the Royal Society of London, as a treatiſe of the

the greateft utility; and it was warmly applauded by fome of the moft diftinguifhed mathematicians of the age. Having been induced to enter into the church, he relinquifhed his mathematical purfuits, and wholly devoted his attention to the affiduous ftudy of divinity, and the duties of his new profeffion. He filled feveral ecclefiaftical ftations, and, among others, thofe of fecretary to the congregation of indulgences and of relics, and of confultor of the holy office. In the year 1681, pope Innocent XI. raifed him to the purple; an honour which he wifhed to decline, but was compelled to accept by the pontiff's abfolute command. He poffeffed it, however, only for a fhort period, as he died in 1682, at the age of 64. One of his "Differtations" is preferved in cardinal Brancaccio's "Works;" another in Charles Dati's "Epiftola ad Philalethos;" and one of his "Letters" in the firft volume of the collection, entitled "Lettere Memorabili." Gen. Biog.

RICCI, SEBASTIAN, was born at Belluno, near Trevifano, in 1659; and having difcovered an early genius for painting, was conducted by his father to Venice, and placed as a difciple with Fred. Cervelli, a Milanefe artift of good reputation, with whom he ftudied for nine years. He afterwards improved his practice at Bologna, &c. by copying, and obtained the favour and patronage of Rannuccio, the fecond duke of Parma.

By the liberality of that prince, he was honourably maintained at Rome, ftudying the productions of the beft ancient and modern mafters; and there he formed that manner which diftinguifhes his productions, and exhibits a ready and fplendid invention, a free and mafterly handling of the pencil, with a full luxuriance of colour, which for a while raifed him into the higheft efteem, and confequently immenfe employment.

Having quitted Rome, he returned to Venice, where he was fo eagerly folicited for his paintings, that he had fcarcely time to take even neceffary refrefhment. His fame fpread through Europe, and he received an invitation to the court of the emperor at Vienna, to adorn the magnificent palace of Schoenbrun. From thence he was encouraged to vifit London, where he was immediately and inceffantly employed by the court, the nobility, and perfons of fortune. Here he remained ten years, with his nephew and co-adjutor, Marco Ricci, who painted fkilfully fcenes of architecture and landfcape. He acquired great wealth by the immenfe occupation he found; and then returned to Venice, where he paffed the remainder of his days till his 75th year, when he fhared the common fate of mortals.

Ricci was one of the few, comparatively fpeaking, who enjoy during their lives the utmoft extent of their fame. In his hiftory, that portion of renown which attaches to him died with him, or nearly fo. In fact, he was a machinift, one who, being converfant in the rules of art, and fkilful in the application of the means, dazzled where he could not inftruct, and deluded by ingenuity without judgment, and art without expreffion. His works are to be found in many of our great houfes, as well as thofe of his nephew. At Chelfea and at the Britifh Mufeum there are confiderable pictures of his painting, but they do not rife in efteem by continued obfervation; and yet, unfortunately, they had fufficient influence in their day to lead the artifts aftray from the contemplation and imitation of the works of Raphael, and the greater mafters of the Italian fchool.

RICCIA, in *Botany*, a cryptogamic genus of plants, named by Micheli after a Florentine Senator of his time, Peter Francis Riccio, Prefident of the Order of St. Stephen, Auditor of the Academy of Pifa, &c.; who feems to have been rather a patron, than a practical cultivator, of botanic fcience.—Mich. Gen. 106. t. 57. Linn. Gen. 566. Schreb. 766. Mart. Mill. Dict. v. 4. Schmidel. Ic. t. 44, 45. Hedw. Theor. 116. t. 29. Juff. 8. Lamarck Illuftr. t. 877.—Clafs and order, *Cryptogamia Hepaticæ*. Nat. Ord. *Algæ*, Linn. *Hepaticæ*, Juff.

Eff. Ch. Male, fcattered warts?

Female, Germen globofe, funk, with the *ftyle*, in the frond. *Capfule* expofed, globofe, crowned with the ftyle, of one cell. *Seeds* numerous, elliptical.

The genuine fpecies of this genus grow on the earth, flourifhing in the damp cold feafon of the year, and difappearing in hot dry weather. Hence they are fuppofed to be annual. Such are three of the Britifh fpecies; *R. glauca.* Linn. Sp. Pl. 1605. Engl. Bot. t. 2546; *R. minima.* Linn. Sp. Pl. 1605. Mich. Gen. t. 57. f. 6; and *R. cryftallina.* Linn. Sp. Pl. 1605. Dickf. H. Sicc. fafc. 15. 20. Mich. Gen. t. 57. f. 3.—Thefe form fmall glaucous patches on the ground, in fandy or moift places. The other two Britifh fpecies float in frefh water pools; *R. fluitans.* Linn. Sp. Pl. 1606. Engl. Bot. t. 251, whofe frond is forked and linear; and *R. natans.* Linn. Syft. Nat. ed. 12. v. 2. 708. Engl. Bot. t. 252, whofe inverfely heart-fhaped form, with copious linear ferrated fcales, like radicles, beneath, has a very peculiar appearance. Nothing is known refpecting the fructification of thefe two laft. *R. fruticulofa* of Dickfon is a *Jungermannia*, Engl. Bot. t. 2514, probably a variety of the *furcata*.

RICCIA, *La*, in *Geography*, a town of Italy, in the Campagna di Roma; 1 mile S.E. of Albano.

RICCIA, a town of Naples, in the Molife; 15 miles E. of Boiano.

RICCIARELLI, in *Biography*. See VOLTERRA, DANIEL DA.

RICCIOLI, JOHN-BAPTIST, a learned Italian Jefuit, and an eminent philofopher, aftronomer, and mathematician, in the 17th century, was born at Ferrara, a city belonging to the papal jurifdiction, in the year 1598. At the age of 16 he commenced his noviciate in the fociety of Jefus. When he had completed his courfe of academical ftudies, he was felected to teach fucceffively rhetoric, polite learning, philofophy, and fcholaftic divinity, in the Jefuits' colleges at Parma and Bologna. While he difcharged the duties of thefe appointments with great fuccefs and reputation, he devoted his leifure hours to the ftudy of geography, hydrography, chronology, experimental philofophy, and aftronomy. During the difpute which took place in his time, refpecting the correctnefs of the Gregorian reformation of the calendar, he inlifted himfelf among the advocates for the reform, and publifhed fome little pieces on the fubject at Bologna, under the name of Michael Manfredi. His principal attention, however, was occupied on productions of greater magnitude. He projected a grand work, which was to be divided into three parts, containing a complete fyftem of philofophical, mathematical, and aftronomical knowledge. The firft of thefe parts was given by him to the public in 1651, in two large and clofely printed volumes, folio, under the title of "Almageftum Novum, Aftronomiam Veterum, Novamque Complectens," &c. In imitation of the "Almageft" of Ptolemy, it prefents us with a collection of the difcoveries and improvements in aftronomical fcience, from the earlieft ages of antiquity to the author's own time. From a table of contents which is prefixed to this part, it appears that the fecond part was to be divided into five books, treating of trigonometry, or the doctrine of plane and fpherical triangles, aftronomical inftruments, the optical part of aftronomy, geography, and chronology; and the third part into ten boks, comprehending

hending obfervations of the fun, of the moon, of eclipfes, of the fixed ftars, and planets, with precepts, and tables of the primary and fecondary motions, and other aftronomical tables. But if thefe parts were completed, they do not appear to have been ever publifhed. In the year 1661 he prefented to the world his "Geographiæ et Hydrographiæ Reformatæ, Libri XII." in folio; and in 1665, his "Aftronomiæ Reformatæ, Tomi duo," folio, 2 vols. in one. The laft work which he publifhed made its appearance in 1669, under the title of "Chronologia Reformata, et ad Certas, Conclufiones Redacta," folio, 2 vols. in one. Father Riccioli died in 1671, when about 73 years of age.

RICCOBONI, Louis, a comic actor and writer, born at Modena in 1674, devoted himfelf to the theatre under the name of Lelio. In 1716 he came to France with his family, and diftinguifhed himfelf as the beft actor at the Theatre Italien. Religious motives induced him to quit the ftage in 1729; and he died in 1753, much efteemed for the decency of his manners, and his amiable difpofition. He was the author of a number of comedies, which had a temporary fuccefs, and which contain much comic humour. One of them, entitled "Les Coquets," was revived a few years fince. He alfo wrote "Penfées fur la Declamation;" "Difcours fur la Reformation du Theatre;" "Obfervations fur la Comedie et fur le Genie de Moliere;" "Reflexions Hiftoriques et Critiques fur les Theatres de l'Europe;" and "Hiftoire du Theatre Italien."

The "Hiftory of the Italian Theatre" of this author, in 2 vols. 8vo., publifhed in 1730 and 1731, and the "Reflections Hiftorical and Critical upon all the Theatres of Europe," which appeared in 1738, contain many judicious obfervations relative to the ftage in general, and, in the work firft mentioned, to the lyric theatre in particular.

Riccoboni, Marie Laboras de Mezieres, fecond wife of the preceding, was born at Paris in 1714. After her marriage, fhe became an actrefs on the Italian theatre, which fhe quitted with her hufband. She is known by feveral novels, written with much elegance of ftyle and refinement of fentiment. The principal of thefe are "Lettres de Miladi Catefby;" "Lettres de la Counteffe de Sancerre;" "Lettres de Sophie de Valiere;" "Erneftine;" "Lettres de Milford Rivers." She alfo tranflated Fielding's Amelia; and fhe appears to have had a predilection for England, in which the fcene of feveral of her novels is laid. She was in habits of intimate correfpondence with Garrick. The works of Madame Riccoboni were printed collectively in 10 vols. 12mo. Neufchatel, and 9 vols. 12mo. Paris. They rank among the moft elegant and ingenious of the clafs, and difplay much knowledge of the tender affections, and great decency joined to vivacity. Several of her novels have been tranflated into Englifh. She died in 1792, reduced by the troubles of the time to a ftate approaching to want.

RICE, in *Botany*. See Oryza.

Rice, in *Rural Economy*, the name of a plant cultivated in many parts of the Eaft, in South Carolina, in America, and alfo in Spain, Italy, and Piedmont. It is a plant that grows to the height of about two feet and a half, with a ftalk not unlike that of wheat, but fuller of joints, and with leaves refembling that of the leek. It branches out into feveral ftems, at the top of which the grain grows in clufters, and each of them is terminated with an ear or beard, and inclofed in a yellow rough hufk. When ftripped of this, they appear to be of an oval fhape, of a fhining white colour, and almoft tranfparent. It is probably a plant that cannot be cultivated in this climate, as the experiments faid to be made by fir Jofeph Banks, and detailed as below by a writer in the tenth volume of the Agricultural Magazine, feem to fhew. It is ftated, that the dry or mountain rice which he received laft year from the Board of Agriculture for trial, had been procured at a confiderable expence by fir John Murray, from the neighbourhood of Serinagur, a city in India, fituated at the foot of mount Imaus, where fnow lies till late in the fpring; and where the climate has been fuppofed to refemble that of England fufficiently to make it probable that the vegetable productions of the one would equally fucceed in the other country; he therefore confiders it as a duty owing to the patriotic exertions of fir John, to give the Board fome account of the refult of the trial of it, made at Spring-Grove, near Hounflow, in Middlefex. He adds, that it was not till near the end of May, when the famples, being of fix forts, were delivered out by the Board, and they were fown immediately, on the 21ft day of that month, on fix fmall beds in a garden, under the fhelter of a paled fence, in a fouth expofure. And the grains were fown very thin, in order that the progrefs of their vegetation might be better noted: in a very few days they appeared above ground. The feafon being warm, with a moderate fupply of rain, it was feldom neceffary to water them; however, when they appeared to flag, which generally happened after three or four dry days had taken place, they were well fprinkled with a watering pot. He fays, that in lefs than a month they had grown feveral inches high; each fort had acquired an appearance very different from the reft; fome were pale green, and had broader blades; fome were deeper coloured, and narrower in the blade; and one fort had a brown hue on the whole plant; and the bafes of the leaves in this kind were nearly black.

He further ftates, that during the month of Auguft, they tillowed much more than he has obferved any other corn to do; fo much fo, that although they had been fown very thin, they became a denfe, compact bed of plants: the blades in fome of the kinds ftanding as clofe, or clofer to each other, than the thickeft fown barley ever does. At the clofe of the month the blades were from a foot to eighteen inches high; the plants continued to tillow, each root having by this time produced from ten to twenty off-fets, but no fymptom of a rifing-ftem was at all obfervable. In the middle of September they had ftill continued to tillow, and the blades to ftrengthen, fo that fome of them were at leaft two feet long. As the frofts of the autumn were now nearly approaching, it became an object of fome importance to examine the ftate in which the plants really were, in order to afcertain the probability of their having produced ears, or poffibility of their having ripened corn, if they had been fown a month or two earlier.

The moft careful infpection was therefore made by diffection, but no traces could be found of the rudiment of a joint beginning to form itfelf on the crown of the root, or of the embryo of the glumes of the ear, which in all kinds of corn are firft difcernible in that part. He fays that about this period he was taken ill, and obliged to defift from obferving their future progrefs; but a froft foon after followed, which cut the blade down to the earth, and at once deftroyed all hopes of thefe kinds of rice producing grain in our climate; the quantity of the blade was however fo uncommonly great, that it is not impoffible, he thinks, it might be advantageous to fow it as food for cattle, for a very large proportion of ftock might certainly be maintained upon an acre of it. He concludes by obferving, that before the froft fets in, he had ordered a tuft of each kind of the rice to be tranfplanted into a pot, and placed in a hot-houfe, in order, if poffible, to afcertain the natural period of this grain; whether, like winter corn, it requires eight or nine months to come to perfection, or, like our Lent corn, arrives at the ſame period in five or ſix: but all of theſe died, notwithſtanding great attention was paid to them: ſome ſeed, however, which he had given to Mr. Lambert, ſucceeded better; it was ſown in his hot-houſe in the month of June, where it throve well, but did not produce ears till near Chriſtmas, a period of ſeven months, from whence it is probable, the grain would have ripened in leſs than two months from the time the ear appeared. It is eaſy to deduce that in the neighbourhood of Serinagur theſe kinds of rice are either ſown as winter corn, or the climate there is far better ſuited to promote the quick progreſs of vegetation than our's is. It was, when it produced ears, about three feet and a half high, and ſome of the ſtems had five joints, including the radical one: had it been in a more ſuitable climate, it would certainly have grown taller, for the flowers dropped off without producing ſeed.

It is however cultivated much in the Eaſt, as in China, as well as in the ſouthern parts of America; the method of which is thus deſcribed by Mr. Duhamel.

1. To haſten the ſprouting of the rice, it is put into baſkets, and ſoaked for ſome days in a ſtanding water. 2. When their rice-grounds are ſo ſoaked with water as to be quite like mud, they are ploughed with a buffalo yoked to a plough very ſimple in its make, having but one ſhare, one handle, and no wheels. 3. After a gentle rain, they break the clods with a kind of large hurdle, drawn by a large buffalo; the driver ſitting upon it to increaſe the weight. 4. The ground is cleared of all ſtones, and whatever roots are in it are pulled up by a ſtrong harrow, with great iron teeth. This inſtrument is drawn by a buffalo, and a man guides it by the help of two handles, like thoſe of a plough, upon which he leans hard. The earth is like mud, and partly covered with water during all this operation. 5. The earth is afterwards ſmoothed with a harrow, which has ſeveral rows of teeth. A man guides this harrow by its two handles, whilſt a buffalo draws it; and as faſt as its teeth form little channels in the ground, the water runs in and fills them up. 6. When the rice that was laid to ſoak has ſprouted, the ſeed is known to be good; and it is then ſown by hand, very thick, and as equally as poſſible. Only part of the ground is ſown in this manner, to furniſh plants for the reſt. The day after it has been ſown the points of the plants appear above the ſurface of the water; for the ground is overflowed all this time with juſt enough water to cover it. And it is added, that when the plants have acquired a little ſtrength, they are ſprinkled with lime-water, to deſtroy the inſects, and ſome of the weeds that would hurt them. For this purpoſe a ſmall baſket is faſtened to the end of a long handle, and dipt in the lime-water, which runs through it, and is conveyed over the plants. And the Chineſe have a great veneration for the firſt inventor of this method, which anſwers to our cuſtom of ſteeping wheat in lime-water, or manuring land with quick-lime. 7. Towards April, when the plants are grown ſtrong enough to cover the whole field, and look very green and even, the greateſt part of them is pulled up by handfuls, all the mud is carefully waſhed off their roots, and, being held at the ſame time as even as poſſible with one another, they are planted in tufts, pretty far aſunder, and in a quincunx form, in fields prepared on purpoſe for them. A ſerene day is choſen for this operation, which muſt be performed as quick as poſſible. This practice of the Chineſe is, he thinks, with reſpect to the common culture of rice, what the new huſbandry is with reſpect to the common culture of wheat. 8. The rice muſt be watered, which is always done in China by overflowing it. To this end, the rice-grounds are always near a rivulet, pond, or great pool of water, from which they are ſeparated only by a bank or cauſeway. If the water was higher than the rice-ground, a trench cut through the cauſeway would overflow it at once: but as it is generally lower, or on a level with the rice-ground, the neceſſary quantity is conveyed in pails or buckets, which are worked chiefly by the help of ropes. 9. Though a man cannot ſtep in theſe rice-grounds without being up to his knees, the Chineſe weed them three times in a ſummer, and that with ſuch care, that they pull up even the roots of every weed. 10. When the rice is ripe, which is known by its turning yellow, like wheat, it is cut down with a ſickle, made into ſheaves, and carried into a barn, where it is threſhed with flails pretty much like ours: the ſtraw is removed with pitch-forks and ſhovels, and the outer huſk of the grain is taken off by beating it with great wooden peſtles, or a kind of mallet, after which it is ſifted and winnowed: and, laſtly, to get off the under huſk, the grain is put between two mill-ſtones, which are worked by a lever faſtened to the upper one. But the two moſt remarkable circumſtances of this culture are, 1ſt, the care which the Chineſe take not to let their plants be too cloſe together, leſt they ſhould rob one another of their food; and 2dly, their weeding their rice-grounds three times in a ſummer, which anſwers the end of the hoeings recommended for the alleys between the beds of other grain, cultivated according to the horſe-hoeing huſbandry.

This plant is ſaid to have been lately cultivated with ſucceſs near Dumfries, by Mr. Charters; notwithſtanding the want of ſucceſs in the above trial, as well as by others in Cambridgeſhire. And it is not improbable, but that by degrees it may be ſo naturalized to the climate, as has been the caſe with many other plants, as to be cultivated without much trouble or difficulty, and thus contribute to the advantage of the country as an article of the grain kind. Rice forms an excellent kind of bread when incorporated with flour, as well as a good food for the feeding of different ſorts of animals of the poultry and other kinds.

Rice is much uſed as food in the Roman Catholic countries in time of Lent. The ordinary preparation is, by firſt ſteeping it in water, then boiling it in milk. Some make it into a ſort of farina, or flour, by pounding it in a mortar, after having firſt put it in hot water, and again waſhed it out in cold.

Among the common kinds of grain, rice is accounted the mildeſt and moſt nutritious, and is ſuppoſed to be particularly ſerviceable in dyſenteries and diarrhœas. It is leſs viſcous than wheat, or of leſs tenacity, when boiled with water.

The northern nations eat their fowls and other meats with rice and ſaffron. The Chineſe make a wine of rice, which is of an amber colour, and taſtes like Spaniſh wine, and ſerves them for their common drink. In ſome parts of Europe they alſo draw a very ſtrong brandy, or ſpirit, from rice.

RICE-*Balking*, in *Agriculture*, a provincial word applied to a method of ploughing, in which, according to Mr. Marſhall, the flag is always turned up towards the unploughed ground, the edge of the coulter paſſing cloſe to the edge of the flag laſt turned: whereas, in *ſlob-furrowing*, the flag is turned towards the ploughed ground, the coulter paſſing fifteen or ſixteen inches from the laſt ploughed furrow; into which, in this caſe, the edge of the flag hangs; and, in both caſes, a ſlip of unploughed ſoil, of a width nearly to that of the flag, is buried.

RICE-*Bird*, in *Ornithology*. See EMBERIZA *Oryzivora*.

RICE *Lake*, in *Geography*, a lake of Canada, having a portage of 11 miles to lake Ontario. It difcharges itfelf by the river Trent, into the head of the bay of Quinté.

RICEBOROUGH, a town of America, in Liberty county, Georgia, where the county courts are held. The county contains 6228 inhabitants.

RICERCARE, Ital. to feek; whence *ricercata*, a refearch, a flourifh, a prelude, an impromptu, a voluntary. See RESEARCH.

RICEYS, LES, in *Geography*, a town of France, in the department of the Aube, and chief place of a canton, in the diftrict of Bar-fur-Seine; 6, 7, and 8 miles S. of Bar-fur-Seine. The place contains 3842, and the canton 7875 inhabitants, on a territory of 167½ kiliometres, in 8 communes.

RICH, CAPE, a cape on the weft fide of Newfoundland, towards the north end, and is the N.E. part of the gulf of St. Lawrence, having the ifle of St. John, and fome other fmall ifles, to the N. This cape was the boundary of the French privilege of fifhing, which extended from hence northward, and round to cape Bonavifta.

RICH *Inlet*, a narrow channel between two fmall iflands near the coaft of North Carolina. N. lat. 34° 14'. W. long. 77° 52'.

RICHARD *of St. Victor*, in *Biography*, a celebrated divine and fcripture commentator in the 12th century, was a native of Scotland, who went to purfue his ftudies at the univerfity of Paris. Here he entered among the canons regular of St. Auguftine, at the abbey of St. Victor, and became a pupil of the famous Hugh, who, like him, derived his furname from the fame houfe. Under this mafter he affiduoufly ftudied the feveral branches of fcience, as far as they were then known, particularly theological and biblical literature; and he acquired great reputation by his proficiency, as well as the friendfhip of the moft eminent men in that feat of learning. In 1164 he was elected prior of his monaftery, where he died, in the year 1173, equally refpected for his virtues as for his learned attainments. His critical pieces are very accurate for the time in which he lived. His ftyle, however, is not very elevated; on which account his pious treatifes, though abounding in excellent matter, are greatly deficient in weight and energy. His works confift of critical obfervations and remarks on fome of the hiftorical parts of the Old Teftament, relating to the tabernacle and the temple of Solomon; allegorical and moral "Commentaries" on feveral of the Pfalms, the Song of Songs, and the Apocalypfe; queftions on certain difficult paffages of St. Paul's epiftles, and other parts of the bible; and numerous critical, doctrinal, and practical treatifes. The whole have been frequently printed in a collective form; and the beft edition is faid to be that of Rouen, in 1650, in 2 vols. folio.

RICHARD I., king of England, furnamed *Cœur de Lion*, fon of Henry II. by Eleanor Guienne, was born in the year 1157. As fecond fon he was invefted in the duchy of Guienne, and county of Poitou. In 1173 he united with his brothers, Henry and Geoffrey, in a rebellion againft his father, which was foon quelled, and forgiven by the reigning monarch. Richard was now fent to Poitou to reduce fome revolted barons, where he difplayed that martial fpirit for which he was afterwards celebrated, and on account of which he obtained his furname. Refufing to pay homage for the duchy of Aquitaine to his elder brother Henry, a war broke out between them in France, which their father found great difficulty in terminating. Henry foon after this died, and Richard, being now heir apparent, was required to refign Aquitaine to his youngeft brother, John. This he refufed, and new wars enfued. In 1189 he joined Philip Auguftus, king of France, againft his own father, and did homage to the French king for the poffeffions which he held on the continent. A war was the confequence of this unnatural junction, in which Henry was haraffed and worn out by Richard, while he found himfelf abandoned by his youngeft fon John. Henry died in July of the fame year, and was fucceeded in his throne by the fubject of this article. He is faid to have vifited his father's corpfe on the day after his deceafe, and expreffing great remorfe for his paft behaviour, charged himfelf with being his murderer. Richard was crowned at Weftminfter, received into his confidence the faithful fervants of the late king, and difcountenanced all thofe who had been abettors in his own rebellion. He fet at liberty his mother, queen Eleanor, who had long been in a ftate of confinement, and endeavoured to conciliate the affection of his brother John by grants of great extent in England and France. Richard, while prince, had taken the crofs along with his father; and now he had come to the crown, he was determined to give fcope to his martial talents in the Eaft. Having made the requifite preparations, he, in 1190, had an interview with Philip of France, who had alfo taken the crofs, at which, mutual conditions were agreed upon refpecting their cooperation in the expedition, and the peace of the kingdoms during their abfence. As a prelude to their enterprize, which, according to the opinion of the times, was regarded as extremely pious in its object and motives, Richard and his nobles, who had embarked in the fame caufe, exercifed their zeal in a horrible maffacre and pillage of the Jews in feveral of the principal towns, which was ended by a bonfire of the bonds which the Chriftians had entered into with this much injured people.

About the middle of the year, the kings of England and France muftered their forces, which amounted to 100,000 men in arms, in the plains of Vefelay, on the borders of Burgundy. Richard then proceeded to Marfeilles for embarkation, and in September the two monarchs met at Meffina, where they fpent the winter, in the courfe of which, diffentions arofe that were nearly breaking out into open hoftilities, but which ended in a new treaty, in which all differences were for the prefent adjufted. Richard had long been under engagements to marry Adelais, Philip's fifter; but an attachment which he had formed to Berengaria, daughter of Sanchez, king of Navarre, together with fome mifconduct of the French princefs, induced him to break the contract, in which it appears that Philip acquiefced. Eleanor arrived at Meffina with Berengaria; but Richard, without waiting to celebrate his nuptials, fet fail in April, 1191, with his fleet, which was foon difperfed by a ftorm. The king failed into Crete; but three of his fhips, with his intended bride, and his fifter, the queen of Sicily, on board, were ftranded on the coaft of Cyprus. The king of that ifland treated the unfortunate crews and the princeffes with great rigour, in revenge for which infult, Richard landed his army in the ifland, defeated the inhabitants in two battles, and reduced the king to the furrender of himfelf, his only daughter, and his fovereignty. In this ifland he confummated his marriage with Berengaria, and then embarked for Paleftine.

The fiege of Acre, celebrated likewife in modern times, which had been commenced two years before, was ftill carrying on by the relics of the emperor Frederic's army, with the other Chriftian adventurers who had at different times joined the banners of the crofs, while it was obftinately defended by a numerous Saracen garrifon, fupported by Saladin at the head of a powerful hoft in the field. The arrival of the two kings infufed new vigour into

into the befiegers, and feats of arms were performed under the walls, by Richard and Philip, efpecially by the former, who far furpaffed his rival in military enterprife. The city furrendered in July 1191, and immediately there were two competitors for the titular kingdom of Jerufalem, whofe claims were efpoufed by the rival kings. Philip, however, did not remain long in the Eaft; he returned home, leaving 10,000 men with Richard, who marched from Acre with the intent of reducing the other towns on the fea-coaft, while Saladin attended his motions, and gave him frequent affaults, which produced deeds of extraordinary valour on both fides, till at length a general engagement was brought on, in which, after both wings of the Chriftian army had been defeated, Richard in the centre, by the moft heroic exertions of bravery, and confummate military fkill, gained a complete victory. This was immediately followed by the poffeffion of Joppa, Afcalon, and other places which Saladin had deferted; and Richard advanced within fight of the holy city; but the greater part of the allies refufed to concur in the fiege of that capital, and he was obliged reluctantly to return to Afcalon. Here he concluded a truce with Saladin, on the condition that Acre, Joppa, and the other fea-ports of Paleftine, fhould remain in the hands of the Chriftians, and that they fhould enjoy full liberty to perform their pilgrimages to Jerufalem.

Richard now prepared to return home, where his prefence was abfolutely neceffary on account of the great diforders into which his kingdom was fallen. Previous to his embarkation, he terminated the conteft for the crown of Jerufalem, by concurring in the election of Conrad, and beftowing the conquered kingdom of Cyprus upon the difappointed competitor Lufignan. At this period, Conrad was murdered in the ftreets of Tyre by two emiffaries of the prince of Affaffins, commonly called the "old man of the mountain;" and although the deed was clearly traced to this fource, Philip was bafe enough to calumniate Richard as the author of it, in order that he might have an excufe for the defigns which he was carrying on againft him in Europe.

Richard fet fail from Acre in October, 1192. In the courfe of his voyage he was wrecked near Aquileia: thence he purfued his way through Germany, in the difguife of a pilgrim; but being difcovered near Vienna, he was arrefted by the orders of Leopold, duke of Auftria, and thrown into prifon. He was afterwards given up to the emperor Henry VI., who had been offended by him. When intelligence of this event reached England, queen Eleanor wrote repeatedly to the pope, reprefenting to his holinefs the fcandal and injuftice of felling and imprifoning the moft illuftrious champion of Chriftendom, whofe exertions for the common caufe were celebrated throughout Europe and Afia; and claiming, in behalf of the captive king, the protection of the holy fee. Her reprefentations were of no avail: Richard was kept in prifon, and loaded with irons; which afforded his rival, Philip, full opportunity for invading his dominions. He entered into a treaty with John, who readily took up arms againft his brother's government, while Philip was making himfelf mafter of great part of Normandy. Richard, in the mean time, fupported his misfortunes and indignities with the moft undaunted courage. The emperor, to juftify his own conduct, produced the royal captive before the diet at Worms, under a charge of feveral heinous offences; but Richard repelled the accufations with fo much fpirit and eloquence, that he carried the affembly with him, who loudly exclaimed againft his detention. At length he was liberated, on the condition that 150,000 marks fhould be paid as a ranfom. He arrived in England in March, 1194, to the great joy of his fubjects in general.

When Philip was made acquainted with Richard's deliverance, he wrote to John "to take care of himfelf, the devil being broke loofe." The property of John was immediately confifcated, and his caftle at Nottingham feized. Richard was recrowned at Weftminfter, in the prefence of William, king of Scotland; and he then began to raife money, that he might take revenge upon his inveterate foe, Philip of France. John threw himfelf at the feet of his brother, imploring, in the moft abject terms, his pardon. "I forgive him," faid the hero, "and hope I fhall as eafily forget his injuries as he will my pardon." In the enfuing war between Richard and Philip, the former gained fome advantages; but a truce fufpended farther hoftilities. A peace was terminated in 1196; but in the following year, the war was renewed, in which much cruelty was exercifed on both fides.

England, during this foreign contention, had been the fcene of much calamity, partly through difturbances occafioned by the exactions of a needy and rapacious government, and partly by the more grievous calamities of famine and peftilence. A lafting accommodation with France, as preparatory to another expedition to the Holy Land, was in agitation, when the reign and life of Richard were brought to a clofe through his avarice, which is thus related by Hume.

Vidomar, vifcount of Limoges, a vaffal of the king's, had found a treafure, of which he fent a part to that prince as a prefent. Richard, as fuperior lord, claimed the whole, befieged the vifcount in the caftle of Chalus, near Limoges, in order to make him comply with his demands. The garrifon offered to furrender, but Richard was determined on revenge; and as he was furveying the caftle with Marcadèe, leader of his Brabançons, he was ftruck by an arrow, aimed at him by Bertrand de Gourdon. The wound was not confidered as mortal: the place was affaulted and taken, and the whole garrifon executed, except Gourdon, who had wounded him, and who was referved for a more favage execution. By the unfkilfulnefs of the furgeon, the wound, which was at firft but flight, exhibited the moft dangerous fymptoms, and the king felt that his end was approaching. He fent for Gourdon, and afked him what had induced him to make an attempt upon his life; to which the man boldly replied, "You killed, with your own hands, my father and my two brothers, and you intended to have hanged myfelf: I am now in your power, and you may take your revenge, by inflicting upon me the fevereft torments; but I fhall endure them with patience, provided I can think that I have been fo happy as to rid the world of fuch a nuifance." Richard, ftruck with the magnanimity and reafonablenefs of the reply, and probably humbled and penitent by the near approach of death, ordered Gourdon to be fet at liberty, and a fum of money to be given him; but Marcadèe, unknown to the dying king, feized the unhappy man, caufed him to be flayed alive, and then hanged. Richard died in the tenth year of his reign, and the forty-fecond of his age, leaving no iffue behind him. The moft fhining parts of his character are his military talents. He loved glory, and chiefly military glory; and as his conduct in the field was not inferior to his valour, he feems to have poffeffed every talent neceffary for acquiring it. His refentments were high, and his pride unconquerable. He was diftinguifhed by all the good as well as bad qualities incident to an impetuous and vehement fpirit: he was open, frank, generous, fincere, and brave; but revengeful, ambitious, haughty, and cruel. His talents were confiderable

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in the cabinet, as well as in the field. He was a passionate lover of poetry: some of his compositions in that line are said to remain; and he bears a rank among the Provençal poets and Troubadours, who were the first of modern Europeans that distinguished themselves by attempts of that nature.

Though the English pleased themselves with the glory which the king's martial genius procured them, his reign was oppressive and arbitrary, by the high taxes which he levied on them, and frequently without consent of the states, or great council. In the ninth year of his reign he levied five shillings on each hyde of land; and because the clergy refused to contribute their share, he put them out of the protection of the law, and ordered the civil courts to give them no sentence for any debts which they might claim. Twice in his reign he ordered all his charters to be sealed anew, and the parties to pay fees for the renewal. He established by law one weight and measure throughout the kingdom, which the mercenary disposition and necessities of his successor engaged him to dispense with for money.

Richard II., king of England, son of Edward the black prince, and grandson of Edward III., was born in 1366, and, on the death of his grandfather in 1377, he succeeded to the throne in his eleventh year. The chief authority of the state, at this time, was in the hands of his three uncles, *viz.* John, duke of Lancaster; Edmund, earl of Cambridge, afterwards duke of York; and Thomas of Woodstock, afterwards duke of Gloucester. A council of nine persons was now nominated to conduct the administration of government. The early part of the king's minority passed in wars with France and Scotland; the consequence of which was a formidable insurrection at home, produced by the taxes necessary for the public service. In 1381, the indecent conduct of a collector of the poll-tax at Deptford having provoked one Walter, by trade a tyler, to break his skull with a hammer, a flame was instantly kindled, which spread over Kent, and the neighbouring counties; so that, in a short time, a body of 100,000 men was collected on Blackheath. Their object was not merely to put an end to an arbitrary tax, but to free the country from the personal servitude to which the lower classes were, at that time, in a great measure subjected. On their approach to London, they sent a message to the king, requesting a conference. He met them on the bank of the Thames, but was unable to satisfy their demands. In the rage of disappointment, they burst into London, committed great devastation, and excited universal consternation. At length ample charters of freedom were granted to them, and a general pardon for all past offences. The insurgents now dispersed, but the principal leader, Wat Tyler, at the head of the Kentish men, remained in London, and was unsatisfied with the concessions granted by the monarch. He met the king in Smithfield, whom he addressed with much insolence, and making the most extravagant demands, Walworth, lord mayor of London, drew his sword and felled him to the ground. While the rioters stood astonished with the fall of their leader, the king, with great presence of mind, rode up alone, and exclaiming that he would be their leader, drew them off involuntarily into the neighbouring fields. The monarch would willingly have pardoned the insurgents, and confirmed to them the charters which had been extorted by force; but other insurrections being excited, his advisers caused him to revoke all the charters that had been extorted from him, and to issue commissions for the trial of the rioters, many of whom were executed.

Richard, when he was sixteen years old, espoused Anne, daughter of the late emperor Charles IV.; after this he began to exercise a very tyrannical spirit, notwithstanding the early promise of his reign, and he took the great seal from Scroop, who had refused to set it to certain extravagant grants of lands made to courtiers. A war with France and Scotland, and the ambitious projects of the duke of Lancaster, disquieted some succeeding years. In 1385 Richard marched with a large army into Scotland, and ravaged the country to Edinburgh and Perth, both which towns he burnt; in the mean time a Scotch army was making a destructive inroad into England. The duke of Lancaster being absent, prosecuting his claim to the crown of Castile, the king's younger uncle, the duke of Gloucester, a man of popular manners and dangerous ambition, became a leader of the opposition to the administration of the king's favourites. By his influence an impeachment was sent up to the lords against the chancellor; and though the king withdrew, with his court, to Eltham, he was intimidated into a dismission of his minister, who was afterwards stript of his estates, and committed to custody. The parliament now felt themselves strong enough to proceed to active measures, and they went so far as to divest the king of all his authority, by obliging him to sign a commission, appointing a council of regency, consisting of fourteen persons, to whom the sovereign power was transferred for a year. The king now, in the twenty-first year of his age, was reduced to a state of complete insignificance, but he held frequent consultations with his friends relative to the means of emancipating himself; and in the year 1387, making a progress to the north, he summoned a council of his friends at Nottingham, by which questions were proposed to the judges concerning the legality of the commission which he had been compelled to sign. They unanimously declared it to be a violation of the royal prerogative, and pronounced all who had joined in the execution of it, as guilty of a capital offence. The duke of Gloucester and his party began now to make preparations to maintain their cause by force of arms. Being by much the stronger party, they obliged the king to accept of terms, and at the ensuing meeting of parliament the five principals in the king's council were impeached, and condemned to death. The judges, who had given their opinion in favour of the king, were all found guilty of high-treason, but the punishment of death was commuted for imprisonment in Ireland during life. In 1389 Richard entered the council, and, in a resolute tone, observed, that he was of full age to take the government into his own hands: his enemies submitted, and he granted a general amnesty.

Several years of tranquillity ensued, and the return of the duke of Lancaster formed a counterbalance to the influence of the duke of Gloucester. In 1394 Richard visited Ireland at the head of an army, in order to settle the affairs of that island, which he accomplished, and then returned. Although no acts of notorious misgovernment had been committed by the king for a considerable period, yet his private character and mode of life tended to disgrace him in the eyes of his subjects. He was indolent and averse from business, and spent all his time in conviviality and amusement, admitting jesters and persons of the meanest rank and station to his intimacy, and laying aside all the proper dignity of rank. He was still governed by favourites, who were the real distributors of every grace from the crown, so that the king was little better than a cypher. By Gloucester and his party the most criminal designs were imputed to Richard, which led the king, by the advice and solicitation of his adherents, to apprehend the duke and his two accomplices, the earls of Arundel and Warwick. This plan was executed in 1397; the duke was sent over to Calais in close custody, while the earls were committed to prison. A parliament was then aſſembled, before which the culprits were impeached of high treaſon. Lord Arundel was condemned, and executed; the earl of Warwick was alſo convicted, and condemned to perpetual baniſhment. The duke of Glouceſter was ſaid to have died of an apoplexy, but it was ſoon diſcovered that he had been ſuffocated. Although the proceedings of parliament were favourable to the royal authority, yet much ill-will prevailed in the nation on account of its ſeverities, and troubles were continually breaking out among the nobles. A quarrel between the dukes of Hereford and Norfolk, ariſing from a charge brought by the former againſt the latter, of ſlanderous words ſpoken concerning the king, was the cauſe of the revolution that terminated the reign. Richard interpoſed his authority and baniſhed them both; but it was agreed, that both exiles might receive, by their attornies, any inheritance that ſhould fall to them during their abſence. In 1399, John of Gaunt, duke of Lancaſter, died, and his ſon, the duke of Hereford, became heir to his vaſt eſtates, which Richard, in defiance of the agreement, ſeized as property lapſed to the crown, and the attorney who claimed them for the duke was even condemned as a traitor. While the nation was full of diſcontent on account of this act of tyranny, Richard went to Ireland, and, during his abſence, Henry of Bolingbroke, as the duke of Hereford, invited by his numerous partiſans to make uſe of this opportunity, came over from France, and landed in Yorkſhire, and being joined by the earls of Northumberland and Weſtmoreland, and other men of rank, proceeded towards the ſouth, at the head of 60,000 men, pretending that their ſole intention was to recover the duchy of Lancaſter. The duke of York, who had been left regent of the kingdom, joined Henry; and Richard, having heard theſe facts, intended to withdraw into France. He was, however, taken and thrown into Flint caſtle, from whence he was taken to London. His depoſition being reſolved on, thirty-five articles of accuſation were drawn up againſt him, which, however informal, and many of them unjuſt, were conſidered as quite ſufficient to juſtify the meaſures taken againſt him, and Richard was depoſed Sept. 30, 1399. Henry at the ſame inſtant ſtood forth, and claimed the crown, which was without heſitation awarded to him. He declared that the life of the dethroned king ſhould be ſafe, and he was committed for ſafe cuſtody to the caſtle of Pomfret; but the uſual fate of depoſed monarchs ſoon awaited him. Indeed it was eaſy to foreſee that he would not long remain alive in the hands of ſuch barbarous and ſanguinary enemies. Hiſtorians differ with regard to the manner in which he was murdered. It was long the prevailing opinion, that ſir Piers Exton, and others of his guards, fell upon him in the caſtle of Pomfret, where he was confined, and diſpatched him with their halberts. But it is more probable, that he was ſtarved to death in priſon; and after all ſuſtenance was denied him, he prolonged his unhappy life, it is ſaid, for a fortnight, before he reached the end of his miſeries. This account is more conſiſtent with the ſtory, that his body was expoſed in public, and that no marks of violence were obſerved upon it. He died in the thirty-fourth year of his age, and the twenty-third of his reign. He left no poſterity, either legitimate or illegitimate.

All the writers who have tranſmitted to us the hiſtory of Richard, lived during the reigns of the Lancaſtrian princes; and candour requires, that we ſhould not give entire credit to the reproaches which they have thrown upon his memory. But, after making all proper allowances, he ſtill appears to have been a weak prince, and unfit for government, leſs for want of natural parts and capacity, than of ſolid judgment and good education. He was violent in his temper; profuſe in his expence; fond of idle ſhow and magnificence; devoted to favourites, and addicted to pleaſure; paſſions, all of them, the moſt inconſiſtent with a prudent economy, and conſequently dangerous in a limited and mixed government.

This prince lived in a more magnificent manner than perhaps any of his predeceſſors or ſucceſſors. His houſehold conſiſted of 10,000 perſons. He had 300 in his kitchen, and all the other offices were furniſhed in proportion. It muſt be remarked, that this enormous train had tables ſupplied them at the king's expence, according to the mode of that age. Such prodigality was probably the ſource of many exactions by purveyors, and was one chief reaſon of the public diſcontents.

Richard III., king of England, born in 1450, was the youngeſt ſon of Richard, duke of York. On the acceſſion of his brother, Edward IV., he was created duke of Glouceſter, and during the viciſſitudes in the early part of Edward's reign, he adhered moſt cloſely to him, and ſerved him with courage and fidelity. He is ſaid to have had a hand in the ſlaughter of Edward, prince of Wales, after the battle of Tewkeſbury, and to have been the author, if not the real perpetrator, of the murder of Henry VI. in the Tower, but the ferocity of his diſpoſition was in him united with deep policy and diſſimulation. He married, about the year 1473, Anne, the widow of the prince of Wales, already mentioned, who was daughter of Neville, the great earl of Warwick. His elder brother, Clarence, had married the other daughter, and a violent diſſention took place between them, on account of the diviſion of the property. Richard, who found Clarence an obſtacle to his views of aggrandizement, combined with the adverſaries of that unfortunate prince in accuſations which proved his deſtruction. On the death of Edward (ſee his article) in 1483, the duke of Glouceſter was appointed the protector of the kingdom. He immediately cauſed his nephew, the young Edward V., to be proclaimed king, and took an oath of fealty to him. There were at this time two great factions in the nation, of which the leaders were the duke of Buckingham and lord Haſtings. Both theſe courted the duke of Glouceſter, who pretended a ſteady friendſhip for each when apart, while he was purſuing ſchemes of the blackeſt ambition. His firſt object was to get rid of thoſe who were connected with the young king by blood; and after ſpending an evening in company with Rivers, Grey, and ſir Thomas Vaughan, he cauſed them to be arreſted the next morning, and committed to Pomfret caſtle, at the ſame time diſmiſſing all the king's attendants and ſervants. He ſhortly after cauſed the priſoners at Pomfret to be put to death without the form of trial; and on the very day of their execution, at a council held in the Tower, a cry of treaſon was raiſed by his order, on which a party of armed men entered, who ſeized the archbiſhop of York, the biſhop of Ely, lord Stanley, and lord Haſtings, of whom the three firſt were committed to cuſtody, while Haſtings was led to immediate death. After this, his next ſtep was to eſtabliſh, with or without evidence, the illegitimacy of Edward's children, to make way for himſelf on the throne. This he did by attacking the chaſtity of his own mother, who, he ſaid, had been true to her huſband only in the caſe of himſelf, and that to Edward and Clarence there were different fathers. Theſe pleas were zealouſly advocated by his adherents, and among others by Dr. Shaw, brother to the lord mayor of London, who dwelt upon them with much eloquence, in a ſermon which he preached at St. Paul's Croſs. The duke of Buckingham afterwards, in a ſpeech

ſpeech before the corporation and citizens of London, enlarged upon the title and virtues of the protector, and then put the queſtion to his audience, whether they choſe the duke of Glouceſter for king? On their ſilence, he repeated the queſtion with more importunity, and at length a few voices cried out "God ſave king Richard." This was conſtrued into a public declaration in his favour, and Buckingham, with the lord mayor, repaired to the protector with a tender of the crown. He firſt affected alarm and ſuſpicion, and then pretended loyalty to his nephew, and unwillingneſs to take ſuch a burden upon himſelf. At length he accepted the offer, and Richard was proclaimed king on the 27th of June 1483. The depoſed king and his brother were never more heard of, they were probably murdered in the Tower.

Richard was now extremely liberal towards thoſe who had been inſtrumental in the change, and took other methods to court popularity. He made a progreſs with a ſplendid retinue through ſeveral of the towns, and at York was a ſecond time crowned, on which occaſion he created his only ſon prince of Wales. He ſoon began to diſplay all the qualities of a moſt cruel tyrant, which ſo diſguſted the whole nation, that deſigns were formed to hurl him from the throne. A conſpiracy was excited againſt him, in favour of Henry, earl of Richmond, which he diſcovered and quelled. This failure appeared to ſeat the king more firmly on the throne, and he took advantage of his ſituation by calling a parliament, in which many good laws were paſſed, the progeny of Edward IV. were baſtardized, and the crown ſettled on himſelf and poſterity. The death of his ſon, ſoon after, was a ſevere ſtroke to him in the midſt of his proſperity, which was followed by that of his wife; the laſt was imputed, but without any evidence, to the effects of poiſon. To prevent a projected marriage between Elizabeth, the eldeſt daughter of his brother Edward, and the earl of Richmond, Richard determined to marry her himſelf; as this union would have been very detrimental to the earl's intereſt, he haſtened his preparations for another expedition to England, and in Auguſt, 1485, landed an army at Milford-haven. Richard, informed of the advance of his rival, took the field, and met him, with an army of nearly 15,000 men, at Boſworth, in Leiceſterſhire. The battle was fought on the 23d of Auguſt; in which the king, finding his ſituation deſperate, ruſhed againſt his competitor, ſlew his ſtandard-bearer, and was upon the point of encountering the earl himſelf, when he was himſelf ſlain. The body of Richard was found in the field, ſtripped naked, and carried acroſs a horſe to Leiceſter, where he was interred in the Grey friars' church-yard. Thus fell this hated tyrant, after having poſſeſſed the throne about two years and two months. The hiſtorians, ſays Hume, who favour Richard, maintain, that he was well qualified for government, had he legally obtained it; and that he committed no crimes but ſuch as were neceſſary to procure him poſſeſſion of the crown: but this is a poor apology, when it is confeſſed, that he was ready to commit the moſt horrid crimes that appeared to him neceſſary for that purpoſe; and it is certain, that all his courage and capacity, qualities in which he really ſeems not to have been deficient, would never have made compenſation to the people for the danger of the precedent, and for the contagious example of vice and murder, exalted upon the throne. In perſon, Richard has been repreſented as of ſmall ſtature, deformed, and of a forbidding aſpect, but it is probable that the deteſtation of his character has aggravated his bodily defects. His memory lives in popular tradition, as that of the moſt odious tyrant that ever filled the Engliſh throne. For the foregoing articles we are chiefly indebted to the hiſtories of Hume and Henry.

Richard, John, a French advocate and theological writer in the 17th and the early part of the 18th centuries, was born at Verdun, in Lorraine, about the year 1638. The firſt part of his education he received at Pont-à-Mouſſon, and was then ſent to Paris, where he ſtudied law and divinity. Afterwards he was admitted an advocate at Orleans; but more for the ſake of poſſeſſing the rank and privileges connected with that title, than from any deſign to practiſe at the bar. His inclination led him to devote his time and talents to the compoſition and publiſhing of ſermons. By his numerous productions of this deſcription he acquired celebrity. In the year 1700 he began to publiſh a compilation, under the title of "A Moral Dictionary, or, Univerſal Pulpit-Science," which, in 1715, was extended to 6 vols. 8vo. It conſiſts of ſtriking ſentiments and reaſonings on a great variety of ſubjects, ſelected from the works of French, Spaniſh, Italian, German, and other divines, arranged in alphabetical order.

RICHARDIA, in *Botany*, was named by Houſtoun, in honour of Richard Richardſon, M.D. F.R.S. who reſided on his own eſtate at North Bierly, Yorkſhire, and died at an advanced age, about the year 1740. His fortune rendering him independent of medical practice, as a maintenance, he beſtowed great attention on the botany of his own country, and his name occurs continually in the publications of the early part of the 18th century, as the correſpondent of Ray, Sloane, Dillenius, &c. He communicated ſeveral papers, on various ſubjects, to the Royal Society; none of them botanical; ſee Pulteney's Sketches, v. 2. 185.—Linn. Gen. 174. Schreb. 230. Willd. Sp. Pl. v. 2. 222. Mart. Mill. Dict. v. 4. Juſſ. 198. Lamarck Illuſtr. t. 254. Gærtn. t. 25. (Ricardia; Rel. Houſt. 5. t. 9.)—Claſs and order, *Hexandria Monogynia.* Nat. Ord. *Stellatæ*, Linn. *Rubiaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, in ſix deep, erect, pointed ſegments, half the length of the corolla. *Cor.* of one petal, funnel-ſhaped; limb in ſix acute, erect ſegments. *Stam.* Filaments ſix, very ſhort, inſerted into the tube of the corolla, alternate with its ſegments; anthers ſmall, roundiſh, between the ſegments. *Piſt.* Germen inferior, three-lobed; ſtyle thread-ſhaped, the length of the ſtamens, three-cleft in the upper part; ſtigmas obtuſe. *Peric.* none. *Seeds* three, obovate, gibbous, rounded at the outer ſide, angular at the inner, crowned with the calyx.

Obſ. Gærtner has obſerved that the calyx and corolla have ſometimes eight ſegments, with eight ſtamens.

Eſſ. Ch. Calyx in ſix ſegments. Corolla of one petal, funnel-ſhaped. Seeds three, crowned with the calyx.

1. R. *ſcabra.* Linn. Sp. Pl. 470. Willd. n. 1.—Gathered by Houſtoun at Vera Cruz.—A rough hairy plant, with the habit of a *Spermacoce.* The *ſtem* is tall, purpliſh, with oppoſite branches, its hairs curved downwards. *Leaves* oppoſite, crowded, ovate, pointed, entire, hairy, with many ſtraight, parallel ribs. *Flowers* encompaſſed with numerous hairy briſtles. *Calyx* briſtly.

RICHARDSON, Jonathan, in *Biography*, a painter, and a writer on the art of painting, was born about the year 1665. He was intended by his father for the law, but at twenty years of age was permitted to deſert that profeſſion, and follow the bent of his inclination for painting. He then became the diſciple of Riley, with whom he lived four years, and finally connected himſelf by marrying his niece. The degree of ſkill which he attained, by no means corre-

correfponded with the ideas he entertained of the art, which were certainly of a juft and elevated kind. There are, however, great ftrength, roundnefs, and boldnefs in the colouring of his heads, which are drawn and marked in the manner of Kneller, with freedom and firmnefs; though the attitudes in which they and his figures are placed, the draperies which clothe the latter, and the back-grounds from which they are relieved, are infipid and taftelefs. It is certainly a very curious circumftance, that, when he wrote with fo much fire and judgment, as is difplayed in his Effay on Criticifm, and the Science of a Connoiffeur, dived fo deep into the inexhauftible ftores of Raphael, and was fo fmitten with the native luftre of Vandyke, he fhould fo ill apply to his own practice, the fagacious rules and hints he gave to others. Full of theory, profound in reflections on the art, and poffeffed of a numerous and excellent collection of drawings, he appears to have poffeffed no portion of invention, as applicable to the painter's art, and drew nothing well below the head; plainly manifefting the peculiarity of tafte or feeling which leads to excellence in that profeffion.

Thus much, however, muft be faid of him, that when Kneller and Dahl were dead, he ftood at the head of the portrait painters in this country, and practifed in it fufficiently long to acquire a tolerable competency. He quitted his occupation fome years before his death, when Hudfon, who had married one of his daughters, maintained the family honours for a while. Richardfon himfelf, by temperance and tranquillity of mind, enjoyed a life, protracted amidft the bleffings of domeftic friendfhip, to the advanced age of eighty, and then died refpected and lamented. He had had, a fhort time previoufly, a paralytic ftroke that affected his arm, yet never difabled him from taking his cuftomary walks and exercife; and it was after having been in St. James's park, he departed fuddenly, at his houfe in Queen-fquare, on his return home.

The fale of his collection of drawings, in February 1747, lafted eighteen days, and produced 2060*l*.; his pictures about 700*l*. He left a fon, who painted and drew alfo, and who appears to have been a perfect pattern of filial reverence and affection.

Richardson, Samuel, in *Biography*, was born in 1689, in fome part of Derbyfhire, to which county his father had retired from bufinefs, which he had carried on in London. In very early life he was characterized for his love of reading, and while a mere boy, he difplayed the uncommon qualities of a tafte for letter-writing and female fociety. At the age of thirteen, he was fo much in the confidence of three young women, as to be employed by them in making draughts of letters to their lovers; and, at this early period, fuch were his fidelity and difcretion, that not one of them fufpected him to be the writer for the others. He was apprenticed to a printer, whom he ferved moft confcientioufly for the full term of feven years, ftealing from the hours allowed to reft and recreation, his opportunities for mental improvement. After the expiration of his apprenticefhip, he paffed feveral years as journeyman in a printing-office, and then fet up in bufinefs for himfelf. His habits of diligence and accuracy, and his honourable dealings, foon gained him employers and friends, and he was often applied to by bookfellers for making indexes, and writing prefaces and dedications. The immediate occafion of his becoming a novel-writer, was an application made to him by two bookfellers, to write for them a volume of letters in a common ftyle, on fubjects that might ferve as models for the ufe of thofe who had not the talent of inditing for themfelves. He extended the idea to the conveying of inftruction in thinking and acting upon important occafions; and in compofing fome letters for the falutary purpofe of teaching young women going out to fervice how to avoid the fnares that might be laid for their chaftity, a ftory which he had heard many years before of a real occurrence came into his mind, and became the parent of "Pamela." This work was publifhed in 1740, and was received with extraordinary applaufe by readers of all ranks. It brought the author into immediate notice; but his "Clariffa," of which the firft two volumes appeared in 1748, placed him in the firft rank of novelifts. "A tale fo varied by character, fo minutely developing the movements of the human heart, fo pathetic in its circumftances, and prefenting fo fublime and perfect an image of female purity, had never before been given to the public. The intereft it excited during its progreffive appearance, efpecially among female readers, was incredible, and the fate of no real perfonage could have agitated more bofoms than that of the fictitious heroine." Rouffeau, in fpeaking of it, afferts, that "nothing was ever written equal or approaching to it in any language." The "Hiftory of Sir Charles Grandifon," his concluding work, appeared in 1753, which was intended to give the world an example of a perfect man, uniting the fine gentleman and the Chriftian.

While he was advancing in the career of his literary fame, he was not inattentive to that improvement of his fortune which his affiduity and integrity in his profeffion fo well merited. His firft great public employment was that of printing the "Journals of the Houfe of Commons," in 26 vols. folio, which he obtained through the recommendation of his friend, Mr. Speaker Onflow. In 1754 he rofe to be mafter of the Stationers' company, and in 1760 he purchafed a half of the patent of law-printer to his majefty. He was twice married, and had feveral children, but four daughters only grew up to folace his declining years. He was the fubftantial valuable friend in difficulty, diftrefs, and ficknefs. He was moft exemplary in temperance both of body and mind, and in the faithful difcharge of every moral duty. He died at the age of feventy-two, and was interred by the fide of his firft wife in St. Bride's church. The writings of Richardfon, exclufive of the three novels above referred to, were of no great confequence. They are chiefly the "Familiar Letters" already noticed; an edition of "Æfop's Fables," with reflections. His "Correfpondence," felected from the original manufcripts, was publifhed in fix volumes, in the year 1804, with a biographical account of the author, by Mrs. Barbauld, to which the reader is referred for more particulars relating to Mr. Richardfon.

Richardson's *Bay*, in *Geography*, a bay on the S.E. coaft of Jamaica.

RICHAW, a town of Pruffia, in the province of Oberland; feven miles S. of Liebftat.

RICHBOROUGH, a hamlet, and a diftrict of land, in the parifh of Afh, lower half hundred of Wingham, lathe of St. Auguftine, and county of Kent, England, is fituated about two miles N.W. from the town of Sandwich. It is noted in hiftory as the fcite of the Roman poft which guarded the fouthern entrance of the Portus Rutupenfis, whence it derived its original name of Rutupium. The fortrefs which defended the northern entrance was called Regulbium; and is noticed under the article Reculver. This port, in Roman times, appears to have been the moft famous of any in Britain; for it is noticed in the writings of Lucan, Juvenal, and Aufonius; and alfo in thofe of Tacitus, Ammianus Marcellinus, and Orofius. It likewife occurs in the Geography of Ptolemy, in the Itinerary of of Antoninus, in the Index of the writer of Ravenna, in the Peutingerian Tables, and in the Notitia of the weftern empire. In thofe days the fcite of Rutupium was a fmall ifland, though at prefent it is a confiderable diftance within land. This is proved by the teftimony of many ancient writers; by the appearance of the furrounding country; and the fact of ftrata of fea-fand being difcovered by digging into its furface. The period when it was deferted by the ocean was probably between the fourth and fixth centuries, as about that time the name of Sandwich, which rofe on the ruins of the Rutupian haven, begins to be mentioned in ancient writings as a frequented port.

Richborough was anciently called *Rhutupiæ*, *Portus Trutulenfis*, or rather *Portus Rhutupenfis*, *Rhutupfis Portus*, *Rhutupiæ Statio*, and *Rhutubi civitas et portus*, among the Greek and Roman writers, by the Saxons denominated *Reptacefter*, and by others *Ruptimouth* and *Richberg*. After the Saxons had commenced their piracies on the coaft, the legio fecunda Augufta, which had been brought from Germany by Claudius, and had been for many years ftationed at Ifca Silurum, in Wales, was removed hither and commanded by an officer under the count of the Saxon fhore. Under the Saxons it was ftill confiderable, and the place in which king Ethelbert refided.

Much diverfity of opinion prevails among the learned as to the precife fituation of the Urbs Rutupiæ, fome identifying it with the caftle, and others placing it along the adjacent fhore, while a third clafs of writers fix it at Canterbury. Among thofe who efpoufe the laft opinion is the late bifhop Douglas, who has difcuffed the fubject with great learning and ingenuity, in a paper printed in the firft volume of the "Bibliotheca Topographica Britannica." With his view of the matter, indeed, we are ftrongly inclined to coincide; for it feems impoffible that the city could ftand within the narrow limits of the caftle, and there are no veftiges in its vicinity of foundations of extenfive buildings, a circumftance which could fcarcely have happened, if fuch buildings had ever exifted. Of the fortrefs itfelf, however, much yet remains to folicit the examination and excite the amazement of the antiquary. In form it appears to have been, when complete, a regular parallelogram; but the greater part of the eaftern wall is now deftroyed. The whole fcite exterior to the ramparts occupied fix acres, one rood, and eight perches of ground; and the area within the walls five acres, three roods, and eight perches. The walls were flanked by round projecting towers at the angles, and by fquare ones at irregular diftances along the fides. There are marks of two of thefe in the weft wall, and of two others, befides the Porta-Decumana, in the north wall, and of two more in the fouth wall; in which undoubtedly was a third, that has fallen down the bank. Thefe fquare towers, projecting about eight feet from the wall, were folid nearly eight feet from the foundation, above which they were hollow. In the main wall within thefe towers are four large, round, fmooth holes in a row, each about nine inches in diameter, and penetrating about eight feet into the fubftance of the main wall. Below thefe are fmaller holes, four inches in diameter, that run about ten inches into the wall; all which feem to have ferved for the infertion of beams, to fupport an apparatus of defenfive machinery. Within the area, towards the north-eaft corner, and beneath the furface of the ground, is a folid rectangular platform of mafonry 144 feet long, 104 feet wide, and 5 feet thick. It is compofed of bolders and coarfe mortar; and is covered on the upper fide with a coat of the fame fort of mortar to the depth of fix feet. In the centre of the platform is the bafe or foundation of a building in the fhape of a crofs, which rifes about five feet above the level of the platform. The fhaft of this crofs meafures 87 feet in length and 7½ feet in breadth; and its tranfverfe is 46 long and 22 wide. In the weftern wall of the caftle was a large opening, 34 feet wide, where, about five feet under the furface, is part of another platform, confifting of large fquare blocks of ftone, and meafuring 24 feet 11 inches in breadth. There is no appearance of any fuperftructure having been raifed from this foundation. Near the middle of the north wall is the oblique entrance, or "Porta-Decumana," which is narrow; and, from the holes remaining in the walls, feems to have been furnifhed with good timber defences. The exterior paffage, running parallel with the main wall, is about four feet and a half wide, having a channel at the bottom for carrying off water from the higher ground within the caftle. Many Roman coins and other antiquities have been difcovered as well within the area of the fortrefs, as in its vicinity; and at the diftance of about 460 yards from its fouth-weftern angle, the remains of a Roman amphitheatre are yet diftinctly vifible, though its banks are much mutilated and levelled by the operations of hufbandry. Leland informs us, in his Itinerary, that there was formerly "a lytle paroche chirch of St. Auguftine and an hermitage" within the caftle. The church was a chapel of eafe to that of Afh; and is mentioned as ftanding in the reign of Edward VI. Antiquities of Richborough and Reculver, abridged from the Latin of archdeacon Battely, Lond. 8vo. 1774. Bibliotheca Topographica Britannica, vol. i. 4to. Lond. 1780. Beauties of England, &c. vol. viii. by E. W. Brayley. King's Munimenta Antiqua, vol. iii.

RICHEA, in *Botany*, fo named by Mr. R. Brown, in memory of M. Riche, one of the naturalifts who accompanied the expedition in fearch of La Peroufe, and being in a confirmed confumption at fetting out, died in the courfe of the voyage. Labillardiere has dedicated a genus to this companion of his labours, but it proves no other than what Forfter had previoufly publifhed as CRASPEDIA; fee that article. Brown Prodr. Nov. Holl. v. 1. 555.—Clafs and order, *Pentandria Monogynia*. Nat. Ord. *Epacrideæ*, Brown.

Eff. Ch. Calyx membranous, fimple, in five deep fegments. Corolla of one petal, clofed, hood-like, fplitting tranfverfely; its abrupt bafe remaining. Stamens inferted into the receptacle, permanent. Five fcales under the germen. Capfule fuperior, of five cells. Receptacles feparate, pendulous from the top of the central column.

1. R. *dracophylla*.—Gathered by Mr. Brown, in Van Diemen's ifland. A *fhrub*, varying remarkably in ftature, being only eighteen inches high on the fummits of the mountains, but in woods at their fides becoming a fmall *tree*, of the height of ten feet. "It has altogether the habit of Labillardiere's *Dracophyllum montanum*, differing only in the fingular economy of the *corolla*, which however feems fufficient to mark it for a diftinct genus." *Brown.* Notwithftanding the opinion of this judicious author, we prefume to think his *Cyftanthe*, Prodr. Nov. Holl. v. 1. 555, fcarcely fufficiently diftinguifhed from the above. Their *corollas* and *capfules* agree; the only difference confifting in the foliaceous *calyx* of *Cyftanthe*, and its want of fcales below the *germen*. We feel the more difpofed to unite thefe genera, as there is but one known fpecies of either.

RICHEFORT, or RICCIAFORT, JOHN, in *Biography*, a Netherlandifh mufical compofer of confiderable eminence. He is placed by Walther in the middle of the fixteenth century; but he was certainly a compofer many years before that period, as we find his name not only in the second book of "Motetti della Corona," published at Fossembrone, 1519, and preserved in the British Museum, in which collection he was author of the fourth motet, "Miseremini mei;" but to a motet in a music-book, preserved at Cambridge, of Henry VIII. when prince of Wales. Glareanus says, that "great praise is due in our times to the vocal compositions of John Richefort." In the museum collection of French songs, in four, five, and six parts, printed in the Netherlands during the sixteenth century, there is one by this author for three tenors and a base, which, though it would be thought monotonous by modern ears, has great merit for the artful contexture of the parts, which are moving throughout in close fugue and imitation. The words, indeed, of these old songs are generally as rude and devoid of meaning as those of our own country, equally ancient; this, however, contains a general censure of indiscriminate urbanity.

RICHELET, Cæsar-Peter, a French writer, was born, in 1631, at Cheminon, in Champagne. He went, when young, to Dijon, where he superintended the education of the son of the marquis de Courtivron. About 1660 he went to Paris, was admitted an advocate, and began to plead at the bar. He became connected with d'Ablancourt and Patru, and acquired reputation from the attention he paid to the French language. In 1665 he was admitted to an academy of men of letters, which the abbé d'Aubignac had established at his own house. It appears that he was for some time placed about the dauphin, as one who might contribute to inspire that prince with the love of literature. He afterwards took up his abode in different parts of France, the enemies he made by his satirical disposition obliging him frequently to shift his residence. He died at Paris in 1698, at the age of 67. The principal work of Richelet is his "Dictionnaire François," of which the first edition was published at Geneva in 1680, 4to., and several have since been printed with additions. The last is that of the abbé Goujet, Lyons, 1759, 3 vols. fol. Richelet's Dictionary has been popular, though his orthography was much censured. He also published "Dictionnaire des Rimes;" "Les plus Belles-Lettres des meilleurs Auteurs François;" of this collection the best edition is that of Bruzen de la Martiniere, 1737, 2 vols. 12mo.; "A Translation of Garcilasso de la Vega's History of Florida;" and other works.

RICHELIEU, Armand du Plessis, a famous prime minister of France, born at Paris in 1585, was the son of Francis du Plessis Richelieu, grand provost of France, and captain of the guards to Henry IV. He was brought up to the church, and after studying at the Sorbonne, went to Rome. At the early age of 22, he was consecrated bishop of Luçon. Though he had obtained some distinction by his proficiency in scholastic theology, his great object was to make his way at court. He concealed, under polite and insinuating manners, a determined disposition, and a spirit of intrigue well suited to a female regency and a reign of favourites. The queen-mother, Mary of Medicis, in 1616 nominated him her grand almoner and secretary of state. On the fall of the marshal d'Ancre, his protector, Richelieu retired from court, and affected to employ himself in writing books of devotion, while he was upon the watch to recover his credit. This point he at length gained, by effecting an accommodation between the queen and her son Lewis XIII., and the new favourite de Lugnes rewarded his services by procuring him a cardinal's hat in 1622. After the death of Lugnes, the court and kingdom fell into disorder through the intrigues of the great, and the contentions of different parties, while all agreed in their defiance of the laws, and encroachments upon the supreme authority. A minister of equal talents and resolution was wanted to remedy these evils, and he existed in Richelieu. He had gained the confidence of the queen-mother, who recovered influence enough to introduce him into the council, notwithstanding the opposition of the other ministers, who feared him, and the repugnance of the king, who suspected his ambition, and was shocked with his licentious manners. In 1624 he found means to subvert all his rivals, and to possess himself of the whole authority of the crown.

The government, in his hands, soon assumed a tone of vigour and decision. He concluded the treaty of marriage between the prince of Wales and Henrietta, the French king's sister, in spite of the efforts of Rome and Spain, and equally disconcerted those courts by sending an army, and preventing the projected union with the Milanese. He next turned his arms against the French Calvinists, who, rendered disaffected by the frequent breaches of the treaties made with them, were become a kind of independent republic within the kingdom. Having first secured the friendship of Holland by pecuniary aid, he obtained the assistance of its fleet, and that of the English, against their brother Protestants of Rochelle, and expelled them from the isle of Rhé. It is acknowledged that the French monarchy dates from him its strength and independence. One of the principal enemies he had to contend with was Gaston, duke of Orleans, the king's brother. In consequence of a conspiracy entered into by this prince to assassinate the minister, and effect great changes at court, Richelieu arrested several of his confidents, and brought some of them to the scaffold. The danger he had incurred formed a pretext for giving him a body guard; and, by his pretended wishes to quit his station, he augmented his influence over his master. In 1627 war broke out with England, chiefly in consequence of the insolent vanity of the duke of Buckingham; and the Rochellers, with whom an accommodation had been made, were induced to favour the English. Richelieu thereupon resolved to reduce to submission a town which had long been the seat of an independent power, often leagued with the enemies of the kingdom; and after the duke of Buckingham had been obliged with disgrace to quit the isle of Rhé, Rochelle was invested on all sides. Richelieu in person took the command of the siege, and in order to prevent the arrival of succours by sea, he caused to be constructed a vast dyke in the ocean, by which all communication from abroad was cut off. This circumstance has given occasion to the cardinal's flatterers to compare him with Alexander before Tyre, and the work has been represented as one of the prodigies of his genius; but it was really that of the genius of the engineer Metezeau, and Richelieu only deserves the praise of adopting a bold design, and finding resources for putting it in execution. At length, after a noble resistance of eleven months, Rochelle submitted to famine; and the Protestants having lost their great bulwark, and all their other strong places, were rendered incapable of again acting as an armed party. It is to the credit of the policy and moderation of Richelieu that they were still allowed the free exercise of their religion.

In 1629 Richelieu received the patent of prime minister, and was nominated lieutenant-general of the army employed in the war in Italy, with powers so extensive, that the royal authority was reduced to a shadow. All that was great in the nation trembled before him. His foreign politics had chiefly in view the humiliation of the house of Austria; and by his treaty, in 1631, with Gustavus Adolphus, he enabled that great king to pursue those plans which brought the

the empire to the brink of ruin. Gaſton, duke of Orleans, in his retreat, with the duke of Lorraine, whoſe ſiſter he had married for his ſecond wife, plotted to excite a civil war for the expulſion of Richelieu, and his own return to conſequence. His intrigues were diſcovered, and all his partizans were declared guilty of treaſon. The duke of Lorraine was compelled to abandon him, and incurred the loſs of ſome of his ſtrongeſt places. Gaſton entered France with a ſmall body of troops, accompanied by the brave duke of Montmorenci, but was defeated at Caſtelnaudari. Montmorenci was taken priſoner, and expiated his crime on the ſcaffold. The queen-mother herſelf was put under arreſt, her ſervants were all ſent to the Baſtille, and ſhe finally ended her days in exile at Cologne. The king ſupported his miniſter in all theſe ſeverities, created him a duke and peer, and gave him the government of Brittany.

France had hitherto acted only as an ally to the Swedes in their hoſtilities againſt the houſe of Auſtria; but after their defeat at Norlingen in 1634, the cardinal thought it neceſſary to enter as a principal into the war; and forming an alliance with Holland, and the dukes of Savoy and Parma, he cauſed war to be declared againſt the king of Spain in 1635. Events were at firſt unfavourable to the French arms, but at length became more proſperous to France, and the enemy was driven from her territories; the public finances were, however, exhauſted, and recourſe was had to the creation of a great number of venal offices, and other objectionable meaſures, to raiſe the neceſſary ſupplies. The talents of a financier do not ſeem to have been among Richelieu's qualifications, and he himſelf gave an example of profuſion which increaſed the public diſcontent. No prime miniſter ever affected more ſtate and ſplendour. The daily expence of his houſehold was eſtimated at a thouſand crowns, a prodigious ſum at that period! His guards and attendants, his equipage and eſtabliſhment, were rather upon the ſcale of a ſovereign prince than of a ſubject, and he much ſurpaſſed his maſter in external pomp. Lewis betrayed a diſſatisfaction on this account, which probably induced Richelieu to make him a preſent of his palace, ſince called the Palais Royal. He incurred great perſonal danger in 1642, from a conſpiracy againſt his power and life, headed by Cingmars. (See his article.) The duke of Bouillon, and the duke of Orleans, entered into the plot, and negociations were opened with Spain for aſſiſtance. The good fortune of Richelieu produced a timely diſcovery of this treaſon, and Cingmars was beheaded. The duke of Bouillon was arreſted, but made his peace by reſigning his principality of Sedan. Gaſton furniſhed proofs againſt his aſſociates. The victim moſt worthy of compaſſion on this occaſion was the ſon of the illuſtrious de Thou, who was capitally condemned only for not revealing a conſpiracy which he diſapproved. Richelieu was at this time lying dangerouſly ſick at Taraſcon. He proceeded to Lyons by water, and was thence carried to Paris in a kind of chamber, borne on the ſhoulders of his guards, breaches being made in the walls of the towns through which he paſſed to admit him. It ſoon appeared that he had not long to live, and he prepared for the final change with great firmneſs. In receiving the ſacrament he declared, that in the courſe of his miniſtry, he had never any thing in view but the good of religion and the ſtate—a declaration which the public opinion did not ratify. He died in December 1642, at the age of 58, worn out with toil and anxiety; but he terminated his career with fortitude and ſerenity, that aſtoniſhed thoſe who had beheld the ſanguinary effects of his adminiſtration. Three mighty and ſucceſsful projects immortalize the period of his government. He humbled the turbulent ſpirits of the great, he ſubdued the ſtubborn zeal of the Hugonots, and he curbed the encroaching power of the houſe of Auſtria. Undaunted and implacable, prudent and active, no combinations of the powerful nobles could withſtand his vengeance; no intrigues could elude his penetration; while he exalted the throne, he controlled a ſovereign impatient to rule, and jealous of his authority; and while he extinguiſhed the liberties of the people, he eſtabliſhed among them diſcipline and order, and opened to them the paths to learning and renown. His own account of his public character is this: "I venture upon nothing till I have well conſidered it; but when once I have taken my reſolution, I go directly to my end; I overthrow and mow down all that ſtands in my way, and then cover the whole with my red mantle." He was fonder of power than money, yet he amaſſed a princely fortune, which he bequeathed to the king. He was the author of ſome ſplendid eſtabliſhments; he rebuilt the Sorbonne, founded the royal printing-houſe, the botanical garden, and the French academy. As a writer, he obtained ſome credit in the controverſy with the opponents of the Catholic church; the moſt famous of his ſuppoſed works is, his "Teſtament Politique," the authenticity of which has been the ſubject of warm controverſy .The letters of Richelieu are ſaid to be intereſting, of which the beſt edition is that of 1696, in two vols. 12mo. Gen. Biog. Hiſt. of France, three vols. 8vo. 1790.

Richelieu, in *Geography*, a town of France, in the department of the Indre and Loire, and chief place of a canton, in the diſtrict of Chinon; 11 miles S. of Chinon; deriving its name from cardinal Richelieu, its founder. The place contains 3600, and the canton 12,525 inhabitants, on a territory of 320 kiliometres, in 21 communes.

Richelieu, a river of Canada, iſſuing from lake Champlain, and firſt called "Chamblee," which name was changed by the French into Richelieu at fort Chamblee, and diſcharging itſelf into the river St. Lawrence, N. lat. 46° 1'. W. long. 72° 56'.

Richelieu *Iſlands*, a cluſter of ſmall iſlands in the river St. Lawrence, about 100 in number, 36 miles above Trois Rivières. N. lat. 46° 22'. W. long. 71° 7'.

RICHEMONT, a town of France, in the department of the Moſelle, on the Orne; 10 miles S. of Thionville.

RICHENBURG, a town of Bohemia, in the circle of Chrudim; 10 miles S.E. of Chrudim.

RICHENVEIR, a town of France, in the department of the Upper Rhine; ſix miles N.N.W. of Colmar.

RICHER, John, in *Biography*, a French aſtronomer and natural philoſopher in the 17th century, of whom little is known, till he was admitted a member of the Royal Academy of Sciences at Paris in the year 1666, under the title of aſtronomer to that body. About 1671, Lewis XIV. ſent him to the iſland of Cayenne in South America, for the purpoſe of making obſervations that might contribute to the improvement of aſtronomical ſcience. After three years he returned, and gave the reſult of his labours in his "Aſtronomical and Phyſical Obſervations made at the Iſland of Cayenne," which are inſerted in the ſeventh volume of the "Memoirs" of the Academy of Sciences. Caſſini ſpeaks of him with commendation in his "Elements of Aſtronomy." He died in the year 1696.

Richer, Claude, a learned prieſt and mathematician in the 18th century, was born at Auxerre in the year 1680. He was intended for the eccleſiaſtical profeſſion when very young, and was ſent to Paris for his education. Here he diſtinguiſhed himſelf in 1701, when only arrived to the years of manhood, by a work which he publiſhed, entitled "Univerſal Gnomonics, or the Science of Dialling," &c. After this he was ordained prieſt, and remained about ten years

years almoſt an entire ſtranger to men of letters, engaged in the religious education of the young. About the year 1730 his paſſion for mathematical ſtudies revived with great ardour, and he produced a work entitled "General Analyſis, containing New Methods of reſolving Problems of every kind, and of all degrees to infinity." This work was immediately adopted by the Academy of Sciences, and conſtitutes the eleventh volume of the "Memoirs." This volume was ſoon to be followed by three others; theſe, however, did not make their appearance, which was probably owing to a change in M. Richer's ſtudies. By an accidental peruſal of a fragment of Manetho, high prieſt of Heliopolis, in Egypt, he was induced to devote his whole attention to the moſt profound reſearches in ancient hiſtory. Notwithſtanding the obſcurity of this relic of antiquity, he conceived that he thoroughly underſtood it, and that it furniſhed him with a clue, by the aid of which he could unravel all the difficulties of ancient hiſtory, ſacred and profane. Under the influence of this perſuaſion, he laboured night and day in attempting to illuſtrate it, till he had produced two immenſe folio volumes, which no one would undertake to print. As a ſpecimen of his labours, he publiſhed "A Chronological Series of the Kings of Egypt, determined according to three ſimple Dynaſties, from the Fragment of Manetho." He died about the year 1756.

RICHERIA, in *Botany*, a genus dedicated by Vahl, to the much neglected memory of Peter Richer de Belleval, firſt profeſſor of Botany, as well as of Anatomy, at Montpellier, to whom Henry IV. of France committed the care of eſtabliſhing a public garden in that univerſity. This deſign was executed in the moſt ſkilful and ſplendid manner. Belleval publiſhed a catalogue of the garden in 1598, and a French treatiſe, in 1605, recommending an enquiry into the native plants of Languedoc. This laſt was accompanied by five plates, intended as a ſpecimen of a future work, for which he ſubſequently prepared a number of engravings, rude and ſtiff in execution, but exhibiting many rare ſpecies. He never lived to publiſh theſe, and the plates remained neglected in the hands of his family, till Gouan recovered them, and ſent impreſſions to Linnæus. At length Gillibert obtained the plates, and publiſhed them in 1796. The two pamphlets above-mentioned were republiſhed in 1785, by the celebrated and unfortunate Brouſſonet; along with a treatiſe on the White Mulberry, by Olivier de Serres, originally printed in 1603. Richer de Belleval lived to ſee his garden deſtroyed by the fury of civil war, and was beginning to reſtore it, when he died in 1623, aged 65. His nephew accompliſhed the reeſtabliſhment of the garden, on a more extenſive ſcale. M. Dorthes of Montpellier publiſhed, in 1786, Recherches ſur la Vie et les Ouvrages de Pierre Richer de Belleval, in which every thing, that could be collected on the ſubject, is recorded. Some writers erroneouſly mention Belleval as the firſt botaniſt who gave copper-plate figures of plants. This honour is due to Fabius Columna, whoſe *Phytobaſanos* appeared in 1592. We muſt not omit to mention, that Scopoli has named a genus *Bellevalia*, a name, or ſomething like it, which Belleval himſelf was fond of giving to the Lily of the Valley. Bruguiere, in 1775, called a Madagaſcar plant *Richeria*, but his genus has not been eſtabliſhed.—Vahl Eclog. v. 1. 30. Willd. Sp. Pl. v. 4. 1122. Mart. Mill. Dict. v. 4.—Claſs and order, *Polygamia Diœcia; Diœcia Pentandria;* or rather *Pentandria Monogynia.* Nat. Ord. *Euphorbiæ*, Juſſ.

Gen. Ch. Male, *Cal.* Perianth of one leaf, permanent, in four or five ovate, acute, downy ſegments. *Cor.* Petals four or five, roundiſh, the length of the calyx. Nectary four or five glands, at the baſe of the imperfect germen. *Stam.* Filaments four, five, or ſix, between the glands of the nectary, erect, longer than the calyx; anthers oblong, two-lobed, erect. *Piſt.* Rudiment of a germen ſuperior, conical, villous, ſtyle and ſtigma wanting.

Female, *Cal.* and *Petals* like the male. Nectary a rim round the baſe of the germen. *Stam.* none. *Piſt.* Germen ſuperior, ovate; ſtyle very ſhort; ſtigmas three, revolute, channelled above. *Peric.* Capſule coated, ovate, ſmooth and even, of three cells, with ſix valves, ſeparating at the baſe. *Seeds* ſolitary, pulpy-coated, pendulous from the top of the central column.

Eſſ. Ch. Male, Calyx four or five-cleft. Petals four or five. Nectary four or five glands, at the baſe of the imperfect germen. Stamens four or five.

Female, *Cal.* and *Cor.* like the male. Nectary a rim at the baſe of the germen. Style very ſhort. Stigmas three, revolute. Capſule coated, of three cells and ſix valves, ſplitting at the baſe. Seeds ſolitary, pulpy.

1. R. *grandis.* Vahl. Eclog. v. 1. 30. t. 4.—Gathered by Ryan, on the ſulphur mountain in the iſland of Montſerrat. A *tree* of a great ſize. *Leaves* alternate, ſtalked, oblong, acute, entire, coriaceous, ſmooth, veiny, ſix or ſeven inches in length; very much contracted at the baſe. *Spikes* axillary, ſolitary, longer than the footſtalks, lax. *Capſule* the ſize of a hazel-nut. The diſcoverer of this rare tree is ſaid to have found ſome of the *flowers* perfect as to *ſtamens* as well as *piſtil.* Hence, notwithſtanding the ſlight differences in the *nectary*, we ſhould incline to place the genus in *Pentandria Monogynia.*

RICHFIELD, in *Geography*, a town of America, in Otſego county, New York, taken from Otſego townſhip, and incorporated in 1792.

RICHFORD, the north-eaſternmoſt townſhip of Franklin county, Vermont, ſituated on Miſſiſcou river; containing 442 inhabitants.

RICH-HILL, a poſt-town of the county of Armagh, Ireland; 62 miles N.W. from Dublin, and four miles E. from Armagh.

RICHLAND, a diſtrict of South Carolina, bounded S. and S.W. by Congaree and Broad rivers, and E. by Wateree river, which divides it from Kerſhaw and Clermont counties.—Alſo, a townſhip of Bucks' county, in Pennſylvania, containing 1317 inhabitants.

RICHMAN'S ISLAND, a ſmall American iſland on the coaſt of Cumberland county, in the ſtate of Maine; four leagues N. from Wood iſland and one league W. of Portland. Few veſſels put in here, except coaſters. Wood iſland is in N. lat. 43° 50′. W. long. 69° 37′.

RICHMOND, a borough and market-town in the wapentake of Gilling-Weſt, north riding of Yorkſhire, England, is ſituated on the banks of the river Swale, at the diſtance of 48 miles N.W. from York, and 293 miles N.N.W. from London. It was anciently much celebrated for its caſtle, which was founded by the firſt earl of Richmond, Alan, ſon of Hoel, count of Brittany. This nobleman, who was nearly related to William, duke of Normandy, accompanied that prince in his expedition to England; and in reward for his ſervices, received from him all the forfeited eſtates of the brave Edwin, earl of Mercia. This grant was made during the time William was engaged in the ſiege of York, and is peculiarly remarkable on account of its brevity. Alan immediately after married Hawiſe, the conqueror's daughter; and being thus loaded both with riches and honour, built the caſtle, and part of the town of Richmond, to protect his family and his eſtates againſt the diſinherited and outlawed

outlawed Englifhmen in thofe parts. Having no iffue by his lady, the earldom of Brittany devolved to Conan le Groffe, his fon by a fecond wife; and Alan, furnamed the Black, fon of Hawife by a former hufband, obtained the earldom and eftates of Richmond. During the reigns of our Norman kings this title and property were poffeffed by feveral different families, fome of whom were allied to the blood royal, both of England and France. Edward III. conferred the eftate on his third fon, John of Gaunt, who afterwards furrendered it in exchange for fome other lands. The fame monarch gave Richmond, with his daughter, in marriage to John, earl of Montford and duke of Brittany, who was furnamed the Valiant. During the wars of York and Lancafter, both the title and the eftates feveral times changed poffeffors, and at length were vefted in the crown by the acceffion of Henry, earl of Richmond, to the throne, under the title of Henry VII. By his fucceffor, Henry VIII., Richmond was conftituted a duchy in the perfon of his natural fon, Henry, who died without iffue in the year 1535.

The town of Richmond is comparatively limited in extent and population; containing, according to the late parliamentary returns, only 512 houfes, and 3056 inhabitants. Its fine fituation, however, and the character of its buildings, which are in general conftructed of ftone, give it a dignified and interefting appearance. It occupies the top and declivity of a lofty eminence boldly rifing from the river Swale, which winds round the town and the caftle in a femicircular direction. The chief trade of this place is that of knit woollen ftockings, in which men, women, and children, are employed. The market day is Saturday, weekly; and there are befides four annual fairs. The market here is one of the largeft in the north of England for corn; and the fairs are noted for a great fupply of horfes, horned cattle, and fheep. Richmond is a borough by royal charter, and fends two reprefentatives to parliament, who are elected by "thofe perfons who are owners of ancient burgages in the faid borough, having a right of pafture in a common field, called Whitecliff pafture." The government of the town is vefted, by the charter of queen Elizabeth, in a mayor, recorder, twelve aldermen, twenty-four common council-men, and other inferior officers. The petty feffions for the wapentake of Gilling-Weft are holden here.

The caftle of Richmond ftands on the fouth fide of the town, on a bold eminence, overlooking the Swale, which runs in a deep valley beneath. On all fides the approach to it is fteep and difficult, except on the north, where the afcent is gradual. The caftle is now in a very ruinous condition, but it ftill retains the features of former grandeur and importance. The keep-tower, of which the fhell is nearly entire, is of great altitude; and its exterior walls are more than eleven feet thick. The lower ftory is fupported by a vaft column of ftone in the centre, from which fpring circular arches clofing the top. The ftaircafe only reaches to the firft chamber, the reft of it being dilapidated, as the floors of the two upper rooms are fallen in. In this keep is a well of excellent water. The ruins of feveral other parts of this caftle yet remain. In the fouth-eaftern corner of the area is a ruinous tower, below which is a dungeon, about fourteen feet deep. The ground covered by this fortrefs meafures nearly fix acres in extent, and is the property of the duke of Richmond and Lennox.

The country around Richmond is extremely picturefque, and affords feveral objects of intereft to the tourift and the antiquary. Clofe to the town, on the north, are the remains of a houfe of Grey friars, which was founded, in 1258, by Ralph Fitz-Randal, lord of Middleham; and adjoining is the fcite of a nunnery, now totally demolifhed. About a mile to the eaftward are the fine ruins of St. Agatha abbey, feated on the banks of the river Swale. This monaftery was eftablifhed, in 1151, by Roaldus, conftable of Richmond caftle, and at the time of the reformation maintained feventeen monks of the Premonftratenfian order. Richard Scroope, chancellor of England, was a great benefactor to this monaftery; for befides his manor of Brumpton-upon-Swale, he granted 150*l.* a-year for the fupport of ten additional regular canons, two fecular canons, and twenty-two poor men. Near this priory ftood an hofpital, which being decayed in the reign of Henry VI. was reftored by William Ayfcough, one of his judges, to whom he had given the patronage of it. A cell for Benedictines, dependent on the abbey of St. Mary of York, was fituated on an eminence in this neighbourhood. It was founded, in 1100, by Wymer, chief fteward to the earl of Richmond. Many other religious foundations occupied the banks of the Swale, which our limits forbid us to enumerate. The circumftance of the waters of this river having been held facred, on account of the baptifm of 10,000 Saxons near Catterick, by bifhop Paulinus, in 627, gave occafion to this multiplicity of religious foundations. Catterick is fituated at the diftance of five miles from Richmond; and is fuppofed by feveral antiquaries to be the fcite of the Roman Cataractonium, or Cataracton, mentioned in the Itinerary of Antoninus. Dr. Gibfon, however, fuppofes that ftation ftood between the village and the river, and fome extenfive Roman remains, on the fpot, he defcribes, feems to juftify his conjecture. This ftation continued for fome time a Saxon town; but was totally deftroyed at an early period by the Danes. The Roman road here divides itfelf into two branches, one of which leads to Caldwell, diftant about eight miles from Richmond, where veftiges of a large town may yet be traced. The Roman name of this ftation is unknown. A Tour in Scotland 1772, by Thomas Pennant, efq. 4to. Lond. 1790. Beauties of England and Wales, vol. xvi. by John Bigland.

Richmond, a village and parifh in the hundred of Kingfton, and county of Surrey, England, is fituated on the fouth bank of the river Thames, at the diftance of ten miles W.S.W. from St. Paul's cathedral, London. It is a fpot of great celebrity, both on account of the beauty of its fcenery, as well as from having been the fcite of a royal palace during feveral centuries. The firft authentic mention of the manor here occurs in the reign of king John, at which time it was denominated Sheen, and was the property of Michael Belet, who held it by the fervice of being the king's butler. In the reign of Edward I. it reverted to the crown, and has fince been generally poffeffed either by the king, or fome branch of the royal family. At what precife period the original royal palace was erected is uncertain; for though Edwards I. and II. refided for fome time in the manor-houfe, it does not appear to have been a ftructure entitled to that appellation. Edward III. is faid to have built a palace on his "maner of Shene;" but Manning, the author of the "Hiftory and Antiquities of Surrey," inclines to the opinion, that he only improved and enlarged the former building. Be this as it may, it had undoubtedly become a fixed regal refidence in the reign of that monarch, who died here the 21ft of June, 1377; as did queen Anne, the confort of his fucceffor, Richard II. in the year 1394. The latter prince was fo much affected by his lofs, that he abandoned the palace, and fuffered it to fall to ruin; or, as others affert, pulled it down. From this period Sheen remained in a neglected ftate, till the acceffion

of

of Henry V. to the throne, when the palace was rebuilt in a ſtyle of greater magnificence than before, and in ſuch a manner, as to render it "a delightful manſion of curious and coſtly workmanſhip, and befitting the character and condition of a king." Of Henry VI. we diſcover no traee here, nor does it appear that Edward IV. ever occupied the palace; but it is recorded, that he granted it, in the ſixth year of his reign, to his queen, Elizabeth, to be held by her during her life. Henry VII. gave the cuſtody of the manor to Robert Skeene; and on the death of his own mother-in-law, the queen dowager, in 1486, took poſſeſſion of the palace, which he frequently made his reſidence. In 1492 he held a grand tournament here, at which ſir James Parker, in a controverſy with Hugh Vaughan, for right of coat of armour, was killed in the firſt courſe. Seven years ſubſequent, the king being then at the palace, it was ſet on fire by accident, and almoſt totally deſtroyed. Henry, however, ſoon replaced it by another, which was built in a ſtyle of much "magnificence and elegance;" and on this occaſion changed the name of the manor to Richmond, in reference to his own title before he obtained the crown. The picture of Henry V. and his family, the marriage of Henry VI. and that of Henry VII. in the Strawberry-hill collection, are ſuppoſed to have been painted for this monarch, and intended for the palace of Richmond. It had been finiſhed only a ſhort time, when another fire broke out, which did conſiderable damage. One of the newly erected galleries alſo fell in the ſame year, only a few minutes after the king and his ſon had been walking in it. Philip I., king of Spain, was entertained here with great magnificence in the year 1506; and king Henry VII. died here 21ſt April, 1509. His ſucceſſor kept his Chriſtmas at Richmond the year ſucceeding his acceſſion to the throne; and on the 12th of January enſuing a tournament was held in the park, when the monarch himſelf, for the firſt time, took a part in the exerciſes. Charles V. was lodged at Richmond in the year 1523. King Henry VIII. had a ſon of his own name born here, who died when ſcarcely two months old. Queen Elizabeth was impriſoned in the palace by her ſiſter, queen Mary; and after ſhe was ſeated on the throne, it became one of her favourite places of reſidence. In her reign, Eric IV., king of Sweden, was lodged here, and here ſhe herſelf ended her days, on the 24th of March, in the year 1603. In the autumn of the ſame year the ſeveral courts of juſtice were removed hither from London to avoid the plague, which was then raging with great vehemence in the capital. Henry, prince of Wales, reſided here in 1605, and in 1625 the courts were a ſecond time adjourned to Richmond for the ſame reaſon as before mentioned. Charles I. was frequently at this palace, where he formed a large collection of pictures. In 1636 lord Buckhurſt, and lord Edward Sackville, performed a maſk before his majeſty and his royal conſort. When the ſame monarch was in Scotland, the parliament ordered that the young prince ſhould be ſent to Richmond with his governor, probably biſhop Duppa, who is ſaid to have educated Charles II. at this place. In the month of June, 1647, the palace was prepared for the king's reception, but he is generally ſtated to have refuſed to go to it. Mr. Lyſons, however, quotes a newſpaper of the 29th of Auguſt in that year, as mentioning that the prince elector was then at Richmond, and that the king, with the duke of York, hunted in the New Park, and killed a ſtag and a buck. During the commonwealth, the palace was ſold by the commiſſioners of the houſe of commons, who ordered a ſurvey of it to be taken, as it then exiſted. From this document we learn, that the great hall meaſured 100 feet in length, and 40 in breadth; and that it had a ſcreen at one extremity, and a turret or clock-caſe, covered with lead, at the other. The ſame record deſcribes the privy lodgings as a free-ſtone building, three ſtories high, and ſurmounted by fourteen turrets. A "canted tower," with a ſtaircaſe of 124 ſteps, is likewiſe noticed; alſo a chapel 96 feet long, and 40 broad; and a privy garden, with an open gallery 200 feet in length, over which was a cloſe gallery of the ſame extent; but no mention is made of a library, though a French writer aſſerts, that a royal library was eſtabliſhed at Richmond by Henry VII. and the librarian is enumerated among the officers of this palace in the houſehold eſtabliſhments of queen Mary and queen Elizabeth. The ſurvey further mentions three pipes, which ſupplied the palace with water, one from the white conduit in the New Park, another from the red conduit in the town-fields; and a third from a conduit near the alms-houſes, which are ſituated cloſe to the river. The materials of the palace are there valued at 10,782*l.* 19*s.* 2*d.* It was purchaſed by Thomas Rookeſby, William Goodrick, and Adam Baynes, on behalf of themſelves and other creditors, and ſhortly after reſold by them to ſir George Norton, who had been one of the commiſſioners appointed to ſit in judgment on Charles I. On the reſtoration, this gentleman having been deprived of his eſtates by confiſcation, Richmond palace was beſtowed on the queen mother, but it is probable, that at this period it was in a very diſmantled ſtate. Indeed Fuller, who wrote ſoon after the reſtoration, ſpeaks of it as pulled down; but this could not literally be the caſe, as it ſeems to have been inhabited ſubſequent to his day. Now, however, it is totally demoliſhed, except a few of the out-offices, and its ſcite is occupied by ſeveral houſes, which are held on leaſe from the crown. One of theſe, the property of the late duke of Queenſberry, was built by the third earl of Cholmondeley, who ornamented it with a very fine collection of pictures. The tapeſtry, which hung behind the earl of Clarendon in the court of chancery, ſtill decorates the hall of this manſion. The firſt mention made of a park at Richmond is in the reign of Edward I. This is the park which, in the time of Henry VIII. was called the Old or Great Park, in contradiſtinction to another adjoining, called the New Park, which had been formed by the predeceſſor of that monarch. The lodge belonging to it was for ſome months the reſidence of the celebrated cardinal Wolſey, after he had loſt the favour of his capricious and tyrannical maſter. Charles I. having formed a third park of far greater extent than both the former ones united, they appear to have merged into one ſoon after, as in the ſurvey taken in 1649, only two parks are mentioned, *viz.* that lately incloſed by the monarch, called the New Park, and another ſtyled the Little or Old Park. This laſt was valued at 220*l.* 3*s.* *per annum*, and was purchaſed by William Brome of London for 7048*l.* The lodge already mentioned was afterwards poſſeſſed by ſir Thomas Jervaſe, and the park by ſir John Trevor, in leaſe from the crown, to which the whole manor reverted at the reſtoration. King William afterwards granted the lodge, together with the ſtewardſhip of the manor, to John Latton, eſq., who held them till the death of that prince. In 1707, they were granted by queen Anne to James, duke of Ormond, who rebuilt the lodge, and reſided there till his attainder in 1715, when he privately withdrew to Paris. By act of parliament, paſſed in 1721, the earl of Arran, his brother, having been enabled to purchaſe his eſtates, king George II., then prince of Wales, bought this of Richmond from him, and frequently retired hither, even after his acceſſion to the throne.

throne. His queen, Caroline, was very partial to the ſpot, and had a dairy and menagerie here; ſeveral ornamental buildings were alſo diſperſed by the ſame princeſs throughout the gardens, in one of which, called the Hermitage, ſhe placed the buſts of Newton, Locke, and other eminent literary characters. His preſent majeſty frequently reſided here in the early part of his reign; and was ſo ſtrongly attached to the place, that he ordered the old lodge to be demoliſhed with the view of building a magnificent palace on its ſcite, which, however, has never riſen above the foundation; but an obſervatory has been erected at a ſhort diſtance from it, according to deſigns furniſhed by ſir William Chambers. Here is a mural arc of 140 degrees and eight feet radius; a zenith ſector of twelve feet; a tranſit inſtrument of eight feet; and a ten-feet reflector by Herſchel. On the top of the building is a moveable dome, which contains an equatorial inſtrument. Part of the Old Park forms a grazing and a dairy farm in his majeſty's own occupancy. The remainder conſtitutes the royal gardens, which were firſt laid out by Bridgeman, and afterwards altered to their preſent improved ſtate by Brown. The other park, *viz.* the New or Great Park, made by Charles I. met with great oppoſition to its formation, and may be reckoned among the impolitic meaſures of his reign. It was preſented to the common council of London by the parliament; but was reſtored to the crown in 1660. The rangerſhip of this park is conſidered an office of high dignity and truſt, and has been frequently held by a female branch of the royal family.

Within Richmond pariſh were anciently ſituated ſeveral religious houſes. Edward II. founded here a convent of Carmelite friars, and endowed it with an annual income of 120 marks out of his exchequer; but only two years after its eſtabliſhment he removed the monks to Oxford. Henry V. alſo founded here a houſe for the maintenance of friars of the Carthuſian order, whom he incorporated by the name of the Houſe of Jeſus of Bethlehem, at Shene. The foundation charter deſcribes it as built on the north ſide of the palace; and it appears from records to have been a ſtructure of great extent and magnificence. At the diſſolution its annual revenues were eſtimated at 962*l.* 11*s.* 6*d.*, and ſhortly after its ſcite was granted to Edward, earl of Hertford. A third convent was erected here by Henry VII. about the year 1499, and filled with friars of the Franciſcan order. This eſtabliſhment was ſuppreſſed in 1534, but its value is not recorded.

Richmond church is dedicated to St. Mary Magdalen, and conſiſts of a nave, two aiſles, and a chancel, built of bricks, with a ſquare embattled tower at the weſt end, conſtructed of ſtone and flints in chequers. The principal monuments here are thoſe of Henry, lord viſcount Brounker, cofferer to king Charles II.; admiral Holborn; ſir Matthew Decker; lady Chaworth, relict of ſir Richard Chaworth, who died in 1689; lady Howard, relict of William lord Howard of Eſcrick; James Thompſon, author of the "Seaſons;" and that of Mrs. Yates, the celebrated actreſs, who died in 1787. This church is in the dioceſe of Wincheſter, and in the deanery of Ewell. According to the parliamentary returns of 1811, the pariſh contains 875 houſes, and 5219 inhabitants. Hiſtory and Antiquities of the County of Surrey, by the late Rev. Owen Manning, S.T.P. continued by William Bray, eſq. of Shire, fol. vol. i. 1804. Salmon's Antiquities of Surrey, 8vo. 1732. Lyſons's Environs of London, vol. i. 4to. Maurice's Richmond, a poem, 4to.

Richmond, a townſhip of America, on the W. line of Maſſachuſetts, in Berkſhire county; 17 miles W. by S. from Lenox, and 150 W. of Boſton. Iron ore of the beſt quality is found here; but as it lies deep, it is raiſed at a great expence. It abounds with lime-ſtone, and coarſe, white, and clouded marble. It was incorporated in 1775, and contains an iron-work, three griſt-mills, a fulling-mill, two ſaw-mills, with 1041 inhabitants.—Alſo, a townſhip of Cheſhire county, New Hampſhire, on the Maſſachuſetts line, about 11 miles E. of Connecticut river, and 97 W. by S. from Portſmouth. It was incorporated in 1752, and contains 1290 inhabitants.—Alſo, a townſhip in Waſhington county, Rhode iſland, ſeparated from Hopkington on the W. by Ward's river, a branch of Paucatuck river. It is diſtant about 19 miles W. of Newport, and contains 1330 inhabitants.—Alſo, a county of New York, comprehending the whole of Staten iſland; which ſee.—Alſo, a county of North Carolina, in Fayette diſtrict, bounded S. by the ſtate of South Carolina, and N. by Moore county. It contains 6695 inhabitants. The chief town is Rockingham. The S.E. part of the county is a continued plain, covered in many places by pines, and moſtly inhabited by Scotſmen. The upper part has hills and vallies. In the middle and eaſt parts large tracts remain uncultivated. The inhabitants, with regard to religion, are Preſbyterians, Baptiſts, Methodiſts, and Quakers. Their houſes are logs, covered with ſlabs.—Alſo, a county of Virginia, bounded N. and N.E. by Weſtmoreland, and S. and S.W. by Rappahannock river, which ſeparates it from Eſſex county. It contains 6214 inhabitants. The court-houſe is 273 miles from Philadelphia.—Alſo, the preſent ſeat of government of the ſtate of Virginia, ſituated in Henrico county, on the N. ſide of James' river, at the foot of the falls, and containing between 400 and 500 houſes; built partly on the bank of the river ſo as to be convenient for trade, and partly upon an eminence that overlooks the lower part of the town, and commands an extenſive proſpect of the river and country. The new houſes are well built, and the ſtate-houſe is on the hill. In this town is an elegant ſtatue of the illuſtrious Waſhington, executed at Paris. The lower part of the town is divided by a creek, over which is a convenient bridge. Another bridge of curious conſtruction connects the city with Mancheſter. The public buildings, beſides the ſtate-houſe, are an epiſcopal church, a court-houſe, gaol, theatre, and three tobacco warehouſes. At the W. end of the town are ſeveral mills. Near the mills are a diſtillery and brewery. The falls above the bridge are ſeven miles in length. A noble canal is cut on the N. ſide of the river, which terminates in a baſin of about two acres, in the town of Richmond. Richmond is 626 miles from Boſton, 374 from New York, 176 from Baltimore, 278 from Philadelphia, 247 from Fayetteville, 497 from Charleſton, and 662 from Savannah. N. lat. 37° 40′. W. long. 77° 50′.—Alſo, a county of the upper diſtrict of Georgia, in which is ſituated the city of Auguſta; it is ſeparated from South Carolina on the E. by Savannah river, and contains ſix towns and 6189 inhabitants.—Alſo, a townſhip in Chittenden county, Vermont, eſtabliſhed in 1794: it contains an excellent tract of land, and lies on both ſides of Onion river. It has 935 inhabitants.—Alſo, a town, or rather village, in the iſland of St. Vincent, in the Weſt Indies; ſituated at the head of a deep bay, on the W. ſide of the iſland. Chateaubelair river runs on the S. ſide of the town, which gives name to the bay. Another river on the N. ſide of the town empties into the bay.—Alſo, a townſhip in Lenox county, Upper Canada, N. of Fredericksburgh in the bay of Quinte, and watered in front by the river Appennie.

Richmond *Bay*, a bay on the N. coaſt of the iſland of St. John, in the gulf of St. Lawrence.

RICHOLD, or RICHELD, a town of France, in the department of the Roer, near the Meufe; two miles N.W. of Dalem.

RICHTENBERG, a town of Anterior Pomerania; 28 miles E.N.E. of Roftock. N. lat. 54° 11′. E. long. 12° 50′.

RICHTENSWYL, a town of Switzerland, fituated on the W. fide of the lake of Zurich, in the canton of Zurich, with a convenient harbour; 11 miles S. of Zurich.

RICHTER, FRANCIS-XAVIER, in *Biography*. There are fix muficians, male and female, recorded in Gerber's Continuation of Walther's Lexicon; among whom, the moft celebrated and beft known in England was Francis-Xavier, whofe works, of various kinds, have great merit. His harmony is correct; the fubjects are often new and noble; but his detail and manner of treating them are frequently dry and fteril, and he fpins and repeats paffages in different keys without end. The French and Italians have a term for this tedioufnefs, which is wanting in our language, they call it *rofalie*, or *rofalia*; derived from the name of a female faint, remarkable for repeating her "Pater nofter," and ftringing her beads more frequently than even St. Dominic himfelf, or than any other pious perfon, that has merited a place in the Golden Legend. An Italian cries out, upon hearing a ftring of repetitions, either a note higher, or a note lower, of the fame paffage or modulation, *ah fanta Rofalia!* Indeed this fpecies of iteration indicates a want of invention in a compofer, as much as ftammering and hefitation imply a want of wit or memory in a ftory-teller. He died at Strafburgh in 1789, in the 80th year of his age.

RICIMER, count and patrician of the Weftern empire, and an important civil and military character in the fifth century, ferved from his youth in the Roman armies, in which he acquired great reputation by his warlike exploits, and at length came to be regarded as the ableft commander of the age. In the reign of the emperor Avitus, being one of the chief commanders of the Barbarian troops which formed the defence of Italy, he deftroyed, in the year 456, on the coaft of Corfica, a fleet of Genferic, the Vandal king, deftined to ravage the coafts of Gaul or Italy. His fuccefs in this inftance enabled him to avail himfelf of the public difcontent to depofe Avitus, and raife Majorian to the throne in the year 457. Not being raifed to the dignity which he expected under this prince, he compelled him to abdicate the purple, which act was foon followed by his death. Ricimer next raifed an obfcure man, named Libius Severus, to the throne, who bore the title of emperor during four years without performing any one imperial function. In that period, and in an interregnum of two years more, Ricimer exerted fovereign authority, amaffing treafures, forming a feparate army, and negociating alliances. His own mean birth prevented him from affuming the purple, and in 467 he concurred in the inauguration of Anthemius, whofe daughter he married. The new emperor and his fon-in-law paffed fome years in union, but at length diffentions broke out between them, which ended in the murder of the emperor, and Olybrius was proclaimed in his ftead. Thus a third, or perhaps a fourth, emperor was added to the number of Ricimer's victims; but in a few weeks after the maffacre of Anthemius, "Italy," fays Gibbon "was delivered by a painful difeafe from the tyrant Ricimer, who bequeathed the command of his army to his nephew Gundobald, one of the princes of the Burgundians." Gibbon's Rom. Hift. vol. vi.

RICINA, in *Ancient Geography*, an ifland fituated on the coaft of Hibernia, being one of thofe called Ebudes, according to Ptolemy and Pliny.—Alfo, a town of Italy, in the Picenum, which became a Roman colony under the reign of the emperor Severus. It was fituated S.W. of Auximum.—Alfo, a town of Italy, in Liguria, S.E. of Genoa.

RICINOCARPODENDRON, compounded of *ricinus*, καρπὸς, *fructus*, and δενδρον, *arbor*, in *Botany*, the name of a genus of plants, eftablifhed by Dr. Amman, the characters of which are thefe: the flower is of the rofaceous kind, confifting of three petals, difpofed in a circular order, in the centre of which there arifes a large and open tube, through which fhoots up the piftil, which grows at the bottom of the cup; this piftil, finally, becomes a trigonal fruit, divided into three cells within, and containing each one feed in a rough coat.

The leaves of this tree fometimes refemble thofe of the afh, being compofed of three or four pairs of fmaller leaves joined to a middle rib, thefe are not ferrated, and terminate in a fharp point; the flowers grow at the alæ of the leaves, they are white, and are difpofed in lax fpikes; the fruit is green at firft, afterwards it becomes of a yellowifh-red, and finally fcarlet; it is of the bignefs of a walnut, and in fhape much refembles the fruit of the ricinus; the covering of the feeds is black on the outfide, and red within, and each feed is divided into two lobes; when ripe, the fruit burfts, and the feeds fall out. It is a native of the Eaft Indies. Act. Petropol. vol. iii. p. 214.

RICINOCARPOS, from the refemblance of the fruit to *Ricinus*. See ACALYPHA, CROTON, MERCURIALIS, TRAGIA.

RICINOIDES. See CEANOTHUS, CROTON, JATROPHA.

RICINUS, fo denominated from the refemblance its feed has to the little infect called *a tick*, *Ricinus*; and this, according to Ainfworth, is compounded of *re* and *canis*, becaufe the tick, or tyke, is particularly annoying to dogs, by fixing itfelf upon their ears and other parts. It is the Κικι or Κροτων of Diofcorides, words expreffive of the likenefs of its feed to the above-named infect; the former of thefe appellations, however, is of eaftern origin, and of rather uncertain fignification, occurring in the prophet Jonah. Pliny mentions an Egyptian herb called *Palma-Chrifti*, with feeds like a tyke.—Linn. Gen. 503. Schreb. 655. Willd. Sp. Pl. v. 4. 564. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 331. Purfh v. 2. 602. Tournef. t. 307. Juff. 388. Lamarck Dict. v. 6. 200. Illuftr. t. 792. Gærtn. t. 107. Loureir. Cochinch. 584.—Clafs and order, *Monoecia Monadelphia*. Nat. Ord. *Tricoccæ*, Linn. *Euphorbiæ*, Juff.

Gen. Ch. Male, *Cal.* Perianth inferior, of one leaf, cloven into five, ovate, concave fegments. *Cor.* none. *Stam.* Filaments very numerous, thread-fhaped, united unequally below into various fets; anthers twin, roundifh.

Female on the fame plant with the male, *Cal.* Perianth inferior, of one leaf, deciduous, cloven into three, ovate, concave fegments. *Cor.* none. *Pift.* Germen fuperior, ovate, covered with awl-fhaped briftly bodies; ftyles three, cloven, erect and fpreading, hifpid; ftigmas fimple. *Peric.* Capfule roundifh, three-furrowed, generally prickly all over, of three cells and three valves. *Seeds* folitary, nearly ovate.

Eff. Ch. Male, Calyx five-cleft. Corolla none. Stamens numerous. Female, Calyx three-cleft. Corolla none. Styles three, cloven. Capfule three-celled. Seed folitary.

Obf. Willdenow divides this genus into two fections; the firft containing fuch fpecies as have *palmate leaves*, the fecond thofe which have fimple, *undivided leaves*.

Sect. 1. *Leaves palmate.*

1. R. *communis*. Common Palma-Chrifti, or Caftor-oil Plant. Linn. Sp. Pl. 1430. Woodv. Med. Bot. 171. t. 61.—Leaves peltate; lobes lanceolate, ferrated. Stem herbaceous, pruinofe. Stigmas three, cloven at the tip.—Native of the Eaft and Weft Indies. Firft cultivated in England, as appears from Turner's Herbal, in 1562. It flowers in July and Auguft. *Root* biennial or annual, long, thick, and fibrous. *Stems* round, thick, jointed, channelled, glaucous; of a purplifh-red colour upwards. *Leaves* large, deeply divided into feven fegments, on long, tapering, purplifh ftalks. *Flowers* in long, green, and glaucous fpikes, fpringing from the divifions of the branches; the males form the lower part of the fpike, the females the upper. *Seeds* ovate, fhining, black dotted with white.

The prefent fpecies is fubject to confiderable variations. In our gardens it is a ftrong, luxuriant, fhrubby annual. In Africa it becomes a tree. Clufius obferved it in Spain, with a trunk as large as a man's body, and fifteen or twenty feet high. And Ray faw it in Sicily as big as our common Elder-trees, woody and long-lived. From the feeds of this valuable plant is extracted the *oleum ricini*, or caftor-oil, fo important for its medicinal properties as a gentle, though moft effectual, cathartic.

2. R. *viridis*. Green Palma-Chrifti. Willd. n. 2. Hort. Berol. v. 1. t. 49.—Leaves peltate; lobes oblong, toothed, the midddle one flightly three-lobed. Stem herbaceous, pruinofe. Stigmas fix.—Native of the Eaft Indies, flowering at Kew, in Auguft. Very like the laft, but always annual, with a taller and fomewhat lefs pruinofe *ftem*. *Leaves* larger, and not fo diftinctly palmate.

3. R. *africanus*. African Palma-Chrifti. Willd. n. 3. (R. communis; Desfont. Atlant. v. 2. 355.)—Leaves peltate; lobes oblong, ferrated. Stem fhrubby, fmooth.—Native of the north of Africa. *Stem* arboreous, or rather fhrubby, not pruinofe. *Leaves* fmaller than in the preceding. *Stigmas* fix, or more properly three, cloven down to the bafe.

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6. R. *fpeciofus*. Beautiful Palma-Chrifti. Willd. n. 6. Burman. Ind. 207. t. 63. f. 2.—Leaves peltate, inclining to digitate; leaflets lanceolate, ferrated.—Native of Java. We know not that this is any where defcribed or figured, except as it occurs in the above authors.

Sect. 2. *Leaves fimple, or undivided.*

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8. R. *dioicus*. Dioecious Palma-Chrifti. Willd. n. 8. Forft. Prodr. 67.—Leaves heart-fhaped, pointed, nearly entire. Flowers dioecious. Capfules muricated.—Native of Tanna ifland. This *fhrub* has round, fmooth, brown *branches*, the younger ones white with down. *Leaves* alternate, entire, or very obfcurely toothed; fmooth above with downy veins; refinous and dotted beneath. *Female flowers* in fmall, axillary, ftalked *clufters*. *Bractea* folitary, ovate, pointed, very large, at the bafe of every flower.

9. R. *globofus*. Globular Palma-Chrifti. Willd. n. 9. (Croton globofum; Swartz Ind. Occ. v. 2. 1181.)—Leaves ovate, obtufe, entire. Flowers dioecious. Capfules globular.—Native of lofty mountains in Jamaica. A branched, erect *fhrub*, four or five feet high. *Branches* round, ftriated, afh-coloured. *Leaves* alternate, ftalked, coriaceous. *Flowers* in terminal, fhort, erect *clufters*. *Capfule* roundifh, the fize of a pea.

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This plant becomes a tree in its native fituation, and the feeds afford the caftor-oil of the fhops.

And there are feveral varieties of it, as the great American palma-Chrifti, which has brown ftalks that divide into two or three branches, and rife fix or feven feet high; the leaves are broader, and not fo deeply divided; they are of a deep green on both fides, and are unequally ferrate. The fpikes of flowers are fhorter, the feed-veffels rounder and of a brownifh colour, and the feeds are much lefs, and brown. This fort is a native of the Weft Indies.

Alfo the green-ftalked American palma-Chrifti, which has a thick herbaceous ftem, of a greyifh-green, with the joints not fo far afunder as in the preceeding fort: it rifes about four feet high, and is divided at the top into three or four branches, which fpread out almoft horizontally; the leaves are large, of a deep green on their upper fide, but greyifh on their under; they are deeply cut into fix or feven (fometimes eight) lanceolate fegments, which are unequally ferrate: the petioles fpread out more horizontally than thofe of the common fort, and are much fhorter: the principal ftalk and branches are terminated by loofe fpikes of flowers; the covers of the capfules are green, and clofely armed with foft fpines; the feeds are fmaller and lighter coloured than thofe of the preceding fort. This is alfo a native of the Weft Indies.

Likewife the wrinkled-capfuled palma-Chrifti, which rifes with an herbaceous ftalk about four feet high; the lower part is purplifh, and the upper deep green, the joints pretty far afunder; the leaves are of a deep green on their upper fide, but paler underneath; they are not fo deeply divided as fome of the others, and are more regularly ferrate; the fpikes of flowers are large; the males have more ftamens, with yellow anthers; the capfules are oval and wrinkled,

 but

RICHOLD, or RICHELD, a town of France, in the department of the Roer, near the Meuſe; two miles N.W. of Dalem.

RICHTENBERG, a town of Anterior Pomerania; 28 miles E.N.E. of Roſtock. N. lat. 54° 11′. E. long. 12° 50′.

RICHTENSWYL, a town of Switzerland, ſituated on the W. ſide of the lake of Zurich, in the canton of Zurich, with a convenient harbour; 11 miles S. of Zurich.

RICHTER, FRANCIS-XAVIER, in *Biography*. There are ſix muſicians, male and female, recorded in Gerber's Continuation of Walther's Lexicon; among whom, the moſt celebrated and beſt known in England was Francis-Xavier, whoſe works, of various kinds, have great merit. His harmony is correct; the ſubjects are often new and noble; but his detail and manner of treating them are frequently dry and ſteril, and he ſpins and repeats paſſages in different keys without end. The French and Italians have a term for this tediousneſs, which is wanting in our language, they call it *roſalie*, or *roſalia;* derived from the name of a female ſaint, remarkable for repeating her "Pater noſter," and ſtringing her beads more frequently than even St. Dominic himſelf, or than any other pious perſon, that has merited a place in the Golden Legend. An Italian cries out, upon hearing a ſtring of repetitions, either a note higher, or a note lower, of the ſame paſſage or modulation, *ah ſanta Roſalia!* Indeed this ſpecies of iteration indicates a want of invention in a compoſer, as much as ſtammering and heſitation imply a want of wit or memory in a ſtory-teller. He died at Straſburgh in 1789, in the 80th year of his age.

RICIMER, count and patrician of the Weſtern empire, and an important civil and military character in the fifth century, ſerved from his youth in the Roman armies, in which he acquired great reputation by his warlike exploits, and at length came to be regarded as the ableſt commander of the age. In the reign of the emperor Avitus, being one of the chief commanders of the Barbarian troops which formed the defence of Italy, he deſtroyed, in the year 456, on the coaſt of Corſica, a fleet of Genſeric, the Vandal king, deſtined to ravage the coaſts of Gaul or Italy. His ſucceſs in this inſtance enabled him to avail himſelf of the public diſcontent to depoſe Avitus, and raiſe Majorian to the throne in the year 457. Not being raiſed to the dignity which he expected under this prince, he compelled him to abdicate the purple, which act was ſoon followed by his death. Ricimer next raiſed an obſcure man, named Libius Severus, to the throne, who bore the title of emperor during four years without performing any one imperial function. In that period, and in an interregnum of two years more, Ricimer exerted ſovereign authority, amaſſing treaſures, forming a ſeparate army, and negociating alliances. His own mean birth prevented him from aſſuming the purple, and in 467 he concurred in the inauguration of Anthemius, whoſe daughter he married. The new emperor and his ſon-in-law paſſed ſome years in union, but at length diſſentions broke out between them, which ended in the murder of the emperor, and Olybrius was proclaimed in his ſtead. Thus a third, or perhaps a fourth, emperor was added to the number of Ricimer's victims; but in a few weeks after the maſſacre of Anthemius, "Italy," ſays Gibbon "was delivered by a painful diſeaſe from the tyrant Ricimer, who bequeathed the command of his army to his nephew Gundobald, one of the princes of the Burgundians." Gibbon's Rom. Hiſt. vol. vi.

RICINA, in *Ancient Geography*, an iſland ſituated on the coaſt of Hibernia, being one of thoſe called Ebudes, according to Ptolemy and Pliny.—Alſo, a town of Italy, in the Picenum, which became a Roman colony under the reign of the emperor Severus. It was ſituated S.W. of Auximum.—Alſo, a town of Italy, in Liguria, S.E. of Genoa.

RICINOCARPODENDRON, compounded of *ricinus*, καρπὸς, *fructus*, and δένδρον, *arbor*, in *Botany*, the name of a genus of plants, eſtabliſhed by Dr. Amman, the characters of which are theſe: the flower is of the roſaceous kind, conſiſting of three petals, diſpoſed in a circular order, in the centre of which there ariſes a large and open tube, through which ſhoots up the piſtil, which grows at the bottom of the cup; this piſtil, finally, becomes a trigonal fruit, divided into three cells within, and containing each one ſeed in a rough coat.

The leaves of this tree ſometimes reſemble thoſe of the aſh, being compoſed of three or four pairs of ſmaller leaves joined to a middle rib, theſe are not ſerrated, and terminate in a ſharp point; the flowers grow at the alæ of the leaves, they are white, and are diſpoſed in lax ſpikes; the fruit is green at firſt, afterwards it becomes of a yellowiſh-red, and finally ſcarlet; it is of the bigneſs of a walnut, and in ſhape much reſembles the fruit of the ricinus; the covering of the ſeeds is black on the outſide, and red within, and each ſeed is divided into two lobes; when ripe, the fruit burſts, and the ſeeds fall out. It is a native of the Eaſt Indies. Act. Petropol. vol. iii. p. 214.

RICINOCARPOS, from the reſemblance of the fruit to *Ricinus*. See ACALYPHA, CROTON, MERCURIALIS, TRAGIA.

RICINOIDES. See CEANOTHUS, CROTON, JATROPHA.

RICINUS, ſo denominated from the reſemblance its ſeed has to the little inſect called *a tick*, *Ricinus;* and this, according to Ainſworth, is compounded of *re* and *canis*, becauſe the tick, or tyke, is particularly annoying to dogs, by fixing itſelf upon their ears and other parts. It is the Κικι or Κροτων of Dioſcorides, words expreſſive of the likeneſs of its ſeed to the above-named inſect; the former of theſe appellations, however, is of eaſtern origin, and of rather uncertain ſignification, occurring in the prophet Jonah. Pliny mentions an Egyptian herb called *Palma-Chriſti*, with ſeeds like a tyke.—Linn. Gen. 503. Schreb. 655. Willd. Sp. Pl. v. 4. 564. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 331. Purſh v. 2. 602. Tournef. t. 307. Juſſ. 388. Lamarck Dict. v. 6. 200. Illuſtr. t. 792. Gærtn. t. 107. Loureir. Cochinch. 584.—Claſs and order, *Monoecia Monadelphia*. Nat. Ord. *Tricoccæ*, Linn. *Euphorbiæ*, Juſſ.

Gen. Ch. Male, *Cal.* Perianth inferior, of one leaf, cloven into five, ovate, concave ſegments. *Cor.* none. *Stam.* Filaments very numerous, thread-ſhaped, united unequally below into various ſets; anthers twin, roundiſh.

Female on the ſame plant with the male, *Cal.* Perianth inferior, of one leaf, deciduous, cloven into three, ovate, concave ſegments. *Cor.* none. *Piſt.* Germen ſuperior, ovate, covered with awl-ſhaped briſtly bodies; ſtyles three, cloven, erect and ſpreading, hiſpid; ſtigmas ſimple. *Peric.* Capſule roundiſh, three-furrowed, generally prickly all over, of three cells and three valves. *Seeds* ſolitary, nearly ovate.

Eſſ. Ch. Male, Calyx five-cleft. Corolla none. Stamens numerous. Female, Calyx three-cleft. Corolla none. Styles three, cloven. Capſule three-celled. Seed ſolitary.

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Alfo the green-ftalked American palma-Chrifti, which has a thick herbaceous ftem, of a greyifh-green, with the joints not fo far afunder as in the preceeding fort: it rifes about four feet high, and is divided at the top into three or four branches, which fpread out almoft horizontally; the leaves are large, of a deep green on their upper fide, but greyifh on their under; they are deeply cut into fix or feven (fometimes eight) lanceolate fegments, which are unequally ferrate: the petioles fpread out more horizontally than thofe of the common fort, and are much fhorter: the principal ftalk and branches are terminated by loofe fpikes of flowers; the covers of the capfules are green, and clofely armed with foft fpines; the feeds are fmaller and lighter coloured than thofe of the preceding fort. This is alfo a native of the Weft Indies.

Likewife the wrinkled-capfuled palma-Chrifti, which rifes with an herbaceous ftalk about four feet high; the lower part is purplifh, and the upper deep green, the joints pretty far afunder; the leaves are of a deep green on their upper fide, but paler underneath; they are not fo deeply divided as fome of the others, and are more regularly ferrate; the fpikes of flowers are large; the males have more ftamens, with yellow anthers; the capfules are oval and wrinkled,

 but

but have no prickles; the feeds are fmall and brown. This is a native of both the Indies.

Farther, the red-ftalked palma-Chrifti, which rifes with a large reddifh ftalk to the height of ten or twelve feet, with many joints, and dividing into feveral branches; the leaves are very large, fome meafuring more than two feet and a half in diameter; are of a dark green, unequally ferrate, and not fo deeply cut as in fome of the varieties; the fpikes of flowers are large, and brown, with whitifh anthers; capfules large, oval, and clofely fet with foft prickles; the feeds are very large, and beautifully ftriped. This fort is a native of Africa and both the Indies.

And the fmall American palma-Chrifti, of which there are two fub-varieties, one with a red, the other with a pale-green ftalk, diftinguifhed in America by the names of red and white oil-feed; the ftem feldom rifes more than three feet high, fometimes dividing at the top into two or three branches; the leaves are much fmaller and more deeply divided than in the other varieties; their borders are unequally ferrate, and the fegments of the leaves are frequently cut on the fides; the fpikes of flowers are fmaller and more compact; the capfules are alfo fmaller, rounder, of a light green, and clofely fet with foft prickles; the feeds fmall, and finely ftriped. This is a native of Carolina, aud fome other places.

Laftly, the livid leaved palma-Chrifti, which is an evergreen tree, ten feet in height, and more; the trunk, during the firft year, is blood-red and very fhining; afterwards it becomes woody, as thick as the wrift, hollow with tranfverfe fepta, pithy, with circular warts at the joints from fallen ftipulas, afh-coloured, interruptedly and flightly ftreaked: before the leaves come out, they are wrapped up in red ftipulas like fheaths, that fall off foon after; the leaves are divided half way into eight, fometimes ten lobes, which are ferrate and acute, and the petiole is long; they are of a dark blood-red colour on the upper furface, and livid on the lower, with blood-red veins, the largeft lefs than a foot in diameter, quite fmooth, without any hairinefs whatever; the fruit of a livid colour, with long foft prickles; the feed fhining, variegated with black and brown. This is a native of the Eaft Indies.

Method of Culture.—All thefe forts of plants are capable of being increafed by feeds, which fhould be fown upon a hot-bed in the fpring, and when the plants are come up, be each planted into a feparate pot filled with light frefh earth, and plunged into a frefh hot-bed, watering and fhading them until they have taken root; after which they muft have a great fhare of free air when the feafon is mild, otherwife they draw up tall and weak. As the plants grow faft, and their roots in a fhort time fill the pots, they fhould be fhifted into larger pots, filled as above; and about the end of May, when the feafon is warm, be hardened to endure the open air by degrees; when, if fome of the plants be fhaken out of the pots, and planted out into a very rich border, and in dry weather duly watered, they grow to a large fize, and produce a great quantity of flowers and feeds. If it be intended to preferve any of the plants through the winter, they muft not be planted out in the full grouud, but be fhifted into larger pots occafionally, as their roots require, placing them in the open air during the fummer feafon in fome warm fituation, where they may remain until October, when they muft be removed into the green-houfe with other exotic plants, watering them fparingly in winter, and admitting free air in mild weather, as they only require to be protected from froft and cold winds.

In common, they have a fine ornamental effect in their leaves among other potted green-houfe plants, and alfo in the large open border or clumps, when cultivated as annuals; but they require room.

Ricinus *Communis*, or common Palma-Chrifti, in the *Materia Medica*. See Castor *Oil.*

RICITOSA, in *Geography*, a town of Moldavia; 20 miles W. of Birlet.

RICK, in *Rural Economy*, a term applied to a pile of corn, hay, ftraw, &c. regularly heaped up in the open air, and fheltered from wet by thatch. See Stack, and Stand, *Corn.*

Rick-*Yard*, a term fometimes given to that part of the farm-yard in which the ftacks are placed. They fhould be fufficiently large, well fheltered from winds, and perfectly fecured from all forts of vermin, efpecially rats and mice.

RICKBAD, in *Geography*, a town of Hindooftan, in Oude; 20 miles N.W. of Lucknow.

RICKETS, in *Medicine*, a difeafe affecting children, and principally characterifed by enlargement and flexure, or diftortion of the bones.

The origin and etymology of this word are equally unknown. It has occurred in this, as in feveral other inftances, that the vulgar had recognized and given a name to the difeafe, before medical men had difcriminated its nature, or at leaft had taken the pains to point out its peculiarities by any written document. The firft account of the difeafe is that of Dr. Gliffon, publifhed in the year 1650, which was the refult of fome communications on the fubject in a private medical fociety. In this treatife we are informed, that the *rickets* had firft been noticed in the counties of Dorfet and Somerfet, about thirty years before, where it was vulgarly known by this name, and that it fpread from thence over all the fouthern and weftern parts of the kingdom, but was not yet commonly known in the north. The rapidity of its progrefs, and the extent and fatality of its prevalence, are fcarcely lefs extraordinary than its general and fpeedy difappearance in later times, as no affignable caufe has ever been pointed out either for its origin or its ceffation. Its firft appearance, as a caufe of death, in the bills of mortality of London, was in the year 1634, when the total number of deaths under this head was only 14; but an extraordinary increafe foon took place. For, in 1649, the deaths from rickets amounted to 190; in 1650, to 260; in the following year, to 329; and in 1660, 521 perfons died of this difeafe. At the commencement of the 18th century, the mortality from this diforder was 393 (A. D. 1700); and it fubfequently decreafed rapidly; for in the year 1750, the number of deaths, recorded in the bills under the head of rickets, is only 21; and at the end of the century (1799), the deaths, under the head of "evil and rickets" conjoined, do not exceed 7. (See Ann. Medical Regifter, vol. i. for 1808, p. 324.) At prefent, indeed, the difeafe is almoft unknown to medical practitioners, except by name.

With the view of accommodating a claffical name both to the vulgar appellation and to the fymptoms of the difeafe, Gliffon invented the term *rachitis*, ῥαχῖτις, *i. e. fpinal* difeafe; fince the curvature of the fpine, which enfues, is one of the moft prominent fymptoms. This appellation has been adopted by the nofologifts, and all fubfequent writers, who have ufed a Latin nomenclature. (See Gliffon, de Rachitide, cap. i.) Whether the difeafe was really unknown, or did not exift, until modern times, is a queftion which it would be very unprofitable to difcufs; fince there are few fatisfactory documents to be found on the fubject. We fhall therefore proceed to deliver a hiftory of the fymptoms.

This difeafe feldom commences before the ninth month, and rarely after the fecond year, of a child's age; but it may

may appear at any interval between these two periods. Its progress is at first usually very slow. The early appearances of its approach are a flaccidity of the muscular flesh, and a certain degree of emaciation of the body, notwithstanding that the appetite for food is rather increased than impaired; together with a paleness and loss of colour in the complexion, and a slight degree of fulness, or tumefaction in the face. The head at the same time appears large with respect to the body, and the fontanelle, and even the sutures of the skull, are more open than is usual in children of the same age. The head continuing to increase in size, the forehead especially, becomes unusually prominent, and the neck appears very slender in proportion to the head. The progress of dentition is also slow, or much later than usual; and those teeth which protrude themselves soon become black, decay, and often fall out. Their ribs lose their convexity, and become flattened at their sides, while the sternum, or breast-bone, is pushed forward, so as to form a sort of ridge. At the same time, or sometimes sooner, the epiphyses at the several joints of the limbs become swelled, while the limbs between the joints appear, or perhaps actually become, more slender. The bones now are obviously every where, to a certain degree, flexible, becoming variously bent and distorted, and especially the legs and the spine of the back are incurvated in various directions. If the child had already acquired the power of walking before the commencement of the disease, it becomes daily more feeble in its motions, and more averse to exertion, and at length loses the power of walking altogether.

While these symptoms go on increasing, the abdomen always appears preternaturally full and tumid, and the stools are generally frequent and loose; yet the appetite often remains good. The faculties of the mind often exhibit a premature advancement, and the power of speech is early acquired; but in some cases the understanding is impaired, and stupidity or actual fatuity ensues. There is usually no febrile affection accompanying the disease at its commencement; but it seldom continues long before the pulse becomes frequent, and other symptoms of fever ensue.

With these symptoms the disease proceeds, and continues in some instances for several years; but, in many cases, in various stages of that progress, it ceases to advance, and the child gradually recovers its health and strength, except that the distortion of the limbs, produced by the disease, continues during the remainder of life. In other cases, however, the malady proceeds, continually increasing, until it has affected almost every function of the animal economy, by the derangement of the viscera and the impediment to their operations, which the distortion of the bones occasions. The most material danger and distress thus produced arise from the distortion of the spine, ribs, and sternum, by which the cavity of the chest is greatly diminished, and the action of the lungs and of the heart much impeded, or altogether arrested. The functions of the liver, stomach, &c. and those of the uterus and bladder, under distortions of the pelvis, are thus also often rendered morbid and distressful for the rest of life. When the head, too, is greatly enlarged, the existence of water is to be apprehended. It is unnecessary to enter into any detail of all the variety of symptoms, which are the secondary effect of these impediments to the action of particular organs; since relief is not to be obtained effectually while the mechanical impediment exists incurably, and the origin of each particular symptom will be easily explained from the circumstances of each case. The organs themselves, however, become seriously deranged under this state of pressure and obstructions; and morbid conditions have been discovered in various parts internally in the bodies of those who have died. Thus, most of the viscera of the abdomen, the liver, spleen, and mesenteric glands, have been found to be preternaturally enlarged; the lungs have been found in a morbid state, apparently from some inflammation that had come on towards the termination of the disease. The brain has been commonly found in a flaccid state, with effusions of a serous fluid into its cavities. The bones very universally have been commonly found in a flaccid state, with effusions of a serous fluid into their cavities. The bones very universally have been found to be soft, so much so indeed, as to be readily cut by a knife; and the muscular parts also soft and tender, the whole of the dead body being without that degree of rigidity which is so common in almost all others. Cullen, First Lines, par. 1724.

The great peculiarity, then, of this disease, appears to consist in a deficiency of that matter which forms the solid parts of the body, especially of the bones, or in a faulty state of the process of ossification, by which that matter is deposited in the membranes and substances destined to become bony, to give them their due firmness, hardness, and strength. There is obviously a defect in the quantity of this matter, the place of which is supplied, especially about the epiphyses of the bones, by a soft substance which increases their bulk. What this deficiency of ossific matter depends upon, it is difficult to ascertain: it may originate either in the faulty action of the organs of digestion and assimilation, by which the nutritive fluids are prevented from being properly prepared; or from a fault in the organs of secretion and nutrition, which prevents the proper elaboration of the circulating fluids. Of the nature of this latter process, however, we are totally ignorant; and practitioners have more generally referred to the former, and ascribed the disease to the actual deficiency of bony matter in the circulating fluids, as furnished by the digestive organs: yet they have been generally also compelled to refer this deficiency to some general laxity or debility of the system. But admitting the existence of such a debility, it is altogether impossible to account for its operation in diminishing the ossific matter, being limited to the early portion of childhood; for though a *mollities ossium*, or softness and flexibility of the bones, has occurred in adult life, it is a circumstance of extreme rarity. In a word, the essential nature of the disease is beyond our investigation.

Causes of Rickets.—Neither are the causes of the disease very clearly demonstrated. Great stress was laid by the earlier writers upon the *hereditary* predisposition which descended from parents to their children; but the very rapid increase of the disease among children, soon after the disorder was first noticed, and therefore the necessary primary origin of it in many whose parents must have been free from the taint, renders the opinion untenable. Indeed the rise, prevalence, and disappearance of the disease, during a certain period of time, including about a century and a half, would seem to connect its existence with some more general cause; but no one has been able to point out any peculiar physical condition of the people of England, during that period, to which such a malady can be attributed. Some have imputed it to the multiplication of manufactures and other unwholesome occupations; but the manufactures continue while the disease has nearly vanished. It is certain, however, that in later times the disease has been principally known among the children of the poor, living in close and uncleanly situations, and in dirty ill-ventilated apartments; and especially among those children who are ill-nursed, that is, in whom constant washing and proper exercise,

exercise, as well as good feeding, have not been attended to. Damp air, and residence in a cold and humid situation, have also been enumerated among the predisposing causes of rickets; and in this respect, as well as in the practice of better modes of management in infancy, the change of circumstances in the present state of great towns, and even in the habitations of the peasantry, when compared with those of the preceding century, will be deemed sufficient at least to have greatly diminished the general sources of infantile disease and mortality. See HEALTH.

Cure of Rickets.—Observation of the circumstances under which the rickets occurred, as well as of those with which it was accompanied, suggested the only means that were resorted to for the cure of this disease, until modern chemistry proposed the administration of a substitute for the deficient ossific matter; a proposal, however, which does not appear to have led to the advantages which were anticipated. The method suggested from observation of the circumstances just alluded to, was rather of a preventive than of a curative nature; and turned upon the plan of invigorating the constitution of the infant from the period of its birth. This is to be accomplished by remedies which may improve the tone of the stomach in particular, and through that medium of the system at large, or by those which operate directly upon the latter. Of these general tonic remedies, the *cold bath* seems to have been commonly found to be the most effectual, at least as a preventive of the disease. Since it became a general custom in this country, through the recommendation of medical men, to wash young childen with cold or tepid water daily, the rickets seem to have been less and less prevalent. Indeed Dr. Cullen declared long ago, that he had never met with the rickets where this practice was adopted; and that where the disease had already begun, this remedy often checked the progress of the disease, and sometimes cured it entirely.

With the same view internal medicines of a tonic quality have been generally prescribed, to remove or arrest the disease; and among these, the preparations of *iron* have been most frequently employed. A preparation of this kind was long ago recommended by Mr. Boyle, and universally adopted, under the appellation of *ens veneris*, which, notwithstanding its name, was iron. The rust of iron, and other preparations, as well as those of zinc, have been also used for the cure of rickets, in preference to the Peruvian bark, on account of the difficulty of administering this substance to infants in any useful quantity; De Haen, however, has borne testimony to the efficacy of the latter.

Much is also to be done by good nursing; that is, by a proper regulation of the exercise, diet, and clothing, by all of which the healthy performance of the functions of an infant is greatly assisted. Exercise, indeed, even in the only form in which young children can enjoy it, *viz.* that of gestation, is one of the most powerful general tonics; and even friction with dry flannels would probably contribute to the same end. The diet of children is now reduced to a much more rational standard than during the last century, and the proper mode of administering it is now too well understood to require any minute instructions in this place. (See INFANTS.) The supposition of the pernicious acidity, arising from the use of that most natural food milk, to which Zeviani and some other writers ascribed the origin of the disease, is altogether without foundation.

It is highly proper, also, where there is a ricketty tendency present, to attend to the symptoms which accompany its approach, and to correct any influence which these symptoms may have upon the general health. Above all, it is advisable to administer remedies against the derangements of the abdominal viscera, connected with tumid abdomen and irregularity of bowels, which so commonly attend that disposition. For this purpose the testaceous powders, combined with small doses of some mercurial alterative, or with rhubarb, or the latter united with steel and soda, may be prescribed with benefit. The use of emetics, which was resorted to by some practitioners, appears to be of no beneficial tendency, unless they may act on the bowels as laxatives; and a system of active purging, which was also generally employed, as it contributes to much debility, should be avoided.

It remains only to mention the chemical proposal, which M. Bonhomme of Paris proposed, of administering the component parts of bone in the way of medicine, upon the supposition that the disease depends upon the mere deficiency of these substances in the circulating blood. M. Bonhomme therefore suggested the administration of phosphate of lime and phosphate of soda in substance; and formed a powder, consisting of equal parts of these substances, of which he gave a scruple twice a day to infants. He contends that the calcareous phosphate, when taken internally, is really transmitted by the lymphatic vessels, and is applied to the purposes of ossification, and that this administration of it powerfully contributes to restore the natural proportions in the substance of the bones, and thus accelerates the cure of rickets. In support of these opinions, he relates various experiments made on young fowls, to which it was given mixed with their food, and in which, he maintains, the progress of ossification was accelerated, in comparison with others to which it was not given. (See his Memoir on Rachitis; and Duncan's Annals of Medicine for 1797.) These physiological experiments, however, lead to no legitimate deductions as to the operations of disease in the human body; and, experience in the latter has not apparently supported the doctrines of M. Bonhomme.

RICKETS is also a disease affecting sheep, as well as some sorts of vegetable crops.

RICKETY GRAIN, in *Agriculture*, a sort of vegetable disorder that often attacks wheat crops. It is, according to Dr. Anderson, a kind of disease which is totally different from that of *smut* or *rust*. The grain affected with this disease assumes a small shrivelled appearance, and irregular form; its colour is somewhat darker than good wheat of the same kind, but is different from that which is affected with either of the two other diseases. Water, when poured upon wheat of this kind, soon, he observes, moistens it, and brings to life a number of eel-shaped animals in various stages of their growth, which had taken up their residence there while the grain was yet in its succulent state, and thus occasioned the disease which produced the alteration in its form. As the grain ripens and dries, these animalcules are arrested in their progress, their life totally suspended, and their destructive operations upon the corn of course obstructed, so long as it remains in this dry state. But no sooner does this grain become soft, in consequence of being moistened with water (whether after being sown in the ground or otherwise), than these creatures are restored to life and activity; they soon begin to feed upon the grain while it is moist, and, if not interrupted in their progress by another desiccation, quickly lay their eggs (for they are oviparous), and go through the ordinary evolutions of nature. The young, when hatched in the corn that was sowed, after living upon it for some time, begin, he asserts, to eat their way up the growing stalk, and establish themselves at length in the grain itself, while it is advancing towards maturity, where they are arrested in their progress in the manner above described when it is fully ripened.

And in respect to the nature of the animalcule that produces these effects, it is remarked, that it can be preserved alive in a quiescent dried state, for twenty-eight years at least, as has been shewn by experiment, after the lapse of which period it was found to revive as readily as if its vital functions had been thus suspended only for one day. It is further stated as worthy of remark, that the eggs of this creature cannot be preserved for a length of time in a dry state, and still retain their prolificacy, neither can those among them which are very young, or those which have attained their full size, be revived after they have been dried up. It is only those individuals that are in the full vigour of life, and in a state soon to produce young, that are endowed with this singular faculty. In this case, the obvious intention of nature is to preserve the species, by keeping them in life until the grain shall be sown, and thus to have a proper food provided for their progeny, however long that may be.

RICKMAN, George William, in *Biography*, a member of the Imperial Academy of Sciences at Petersburgh, was born at Pernau in 1711, after the decease of his father, who was treasurer to the king of Sweden. Having acquired the rudiments of a good education in the gymnasium at Revel, he prosecuted his studies at the universities of Halle and Jena, but applied chiefly to mathematics and natural philosophy, to which he shewed a particular attachment. In the year 1735 he was made a member of the Imperial Academy of Sciences; in 1741 he became extraordinary professor, and in 1745 he was elected ordinary professor of experimental philosophy. He was from this period particularly attached to the new science of electricity, and applied himself particularly to atmospherical electricity. On the discoveries made in this branch of knowledge he had composed a treatise, which he intended to read on the 6th of September 1753, at a public meeting of the Academy; and in order to demonstrate what he might advance in the discourse, he made a great number of experiments on divers thunder clouds. In one of these the professor was struck dead by a flash of lightning, drawn by his apparatus into his room. Of this fatal accident there are two accounts in the Transactions of the Royal Society.

The professor had provided himself with a gnomon, an instrument to measure the strength of the electricity of the passing clouds. He was, on the 6th of August, N.S. 1753, a little before noon, at the Academy, when it thundered at a considerable distance, the sky being then clear and the sun shining bright. In the hope of confirming his former observations, or of making some new ones, he hurried home, accompanied by Solokow an engraver, that the latter might make himself master of the leading circumstances of the electrical experiments, in order to be the better enabled to represent it on a copper plate, which was to be annexed to his dissertation. The philosopher led the engraver to his apparatus, but while examining for his own use, or perhaps describing the effect of the electricity on the gnomon to his friend, with his head inclined towards it, he received a violent shock, which instantly deprived him of existence. M. Solokow observed, he said, a globe of blue fire, as big as his fist, jump from the rod of the gnomon towards the head of the professor, which was at the instant about a foot from the rod. This flash killed M. Rickman, but M. Solokow could give no account of the particular manner in which he was immediately affected by it; for, at the same time that the professor was struck, there arose a sort of steam, or vapour, which entirely benumbed him, and made him sink to the ground, so that he did not even remember to have heard the clap of thunder, which was very loud. The globe of fire was, however, attended with a report as loud as that of a pistol: a wire, which brought the electricity to his metal rod, was broken in pieces, and its fragments thrown upon M. Solokow's clothes. Upon examining the effects of the lightning in the room, it was found that the door-case was half split through, and the door torn off and thrown into the room. An attempt was made to bleed the breathless body, but no blood followed. The shoe belonging to the left foot was burst open, and uncovering the foot at that place, they found a blue mark, from which it was inferred that the electrical fluid, having entered the head, made its way out again at the foot.

Upon the body were several red and blue spots, but the hair of the head was not singed. The stocking was entire though the shoe was ripped up; the coat was uninjured though the waistcoat was much singed; and there appeared on the back of M. Solokow's coat long narrow streaks, as if red-hot wires had burnt off the nap. On opening the body the cranium was entire, and the brain perfect, but the transparent pellicles of the windpipe were excessively tender, gave way, and were easily rent. There was some extravasated blood in it, as likewise in the cavities below the lungs; those of the breast being quite sound, but those towards the back were of a brownish colour, and filled with more of the above-mentioned blood: otherwise none of the entrails were touched, but the throat, the glands, and the thin intestines, were all inflamed. After two days the body was in such a state of putrefaction that it was with difficulty got into a coffin. Phil. Trans. vol. xlix. pt. 1. Priestley on Electricity.

RICKMANSWORTH, or Rickmeresworth, in *Geography*, a small market-town in the hundred of Cashio and county of Hertford, England, occupies a low, moorish situation near the confluence of the rivers Gade and Colne, at the distance of 19 miles N.W. from London. The manor was an ancient demesne of the Saxon kings, and was given by king Offa to the abbey of St. Alban's, to which it was confirmed by succeeding monarchs, and had the charter of a weekly market and two annual fairs granted by Henry III. The church is a spacious edifice, consisting of a nave, aisles, and chancel: it was repaired in the year 1677, and again in 1802: the large gallery at the west end was probably erected about the former period. Previous to the late repairs, a large altar-tomb, in memory of Henry Cary, baron of Lepington and earl of Monmouth, stood against the south wall of the chancel; but being supposed to disfigure the place, it was removed; and a memorial slab of black marble, which was affixed to the tomb, was let into the south wall, with sculptures in white marble of the family arms. Against the north wall is a mural monument, to commemorate sir Thomas Fotherly (gentleman of the privy chamber to Charles I.), and his son and grandson. Several others of the family are recorded on a slab on the floor. In the east part of the south aisle are three large altar-tombs, in which are deposited the remains of the families of Colte, Salter, and Whitfield, inhabitants of this town. In the north aisle a neat mural monument records the memory of Timothy Earle, esq. of Moor-house, who died in May 1787, aged 80; and also of Dorothy his wife. A marble tablet against the north wall commemorates admiral William Bladwell, formerly of Money-hill in this parish, who died in March 1783, at the age of 80.

Rickmansworth, by the vicinity of several streams, is rendered very convenient for trades that require the assistance of water: several mills have consequently been erected for various purposes in its neighbourhood: a large cotton and flour-mill at the south entrance to the town; one for flock

and

and filk at a fmall diftance to the weft; and feveral for paper, &c. towards the north, on the rivulet that flows from Chefham. Additional employment, particularly for females, is derived from the manufacture of ftraw-plat. The market was formerly diftinguifhed for its corn trade, but is now little frequented, though toll free: the market-houfe is a mean wooden ftructure, raifed on pillars, and open beneath. The population, as afcertained under the act of 1811, was 3230, the number of houfes 589.

The manor of the *Moor* in Rickmanfworth parifh, being anciently parcel of the poffeffions of St. Alban's abbey, was, about the year 1431, with other contiguous manors, held under that foundation by a tenant named Flete, who had for feveral years refufed either to pay the quit-rent, or to perform the covenanted fervices claimed by the abbot; one of which was finding for his ufe, and that of his fucceffors, "one nag-horfe to carry him to Tynemouth, whenever he or they fhould vifit that cell:" the difpute was at length decided in favour of the abbot by fir William Babyngton, chief juftice of the common pleas; and Flete was compelled to the obfervance of the accuftomed homage and fealty. The next poffeffor on record was Ralph de Boteler, lord of Sudely in Gloucefterfhire. It is now held by Robert Williams, efq. banker of London.

Moor-Park houfe, the fplendid refidence of this gentleman, is a magnificent building of the Corinthian order, ftanding in a finely wooded park about five miles in circumference, and having two fronts, refpectively facing towards the north and fouth. The height of the ground to the fouth contracts the view; but the northern front commands an extenfive profpect; the hill, which had previoufly obftructed the fight, having been lowered about the year 1725, at the expence of 5000*l.* This was effected by B. H. Styles, efq. to whom the prefent manfion is indebted for its chief grandeur, as he new cafed and fronted it with Portland ftone; and having built the magnificent portico, erected two wings for the chapel and offices, and connected them with the centre by colonnades of the Tufcan order. The charge of the carriage of the ftone from London, amounted to upwards of 15,000*l.*, and the entire expence, including the improvements in the park, was more than 150,000*l.* Beauties of England and Wales, vol. vii. by E. W. Brayley.

RICKSGÖLD, in *Commerce*, one of the two fpecies of paper currency in Sweden, the other being *banco*. The latter is iffued by the national bank, and the former by the Rickfgöld bank, which is under the direction of government. Banco is 50 *per cent.* better than Rickfgöld; that is, two dollars of the former are worth three dollars of the latter. Banco is a legal tender, and has lately been declared, by royal authority, the national currency. Rickfgöld is current in all payments; but as no frefh iffues of this paper have been lately made by government, it is continually decreafing in circulation, while banco increafes. Both currencies are made payable to bearer on demand, and are accordingly difcharged when prefented for payment.

RICLA, in *Geography*, a town of Spain, in Aragon, on the Xiloca, anciently called "Nertobriga;" 14 miles N.E. of Calatayud.

RICOCHET Battery, in *Fortification*. See Battery *à Ricochet*.

Ricochet *Firing*, in the *Military Art*, is a method of firing with pieces elevated from three to fix degrees, and loaded with a fmall charge, fo that the ball may bound and roll along the infide of the parapet. The ball or fhot, thus difcharged, goes rolling and bounding, killing, maiming, or deftroying all it meets with in its courfe, and creates much greater diforder, by moving thus flowly, than if thrown from the piece, whofe elevation is greater, with greater violence.

The word *ricoche* fignifies *duck and drake*, terms applied to the bounding of a flat ftone thrown almoft horizontally into the water.

RICOTE, in *Geography*, a town of Spain, in the province of Murcia; 20 miles N.W. of Murcia.

RICOTIA, in *Botany*, a Linnæan name whofe origin no one has been able to explain, nor can we throw any light upon it. It has the appearance of a proper name, and was probably given in honour of fome obfcure botanift.—Linn. Gen. 337. Schreb. 440. Willd. Sp. Pl. v. 3. 477. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 98. Juff. 239. Lamarck Dict. v. 6. 210. Illuftr. t. 561. Gærtn. t. 142. —Clafs and order, *Tetradynamia Siliquofa*. (*Siliculofa*; Brown.) Nat. Ord. *Siliquofæ*, Linn. *Cruciferæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, deciduous, of four, oblong leaves, approximating in a parallel manner. *Cor.* cruciform, of four, obcordate petals, fpreading. *Stam.* Filaments fix; four the length of the tube; two fomewhat fhorter: anthers oblong, acute. *Pift.* Germen fuperior, cylindrical, the length of the ftamens; ftyle fcarcely any; ftigma acute. *Peric.* Pod feffile, lanceolate-oval, with one or two cells, and two flat valves. *Seeds* moftly four, orbiculate, compreffed.

Eff. Ch. Pod of one cell, oblong, compreffed: valves flat.

1. R. *ægyptiaca*. Egyptian Ricotia. Linn. Sp. Pl. 912. (Lunaria foliis fupradecompofitis: foliolis trifidis, filiquis oblongis pendulis; Mill. Ic. v. 2. 113. t. 169.)—Native of Egypt, flowering in June and July.—*Root* annual. *Stem* a foot high, fmooth and branching. *Leaves* unequally pinnate; leaflets various, fome undivided, others three-lobed, of a lucid green. *Flowers* purple, on long ftalks, at the fides and ends of the branches, in fmall, loofe *clufters*. *Pods* drooping, when ripe of a pale brown colour.

This genus is very nearly allied to *Lunaria*, from which indeed it chiefly differs in having a feffile, not ftalked, pod.

RICZIWOL, in *Geography*, a town of the duchy of Warfaw; 30 miles N. of Pofen.

RIDA, a town of the Valais; 4 miles S.E. of Sion.—Alfo, a town of Sweden, in the province of Upland; 24 miles N.E. of Stockholm.

RIDALE, or Risdale, a river of England, in the county of York, which runs into the Swale, near Richmond.

RIDAL-HEAD, a mountain of England, in Cumberland; 2 miles N. of Amblefide.

RIDDERHUDE, a town of the duchy of Bremen; 8 miles N. of Bremen.

RIDDLE. See Ænigma.

Riddle, in *Rural Economy*, a fort of fieve ufed to feparate duft and the feeds of plants from corn. They are made of different forms and fizes, for different ufes.

RIDE of hazle, or other wood, is a group or clufter of fprigs fhooting out of the fame root or ftock.

Ride, or *Riding*, in the *Manege*. To ride fignifies to learn to ride. Thus, he rides under a good mafter. For an account of the origin and hiftory of the art of riding, we refer to the article Horse.

In addition to the obfervations which occur under that article, in proof of the antiquity of the art of riding, we fhall here introduce fome other confiderations, which tend to evince the priority of riding to the ufe of chariots. Egypt appears to have been the fpot in which the horfe feems to have been firft fubdued and difciplined by man;

and it is evident from the Mofaic hiftory, that in the firft inftance where mention is made of Pharaoh's chariots, he is likewife faid to have had his horfeman: which word, in the Hebrew language, is explained by the commentators to mean one who fits upon and guides a horfe. Befides, the Hebrew word, "parafh," horfeman, is derived, as Buxtorf fays, from a Hebrew root, which fignifies to *prick* or *fpur*; and the rider, or fpurrer, was fo denominated, becaufe he ufed to prick or fpur the horfe. Aben-Ezra fays, that the horfeman was fo called from wearing fpurs on his heels. By this account and explanation of the word, which in the Hebrew fignifies a "horfeman," we are informed of the great antiquity of fpurs; and may reafonably conclude, that the art of riding was not only known, but, from the invention of fpurs, had alfo received an improvement, not unworthy of the difcovery of more difcerning times; and feems to imply, that riding was not only familiar, but even advanced in thofe primitive times to a degree of exactnefs, perhaps, not hitherto fufpected. The arguments here, and alfo under the article Horse, alleged in proof of the feniority of horfemanfhip to that of the ufe of chariots, may be ftrengthened by the following paffage in the book of Job, where, fpeaking of the oftrich, he fays, "fhe lifteth herfelf on high, fhe fcorneth the horfe and its rider;" which expreffion feems to imply that it was a cuftom, as it is now in fome nations, to hunt this bird on horfeback, and that fhe was fuperior to the fwifteft horfe. Hence it muft be granted that riding was practifed in his country, and at the time in which he lived; nor is it to be forgotten, that he lived in a country diftinguifhed above others for its horfes, and in which no chariot was ever known to have been ufed. We may alfo add to the fame purpofe, the noble defcription which he gives of the horfe, fo known and fo admired, in which he fpeaks of him only as being rode, and not driven in a carriage: and if this writer, as fome learned perfons have thought, lived long before the time of Mofes, what he fays in relation to this fubject muft be anterior to the Mofaic hiftory; and if that be the cafe, the antiquity of equitation will be carried fo high, as to put it beyond the reach of inquiry and inveftigation. In the defcription juft referred to, the Englifh tranflators make Job fay, "that this animal's neck is clothed with *thunder*;" an expreffion no lefs falfe than abfurd. The true rendering of this paffage is, that his neck is clothed with a *mane*. Thus Bochart, Le Clerc, Patrick, and other commentators tranflate it. Bochart fays, that the word, which in Hebrew fignifies *thunder*, is fynonimous with that for the *mane* of the horfe; but this being the cafe, it is aftonifhing that the tranflator fhould have fet afide the juft and natural fignification, and have chofen to cover the horfe's neck with *thunder*, inftead of a *mane*; nor is it lefs amazing, that this nonfenfe fhould have been extolled by the author of the "Guardian," and others, as an inftance of the fublime. We fhall here obferve, that the Grecians, in many inftances, chofe mares for riding before horfes. Ælian fays, they thought them fitter for the courfe; and Virgil only names the mares of Epirus, as running in the Olympian race. Pliny fays, they were fwifter than horfes. Berenger's Hift. and Art of Horfemanfhip, vol. i. p. 12, &c.

The knowledge and utility of the art of riding confift in being able to difcern, and dextrous to employ, the means by which the horfe may be brought to execute what the rider requires of him, with propriety, readinefs, and fafety: and this knowledge in the man, and obedience in the horfe, fhould be fo intimately connected, as to form one perfect whole; this union being fo indifpenfably neceffary, that, where it is not, there is no meaning between the man and horfe: they talk different languages, and all is confufion.

The Greeks, who excelled in the art of riding, were accuftomed to mount and difmount, by vaulting and leaping from and upon the backs of their horfes, as well as from one horfe to another. Thefe feats of activity feem to have been firft practifed in battle, and in thofe ages when faddles, and confequently ftirrups, were unknown. The utility of this method muft be acknowledged; for if one horfe was tired, wounded, or killed, his mafter had another for his fervice; two or three being led into the field, which were ufed as occafion required. Thefe exercifes, fo effentially neceffary in war, were, after a time, performed in the public games, and other occafional exhibitions, merely to fhew the nimblenefs and addrefs of the horfeman; and the modern art of vaulting, in all its variety of poftures and methods, and which has *now* little more in view than to difplay the activity of the performer, is, without doubt, derived from this ancient practice; as well as the whole modern manege, except fome few experiments, calculated merely for grace and pleafure, is borrowed from the different motions and evolutions performed by men and horfes in battle. To this likewife we owe the folemnities and fports of tilts, tournaments, and jufts; invented as a mock-war, to fill up the lazy hours of peace, to infpire and keep alive a martial fpirit, and to render the body active, robuft, and expert in the feats of arms.

It is well known that the Romans were indebted to Greece for many arts and ufeful improvements, and particularly horfemanfhip, which was received and adopted by them with fuch eagernefs, and cultivated with fuch diligence and zeal, that they foon were able to excel their mafters. Romulus, at a very early period, inftituted his order of "equites," or horfemen, as Athens and Sparta had done before, on purpofe to encourage the practice of riding, and engage his new fubjects to keep horfes at their own expence, which, in thofe times, were fo coftly, that the rich alone were equal to the charge of maintaining them. Among the Romans they had a horfe called "fingularis," or fingle, upon which a man rode without a faddle, ufing only a cloth, like the Greeks, faftened with a furcingle, or elfe fitting upon the bare back. The riders were alfo, occafionally, tied and bound to their horfes by thefe girths, that they might fit more firmly and fecurely; but the practice was imprudent and dangerous, as they were thus liable to be dragged and torn by the horfe, in cafe they were unfeated, like the warrior defcribed by Silius Italicus (lib. 4. Punic.):

"——— Rapiturque pavore
Tractus equi, vinctis connexa ad cingula membris."

Lock faddles, now but little ufed, are liable to the fame objection.

The art of riding fubfifts in various modes and different degrees of fkill and perfection among different nations. In Arabia, where the horfes are the fineft and beft of their kind, their owners manage them with fingular dexterity. Their faddles have the back part, or "cantle," fo high, that it reaches more than half-way up the rider's back. The ftirrups are flat, in the Turkifh manner, and contain the whole foot. They never ufe a girth, which makes it more difficult to mount and keep their feat. The Arabian youth underftand the equilibre, and keep their body in a juft counterpoife; being fo dextrous, that they will ftand on the faddle, while the horfe runs at full fpeed, fling their lances, turn round, throw themfelves over, and ftand upon their heads; the horfe continuing his career all the time.

Similar evolutions were practised by the ancient Romans. The Turks ride with their ftirrups fo fhort, that their knees are almoft as much bent, as when they fit upon their hams upon a fofa. Their faddles are as large and unwieldy as a pack-faddle: they faften and fecure them upon the horfe by a large girth, which paffes over them, and prevents the faddles from turning, which their great weight would otherwife make them do. The bridles are generally gilt and ornamented, but otherwife very clumfy and ill-made. The Turks feldom ufe fpurs, or carry a whip or fwitch; and yet they have an abfolute command over their horfes, and make them do whatever they pleafe. In riding, they ufe only a ftick, about three feet in length, and of the fize of a large cane. This they hold by the middle, and ftrike the horfe with it on his neck with either end, to direct and compel him to turn; making them run at full fpeed, and laying them out fo rapidly, as almoft to make their bellies touch the ground; the riders, at the fame time, ftriking their darts into a turban, or toffing them in the air, riding after, and catching them before they fall to the ground. Others, efpecially the Arabs belonging to the fultan, will leap from one horfe to another, running at their utmoft fpeed. Others will creep under the belly, and up to the faddle again; others will turn two or three times round the horfe's neck, and others will ftand upright upon the faddle, and turn their faces to the tail, the horfes all the time going at their utmoft ftretch.

The Perfians have great perfonal addrefs and activity on horfeback. They play at "Mall" mounted on their horfes, and ftrike the ball with certainty and furprifing fkill. They place alfo upon the top of a tree, or high pole, an apple, as a mark to fhoot at with arrows. They fet off at full fpeed, and when they are got beyond the mark, turn themfelves round towards the croupe, draw their bows, and in this pace, and this attitude, feldom fail to hit the apple. The Tartars have, in all ages, been famous, under different names, for their love of horfes, whofe flefh they eat, drinking the milk of the mares, and fkill in riding. It is a practice with them to tie the reins of their bridles to their girdles, and by the motion of their bodies alone to govern and direct their horfes; pulling them into different attitudes, and making them perform a variety of evolutions. By this method they have their hands at liberty for the ufe of their weapons, which they manage with a fkill furpaffing that of other nations. Some will hold their bows in the fame hand in which they hold their bridles, and at the fame time draw the bow, and guide their horfe with great addrefs, always riding with their ftirrups very fhort, in order to collect themfelves better, and be able to rife up, as it were, when they are going to attack an enemy, and ftrike a blow.

The venerable Bede fays, that the Englifh began to ufe faddle-horfes about the year 631, when prelates and others rode on horfeback, who till that time were accuftomed to go on foot; but that if, upon urgent occafions, they were obliged to ride, they ufed mares only, in token of their humility; the mare not being fo full of pride or fpirit as the horfe. In the reign of Edward III. the horfes called "Dextrarii," correfponding to thofe that are now termed *managed* horfes, or horfes *dreffed* and difciplined for war, were held in the higheft eftimation, and appropriated to military exercifes; and upon common occafions, perfons of rank and confideration always rode upon horfes of inferior degree, diftinguifhed by the names of "Courfers, Amblers, Palfreys, Hackneys, Nags, and Poneys," recommended by their eafy paces and quiet temper. In feveral countries it was a cuftom, rigoroufly obferved, that no knight of chivalry, or other gentleman, fhould ride upon a mare, it being thought difhonourable and vile. The mares were always devoted to the cart, and all the ignoble fervices. The Spaniards, Turks, and fome other nations, ftill adhere to this abfurd notion, upon all occafions. The Dextrarii above-mentioned were called "magni equi," or great horfes, being of the largeft fize, and intended to ferve in war or for the exercife of the tournament; and as thefe great horfes were required to be *dreffed* or taught, that they might perform their tafks with readinefs and fidelity; and as it is neceffary that the rider fhould have knowledge and fkill to guide his horfe, thofe perfons who profeffed the fcience of arms were obliged to learn the art of managing their horfes, in conformity to certain rules and principles; and hence came the expreffion of learning to "ride the great horfe."

After an ample review of the ftate of horfes in England, Berenger takes occafion to diftribute them into two general claffes, which may be arranged under two diftinct periods of time. In the firft era, as it was an univerfal cuftom for horfemen to fight in armour, the burden was fo heavy, and the fervice fo fevere, that none but *large* and *ftout* horfes were equal to the tafk. The practice of raifing fuch a breed of horfes began about the time of Henry II., or fomewhat earlier, and continued till towards the end of the reign of Elizabeth. About the reign of James, armour, being rendered ufelefs by the invention of fire-arms, was laid afide; and the *great* horfe became ufelefs, and, on many occafions, even improper. *Lighter* and more *nimble* horfes were therefore brought into ufe, and here begins the era which comprehends the fecond clafs of horfes, called the *light* or *fwift* breed. This ingenious writer clofes his review with obferving, that, however highly gifted the horfes may be, there are *duties* incumbent alfo upon thofe who are to ride them, without an attention to which all the talents of the horfe, inftead of being called forth and improved, will be crufhed, extinguifhed, and nature have been kind in vain. Thefe duties are comprehended under the "art of riding." This art has been, as this author regrets, fo long neglected and defpifed, that one would be almoft prompted to conclude that a fatality had conftantly attended it in this country; favoured as it is with every advantage for breeding, nourifhing, and procuring the fineft horfes of all forts, and with a nobility and gentry, whofe love of exercife, activity, courage, perfonal endowments, and commanding fortunes, would qualify them to take the lead, and "witch the world with noble horfemanfhip;" yet, with all thefe high privileges, they have fuffered it to languifh, and almoft perifh in their hands; for a length of time it has been able to boaft but of a very few perfons who have ftood forth as its avowed friends and protectors. The duke of Newcaftle honoured it with his practice, and greatly enriched it with his knowledge. Sir Sidney Medows, fir William Hope, and the earl of Pembroke, are alfo mentioned with approbation and refpect. Our author adds, that fince the acceffion of his prefent majefty, the profpect has brightened, and better times begin to dawn. Since this happy event, the art has manifefted figns of recovery; public riding houfes have been opened, encouraged, and frequented; and the art has been fo far protected and honoured by his majefty, that, as our author fays, we may expect to fee the golden age of horfemanfhip revive, and that men will no longer "complain of the want of excellent horfes, nor the horfes *groan* for want of worthy riders." This art has been much indebted to the publication of "The Hiftory and Art of Horfemanfhip," by Richard Berenger, efq., which has furnifhed various extracts, to be found under their appropriate titles, in our Cyclopædia. We fhall here fubjoin fome particulars that

that have not elsewhere been introduced, and close the article with suitable references for the direction of the reader.

The posture of the body is an object of primary consideration in the art of riding. In reference to this object, the body may be divided into three parts, two of which are moveable, and the other immoveable. Of the two moveable parts, the first is the trunk or body, down to the waist; the second is from the knees to the feet; and the remaining immoveable part is that between the waist and the knees. The parts which ought to be without motion are the fork or twist of the horseman, and his thighs; and for this purpose, they ought to have a certain hold or centre upon which to rest, so that no motion of the horse may disturb or loosen them; this point or centre is the basis of the hold which the horseman has upon his horse, and is called the "seat;" and hence it must appear, that not only the grace, but the symmetry and true proportion of the whole attitude depends upon those parts of the body that are immoveable. Let the horseman then place himself at once upon his twist, sitting exactly in the middle of the saddle; let him support this posture in which the twist alone seems to sustain the weight of the whole body, by moderately leaning upon his buttock; let his thighs be turned inward, and rest flat upon the sides of the saddle; and in order to this, let the turn of the thighs proceed directly from the hips, and let him employ no force or strength to keep himself on the saddle, but trust to the weight of his body and thighs: this is the exact equilibre: in this consists the firmness of the whole building, a firmness which young beginners are never sensible of at first, but which is to be acquired, and will always be attained, by exercise and practice. A moderate stress upon the buttocks is necessary, because a person that sits full upon them can never turn his thighs flat upon the saddle; and the thighs should always lie flat, because the fleshy part of the thigh, being insensible, the horseman would not otherwise be able to feel the motions of his horse; the turn of the thigh should be from the hip, because this turn can never be natural; but as it proceeds from the hollow of the hip-bone, the horseman never avails himself of the strength or help of his thighs, because, besides their being then less steady, the closer he pressed them to the saddle, the more would he be lifted above the saddle; and with respect to his buttock and thighs, he ought always to be in the middle of the saddle, and sit down full and close upon it. With regard to the position of the body or trunk, which is the first of the moveable parts, and which comprehends the head, the shoulders, the breast, the arms, the hands, the reins, and the waist of the horseman, we shall begin with the head. This should be free, firm, and easy, and thus prepared for all the natural motions which the horseman may make in turning it to one side or the other. The shoulders only influence, by their motions, that of the breast, the reins, and the waist. The horseman should present or advance his breast, by which his whole figure is opened and displayed; he should have a small hollow in his reins, and push his waist forwards to the pommel of the saddle, because this position corresponds, and unites him to all the motions of the horse. The mere throwing of the shoulders back produces all these effects in the degree that is requisite; whereas if we were to look for the particular position of each part separately, and by itself, without examining the connection subsisting between the motions of one part with those of another, there would be such a bending in the reins, that the horseman would be hollow-backed; and by forcing his breast forward and his waist towards the pommel of the saddle, he would be flung back, and must sit upon the rump of the horse. The arms should be bent at the elbows, and the elbows should rest equally upon the hips. It is indeed the bridle-hand which ought to be steady and immoveable, and hence it might be concluded, that the left elbow only ought to rest upon the hip; but grace consists in the exact proportion and symmetry of all the parts of the body; and having the arm on one side raised and advanced, and the other kept down and close to the body, would present an aukward and disagreeable appearance. It is this which determines the situation of the hand which holds the whip, the left hand being of an equal height with the elbow; so that the knuckle of the little finger and the tip of the elbow be both in a line; this hand then being rounded neither too much nor too little, but so that the wrist may direct all its motions, the right hand, or the whip-hand, should be placed lower and more forward than the bridle hand. It should be lower than the other hand, because if it were on a level with it, it would restrain or obstruct its motions, and if it were higher, it could not take so great a compass as the bridle-hand, which must be always kept over-against the horseman's body; it is absolutely necessary to keep the proportion of the elbows, that it should be lower than the other. The second division of the moveable parts includes the legs and feet. The legs serve for two purposes; they may be used as aids or corrections to the animal; they should therefore be kept near the sides of the horse, and in a line with the rider's body; for being near that part of the horse's body where his feeling is most delicate, they are ready to perform their office at the moment when they are wanted. Besides, as they are an appendage to the thighs, if the thigh is upon its flat in the saddle, they will necessarily be turned just as they ought, and will infallibly give the same turn to the feet, because the feet depend upon them, as they depend upon the thighs. The toe should be held a little higher than the heel, for the lower the toe is, the nearer will the heel be to the sides of the horse, and must be in danger of touching his flank. Many persons, however, when they raise their toe, bend and twist their ankle, as if they were lame in that part. The reason is plain; it is because they make use of the muscles in their legs and thighs, whereas they should employ only the joint of the foot for this purpose; a joint given by nature to facilitate all the motions of the foot, and to enable it to turn to the right or left, upwards or downwards. Such, according to Mr. Berenger, is the mechanical disposition of all the parts of the horseman's body.

The hand, in horsemanship, admits of five different positions, in order to guide and govern the motions of a horse. The first is that general position from which proceed, and indeed ought to proceed, the other four.

Hold your hand three fingers breadth from your body, as high as your elbow, in such a manner that the joint of your little finger be upon a right line with the tip of the elbow; let your wrist be sufficiently rounded, so that your knuckles may be kept directly above the neck of your horse; let your nails be exactly opposite your body, the little finger nearer to it than the others, your thumb quite flat upon the reins, which you must separate by putting your little finger between them, the right rein lying upon it: this is the first and general position.

Does your horse go forwards, or, rather, would you have him go forwards? Yield to him your hand, and, for that purpose turn your nails downwards, in such a manner as to bring your thumb near your body; remove your little finger from it, and bring it into the place where your knuckles were in the first position, keeping your nails directly above your horse's neck: this is the second.

 Would

Would you make your horse go backwards? quit the first position; let your wrist be quite round; let your thumb be in the place of the little finger in the second position, and the little finger in that of the thumb; turn your nails quite upwards, and towards your face, and your knuckles will be towards your horse's neck. This is the third.

Would you turn your horse to the right? leave the first position, carry your nails to the right, turning your hand upside down, in such a manner, that your thumb be carried out to the left, and the little fingers brought in to the right. This is the fourth position.

Lastly, would you turn to the left? quit again the first position; carry the back of your hand a little to the left, so that the knuckles come under a little, that your thumb may incline to the right, and the little finger to the left. This makes the fifth position.

These different positions, however, alone are not sufficient; we must be able to pass from one to another with readiness and order.

Three qualities are essentially necessary to the hand. It ought to be firm, gentle, and light. We call that a firm or steady hand, whose feeling corresponds exactly with the feeling in the horse's mouth, and which consists in a certain degree of steadiness, constituting that just correspondence between the hand and the horse's mouth, which every horseman wishes to find.

An easy or gentle hand is that which, by relaxing a little of its strength and firmness, eases and mitigates the degree of feeling between the hand and horse's mouth, which we have already described.

Lastly, a light hand is that which lessens still more the feeling between the rider's hand and the horse's mouth, which was before moderated by the gentle hand.

The hand, therefore, with respect to these properties, must operate in part, and within certain degrees, and depends upon being more or less felt or yielded to the horse, or withheld.

It should be a rule with every horseman not to pass, at once, from one extreme to another, from a firm hand to a slack one; so that in the motions of the hand you must, upon no account, jump over that degree of sensation which constitutes the easy or gentle hand. Were you at once to go from a firm hand to a slack one, you would then entirely abandon your horse, you would surprise him, deprive him of the support he trusted to, and precipitate him on his shoulders, supposing you do this at an improper time. On the contrary, were you to pass from the slack to the tight rein, all at once, you must jerk your hand, and give a violent shock to the horse's mouth; which rough and irregular motions would be sufficient to falsify the firmest appui, and ruin a good mouth.

It is indispensably necessary, therefore, that all its operations should be gentle and light; and, in order to this, it is necessary that the wrist alone should direct and govern all its motions, by turning and steering it, if we may so say, through every motion that it is to make.

In consequence, then, of these principles, we insist that the wrist be kept so round that your knuckles may be always directly above the horse's neck, and that your thumb be always kept flat upon the reins. In reality, were your wrist to be more or less rounded than in the degree we have fixed, you could never work with your hand but by the means of your arm; and, besides, it would appear as if it were lame; again, were your thumb not to be upon the flat of the reins, they would continually slip through the hand, and by being lengthened, would spoil the appui; and, in order to recover them, you would be obliged every moment to raise your hand and arm, which would throw you into disorder, and make you lose that justness and order without which no horse will be obedient, and work with readiness and pleasure.

Those motions, which are called descents of the hand, are made three different ways, either by dropping the knuckles directly, and at once, upon the horse's neck, or by taking the reins in the right hand, about four fingers' breadth above the left, and letting them slide through the left, dropping your right hand at the same time upon the horse's neck, or else by putting the horse under the button, as it is called; that is, by taking the end of the reins in your right hand, quitting them entirely with your left hand, and letting the end of them fall upon your horse's neck. These motions, however, which give a prodigious grace to the horseman, never should be made but with great caution, and exactly at the time when the horse is quite *together*, and in the hand; and you must take care in counterbalancing, by throwing back your body, the weight of the horse upon his haunches.

The appui being always in the same degree, would heat the mouth, would dull the sense of feeling, would deaden the horse's bars, and render them insensible and callous; this shews the necessity of continually yielding and drawing back the hand, to keep the horse's mouth fresh and awake. See Appui.

The effects produced by the several positions and motions of the hand above described, are as follow: the hand directs the reins, the reins operate upon the branches of the bit; the branches upon the mouth-piece, and the curb; the mouth-pieces operate upon the bars, and the curb upon the chin of the horse.

The right rein guides the horse to the left, the left rein to the right. Would you go to the right? you pass to the fourth position of the hand, that is, you carry and turn your nails to the right; now, in carrying thus your nails to the right, and reversing your hand in such a manner that your thumb points to the left, and your little finger being raised turns to the right; you, by this means, shorten your left rein; it is this left, therefore, that turns and guides the horse to the right. Would you go to the left? pass to the fifth position; you will carry the back of your hand to the left, so that your nails will be turned downward a little, your thumb will be to the right, the little finger to the left; this will shorten the right rein; the right rein, therefore, determines your horse to the left.

We have already said, that the effect which the mouth-piece has upon the bars, and of the curb upon the chin, depends upon the branches of the bitt: when the branches rise, or are turned upwards, the mouth-piece sinks; and when the branches sink, the mouth-piece rises; so that when your horse is going straight forward, if you keep your hand low, and close to your body, the mouth-piece then presses stronger upon the bars; and the chain or curb having, in consequence, more liberty, acts less upon the beard. On the contrary, if you keep your hand high, a little forward, and consequently a little out of the line of the end of the branches, the mouth-piece then sinks, and the branches, of necessity, operate upon the curb, which presses then very strongly upon the beard. Now, in order to place, and bring in your horse's head, you must hold your hand low; and, in order to raise and lighten a horse that weighs upon the hand, and carries his head too low, you must advance your hand a little, and keep it high.

Would you have your horse go back, come to the third position? but take care to round your wrist exactly, in order to work equally with both your reins; and by this means aid your horse more effectually to go back straight and balanced

lanced between your legs, which he could never do, if one rein were to operate ſtronger than the other.

There are particular caſes where the reins are ſeparated, and one held in each hand; it is uſual to ſeparate them, when you trot a young horſe, or when you are to work one who is diſobedient and reſiſts his rider; upon theſe occaſions, keep both your hands upon a level, low, and near your body. To turn to the right, uſe your right rein; to go to the left, uſe your left rein; but in order to make them have their effect, move your arm gently, turning it a little from your body, keeping your hand always low, and even near your boot.

Every horſeman, who would be perfect in his art, ought to know the diſpoſition of his horſe, the vices to which he is ſubject, the cauſes from which they proceed, and the proper method of reſtraining or amending them. Sometimes a horſe will rebel, when you preſs him to do ſomething of which he is ignorant; in this caſe he ſhould be taught what you expect. If he knows, but cannot, through inability, perform what you require, endeavour to aſſiſt nature by the help of art; but if he knows, and is able to do what you expect, firſt try every method which patience and perſeverance can ſuggeſt, and if you fail, compel him by force and ſeverity. A horſe may be imperfect and bad from four cauſes: weakneſs, heavineſs in his make, want of courage, and ſloth; and four qualities muſt conſpire to make a good horſe, *viz.* ſtrength, activity, courage, and judgment. By a combination or mixture of theſe different qualities, are the various diſpoſitions of horſes produced; and the remedy ought to be adapted to the nature of the animals as well as to the diſorder which the horſeman propoſes to rectify. A horſe may be difficult to be mounted; examine the ſource of this vice. It may be owing either to the ignorance, or the brutality, of thoſe who have firſt had to do with him, or perhaps that the ſaddle may have hurt him, or elſe to a temper naturally bad. To whatever cauſe it may be owing, remember never to beat him; for inſtead of curing him, you would certainly confirm him in his vice; clap him gently when you approach him, ſtroke his head and mane, talk to him, and as you talk, clap the ſeat of the ſaddle; keep yourſelf ſtill all the while, put your foot only in the ſtirrup to encourage your horſe, without doing any more, in order to make him familiar, and to loſe all apprehenſion and fear when he is going to be mounted; by little, and by degrees, at laſt, he will let you mount him; you will immediately get down, and remount, and ſo ſucceſſively for ſeveral times together, without attempting to do any thing elſe; but ſend him back to the ſtable. If it happens that when you are upon him, he runs from the place where you got upon him, bring him to it immediately, keep him there ſome time, coax him, and ſend him away. The firſt leſſons ought to be well weighed, when you undertake to bring a young horſe to obedience, and to reclaim him from liberty to the ſubjection of the bridle, ſaddle, and the weight of his rider; ſo reſtrained, it is not ſurpriſing if he ſhould employ all his ſtrength againſt you in his own defence.

The generality of colts are difficult to be turned and guided as you would have them go; we ought not, however, to be ſurpriſed at this their firſt diſobedience. It muſt be imputed to the habit they acquire from their birth, of conſtantly following their dams; indulged in this liberty, and ſubjected all at once by the bit, it is but natural they ſhould rebel. There is no way of eradicating theſe firſt impreſſions, but by gentleneſs and patience. A horſeman who ſhould make uſe of force and correction, and employ it all at once upon a young horſe, would diſcourage and make him be vicious ever after. If, therefore, your horſe refuſes to go forward, you muſt lead another horſe before him; the perſon who rides the colt will try from time to time, and, inſenſibly, to make the colt go abreaſt with him, and afterwards get before him. If, being ſurpriſed at ſeeing the horſe no longer, he ſtops, or runs back, the rider muſt endeavour to drive him forward either by his voice, or ſome kind of ſlight inſtrument, or he that rides the other horſe may give him a ſtroke with the chambriere, in order to make him go forward; if theſe methods ſhould not ſucceed, he will go before him again with the other horſe; by degrees (for one leſſon will not be ſufficient) the colt will grow accuſtomed to it, and, at laſt, will go on of himſelf.

Moſt horſes who ſtart have ſome defect in their ſight, which makes them fear to approach the object. The horſeman, upon theſe occaſions, inſtead of having recourſe to puniſhment, which often ſerves only to alarm the horſe, and extinguiſh his courage and vigour, ſhould firſt endeavour to lead him gently towards the object that terrifies him, either by encouraging him with his voice, or by cloſing his legs upon him, to make him go up to the object that terrifies him. If he will not go towards it, you may give him the ſpurs, but with diſcretion; and by coaxing and careſſes, puſh him towards it inſenſibly. Severe correction will never cure him of this fearful temper, which is a fault inherent in his nature; nor of any imperfection in his ſight, which is a diſorder belonging to him; but the habit of view and ſmelling may, in time, remedy the defects of nature.

If, notwithſtanding, you perceive that ſloth and malice are added to theſe faults, you muſt uſe, as you find it neceſſary, both mildneſs and ſevere correction; and you will beſtow them in proportion to the effect they produce. For the reſt, be careful never to ſurprize and alarm a young horſe which is ſhy, and apt to ſtart; never terrify him with what he moſt fears; never beat him in order to make him come up to an object of which he is afraid; accuſtom him by degrees to it, and have patience; the fear of puniſhment does oftentimes more harm, and is more dreaded by him, than the very object which firſt alarmed him.

There are ſome horſes who are ſtruck with ſuch terror at the ſight of a ſtone, or wooden-bridge, at the ſound and echo of the hollow part of it, that they will fling themſelves headlong into the water, without the rider's being able to reſtrain him. They are to be cured of this apprehenſion, by covering the pavement of their ſtall with wooden planks, between two and three feet high. The horſe ſtanding conſtantly upon them, his feet will make the ſame noiſe as they do when he goes over a bridge; and he will, of courſe, grow familiar to the ſound, and loſe all apprehenſion of it.

To accuſtom them likewiſe to the noiſe of the water running under the bridge, lead him to a mill, fix two pillars directly over-againſt the wheels, and tie your horſe conſtantly for two hours together, ſeveral times in the day. Having done this, bring him back to the bridge, and let an old horſe, that is not afraid, go before him upon the bridge, by degrees you will find him go over a bridge as readily and quietly as if he had never had the leaſt apprehenſion.

For horſes that are addicted to lie down in the water, you muſt provide yourſelf with two little leaden balls, and tie them to a piece of packthread, and, in the moment that he is lying down, you muſt drop theſe into his ears; and if he riſes inſtantly, or forbears to lie down, draw them back; but this method is not leſs ſure than that of breaking a flaſk filled with water upon his head, and letting the water run into his ears.

Fire, ſmoke, the ſmell of gunpowder, the noiſe of guns, or other arms, naturally ſurpriſe and frighten a horſe.

There

There are few that will come near fire, or paſs by it, without difficulty. There are many occaſions, however, in which it is neceſſary; it is therefore proper to accuſtom your horſe to it. In the firſt place, begin with your horſe by letting him ſee it, and for that purpoſe tie him between two pillars, and hold before him, at about thirty paces diſtant, a burning whiſp of ſtraw; this ſhould be continued for ſome days together, repeating it ſeveral times each day. Let the perſon who holds the brand advance towards the horſe ſtep by ſtep; and let him take care to advance, or ſtop, often, as he perceives the horſe is moved, or leſs frightened, who, in a ſhort time, will be emboldened, and no longer afraid of the fire. After this, get upon him, carry him ſlowly, and as it were inſenſibly, towards the brand, the perſon who holds it taking care not to ſtir; if your horſe comes up to it without being frightened, let the man on foot walk on, and let the horſe follow the fire. Would you bring your horſe to go acroſs a fire, lay upon the ground ſome ſtraw about half burnt out, and he will paſs over it.

With reſpect to the noiſe of arms and drums, let your horſe hear them before you give him his oats; do this regularly every day, for ſome time, and he will be ſo uſed to them as not to mind them.

A horſe is ſaid to be *entier*, in its natural ſenſe whole, entire; and, in the figurative meaning, obſtinate, ſtubborn, opinionated, to that hand to which he refuſes to turn. A hurt in his foot, leg, or ſhoulder, may often be the cauſe of his refuſing to turn to that ſide where he feels any pain. A hurt in his reins, or haunches, a curb or ſpaving, which, by hindering him to bend, and reſt upon his hocks, may make him guilty of this diſobedience. Art can do little towards curing theſe evils; conſequently, a horſe ſo affected will never dreſs well, becauſe he never can be made ſupple and ready; beſides, every horſe is naturally inclined to go to one hand more than the other, and then he will go to that hand on which he finds himſelf the weakeſt, becauſe with the ſtrongeſt he can turn more eaſily.

It is a known fact that horſes are naturally inclined to go better to one hand than to the other. The halter, the bridle, the ſaddle, and the girths, are all put on, and tied on the left ſide; when they are rubbed or curried, the man ſtands on their left ſide; the ſame when they are fed; and when they are led out, the man holds them in his right hand, conſequently their head is pulled to the left; here is a chain of reaſons ſufficient to induce us to believe, that if they are readier to turn to one hand than the other, it is owing to a habit and cuſtom which we ourſelves have given them.

We ſeldom meet with horſes that are readier to turn to the right hand than the left; and when it ſo happens, it oftentimes denotes an ill temper; it demands much time and pains to cure them of this fault.

Note.—It is not proper to uſe ſevere correction to make a horſe obey who refuſes to turn to one hand; if he is cold and dull, he will loſe all his vigour and courage; if he is of an angry temper, hot, and briſk, you would make him deſperate and mad; work him then upon the principles of art, and purſue the method you think moſt likely to reform his ill habits, and reduce him to obedience. If he obſtinately refuſes to turn to one hand, begin the next leſſon by letting him go to his favourite hand a turn or two; finiſh him on the ſame hand, and by degrees you will gain him; whereas, were you to do otherwiſe, you might make him be ever after rebellious. A horſe that ſtrenuouſly reſiſts his rider, if he has vigour and courage after he is reduced and conquered, will, nevertheleſs, ſucceed in what you want of him, provided he is under the direction of an able and knowing perſon, who underſtands the aids of the hands and legs, and their mutual harmony and correſpondence. Such a horſe is even preferable to one who never rebels, becauſe, in this laſt, nature may be deficient, if we may be allowed the expreſſion, with reſpect to his want of ſtrength and reſolution.

In order to teach your horſe to turn to both hands, you muſt ſeparate your reins, as we have already mentioned; do not confine him too much, ſupport him moderately, ſo that you may eaſily draw his head to one ſide or the other, as you would have him go, and to give him the greater liberty to turn.

If he refuſes to obey, examine him; if he is by nature impatient, hot, and vicious, by no means beat him, provided he will go forward; becauſe being held in hand, and kept back a little, is puniſhment enough; if he ſtops, and tries to reſiſt, by running back, drive him forward with the chambriere.

The reſiſtance of a horſe whoſe mouth is faulty, diſcovers itſelf more in going forward than backward, and in forcing the hand. A horſe of this ſort ought never to be beat, he ought to be kept back, as we have juſt now ſaid; you muſt endeavour to give him a good and juſt appui, and put him upon his haunches, in order to cure him of the trick of leaning upon his bit, and forcing the hand. If your horſe is heavy, never preſs or put him together, till you have lightened his fore-part, and put him upon his haunches, for fear of throwing him ſo much upon his ſhoulders, that it may be very difficult afterwards to raiſe him. Take particular care to lighten every horſe that is heavy before, and has malice in his temper at the ſame time; for if you were to preſs him, he would reſiſt you through vice; in which caſe, by his want of ſtrength on one hand, and being heavy and unwieldy on the other, you would be expoſed to evident danger.

A reſtive horſe is one that refuſes to go forward, who ſtanding ſtill in the ſame place, defends himſelf and reſiſts his rider in ſeveral different manners; it is much to be feared that one ſhould loſe all temper with ſuch a horſe, ſince it requires a great deal of patience to cure ſo capital a fault, and which, perhaps, by habit and time, is ſo rooted in him as to be almoſt natural to him. Treat a horſe of this ſort, who has been too much conſtrained and tyrannized over, with the ſame lenity that you would ſhew to a young colt. The ſpurs are as improper to be uſed to one as the other; make uſe of your ſwitch, in order to drive him forward, as you will alarm him leſs, for the ſpurs ſurprize a horſe, abate his courage, and are more likely to make him reſtive, than oblige him to go forward, if he refuſes to do ſo.

There is likewiſe another method to puniſh a reſtive horſe, it is to make him go backward the moment he begins to reſiſt; theſe corrections often ſucceed; but the general rule is to puſh and carry your horſe forward, whenever he refuſes to advance, and continues in the ſame place, and defends himſelf either by turning or flinging his croupe on one ſide or the other; and, for this purpoſe, nothing is ſo efficacious as to puſh him forward vigorouſly.

The moſt dangerous of all defences a horſe can make, is to riſe directly upon his hinder legs, and ſtand almoſt quite ſtraight, becauſe he runs a riſk of falling backward, and in that caſe the rider would be in danger of his life. People have endeavoured to correct this vice by a method of puniſhment, which might prove dangerous unleſs given in time, and with the greateſt exactneſs.

Whenever the horſe riſes ſtraight up, throw your body forward, and give him all the bridle; the weight of your body upon his fore-parts will oblige him to come down; in the minute that his fore-feet are coming to the ground, give

give him both the spurs firm, and as quick as you can. These aids and corrections, however, must be given with the greatest caution and exactness; for were you to give him the spurs when he is in the air, he would fall over, whereas if you watch the time so as not to spur him but when he is coming down, and his fore-feet near the ground, it is then impossible he should fall backward, for then his balance is destroyed, and he is upon all his legs again, and cannot rise without first touching the ground, and taking his spring from thence; if, therefore, you give him the spurs before he is in a situation to rise again, you will punish him, and drive him forward at the same time.

This defence is still more dangerous in horses who are of a fiery temper, and weak in their haunches at the same time. These are continually apt to rise; and whatever precautions the rider may take, he is in continual danger of their coming over; the way to correct them is this; tie your horse between the pillars very short, put on a good caveson of cord, and do not suffer him to be mounted. Prick him upon the buttock with a spur, or sharp piece of iron, in order to make him strike out behind; encourage him when he kicks, and continue to make him kick, encouraging him from time to time, when he obeys; do this for a quarter of an hour every day. When you perceive that he begins to kick the moment after you so prick him, without waiting till he feels it, get upon him, hold your reins long, prick him, and let a man stand by and prick him at the same time; encourage him when he kicks, and continue to prick him, to make him do it, till he will kick readily only at the offer you make of pricking him; he ought to be brought to this point in five or six days. After this, take him out of the pillars, mount him, and trot him in the longe, and make him kick by pricking him behind; after that, let him walk two or three steps, then make him kick again, and so work him by degrees. Put him to the gallop, and if he offers to rise, prick him behind, and make him kick; nothing excels this method, to break a horse of this terrible and dangerous vice.

Those horses who are subject to kick, either when they go forward, or stand still, must be kept much together, or held in closely, to make them go backward, and you will cure them of this vice.

He who would succeed in correcting the vices of horses should never depart from this maxim; always to observe a just medium between too indulgent lenity and extreme severity; work your horse according to his strength and capacity; give your lessons in proportion to his memory; and dispense your punishments and rewards suitably to his courage and disposition. See Berenger's Hist. and Art of Horsemanship, vol. ii. ch. 1, 2, 3. See also AIDS, AIRS, APPUI, BALLOTADES, CAPRIOLES, CORRECTIONS, CROUPADES, CURVETS, ENTIER, EPAULE *en Dedans*, GALLOP, HAND, MEZAIR, PASSADE, PASSAGE, PESADE, PILLARS, PIROUETTE, RAMINGUE, RESTIVE, STEP *and Leap*, STOP, TERRE-A-TERRE, TROT, UNION, VOLTE.

RIDE, among sheep farmers, a term applied to rams, which, when they are put to the ewes, are said to be at ride. See RAM.

RIDE, in the *Sea Language*, a term variously applied. Thus, a ship is said to ride, when her anchors hold her fast, so that she drives not away by the force of the wind or tide.

A ship is said to *ride well* or *easy*, when she does not labour heavily, or feel a great strain, when anchored in an open road or bay. On the contrary, when she pitches violently into the sea, so as to strain her cables, masts, or hull, she is said to *ride hard*, and the vessel is termed a bad roader.

A ship *rides across*, when she rides with her main-yards and fore-yards hoisted up to the hounds, and both yards and arms topped alike.

She is said to *ride a-peek*, when one end of the yard is peeked up, and the other hangs down: this is also said of a ship, when, in weighing, she is brought directly over her anchor.

She is said to *ride athwart*, when her position lies across the direction of the wind and tide, when the former is so strong as to prevent her from falling into the current of the latter: and to *ride betwixt wind and tide*, when the wind hath equal force over her one way, and the tide another, so that she is in a manner balanced between them, and rides without the least strain on her cables. If the wind have more power over her than the tide, she is said to *ride wind-road*.

She is said to *ride hawseful*, when, in stress of weather, she falls so deep, that the water runs in at her hauses.

She is said to *ride portoise*, when her yards are struck down upon the deck, or when they are down a-port-last.

To RIDE *land-locked*, at sea. See LAND-*locked*.

To RIDE *by the Stoppers*. See STOPPERS.

RIDEAU, in *Fortification*, a small elevation of earth, extending itself lengthways on a plain; serving to cover a camp, or give an advantage to a post.

The word, in its original French, signifies a *curtain* or *cover*, formed from the Latin *ridellum*. Borel derives it from *ridere*.

A rideau is also convenient for those who would besiege a place at a near distance, and to secure the workmen in their approaches to the foot of a fortress.

RIDEAU is sometimes also used for a trench, the earth of which is thrown up on its side, to serve as a parapet for covering the men.

RIDEAU, in *Geography*, a river in the eastern district of Canada, which runs into the Utwas, or Ottawa. N. lat. 45° 15′. W. long. 76°.

RIDER, a town of Arabia, in the province of Hadramaut.

RIDER, in *Artillery Carriages*, a piece of wood, somewhat higher than it is broad, and of a length equal to that of the body of the axle-tree, upon which the side-pieces rest in a four-wheel carriage; such as the ammunition-waggon, block-carriage, and sling-waggons.

RIDER is also used for after-clauses, added to bills, whilst they are depending in parliament.

RIDER-*Roll*. See ROLL.

RIDERS, *Out*. See OUT-*Riders*.

RIDERS, in *Ship Building*, interior ribs, to strengthen and bind the parts of a ship together, being fayed upon the inside stuff, and bolted through all. They are mostly used in ships of war, and are variously situated, as the *floor-riders*, which are fayed athwart the keelson, and should be placed over the first futtocks. The next are the *first futtock-riders*, which fay alongside the floor-riders, and give scarph above them: these are connected by cross-chocks athwart their heels, that scarph to each side with hook and butt. The next are *second futtock-riders*, which fay alongside of the first futtock-riders, down to the floor-riders, and run up under the orlop beams. The *third futtock-riders* fay alongside the second futtock-riders, scarph or meet the heads of the first futtock-riders, and run up to the gun-deck beams. The whole are bolted together fore and aft. Breadth and top-riders, which were above the former, seem now to be discontinued

tinued in the navy, as they could only be ufeful in wake of the main and fore-chains, as the midfhips is much better ftrengthened now by uniting the fides and *fkid-beams* together by the knees.

Thefe riders ftood diagonally, fo as to faften through two or more timbers, the ftrength depending much thereon. The top-riders came up to the top of the fide, and the breadth-riders between them and the third futtock-riders, or on the broadeft part of the fhip, and hence their name. Riders are not fo much required in merchant-fhips as in fhips of war, excepting floor and lower riders in large fhips (which are generally of iron, fo as not to interrupt the ftowage), becaufe the cargo being ftowed low down, and the rigging lighter, the upper works are not fo liable to ftrain and labour, like thofe fhips of war having their heavy ordnance above the line of floatation.

RIDGE, in *Buildings*, the higheft part of the roof or covering of a houfe.

Ridge is particularly ufed for a piece of wood, in which the rafters meet.

RIDGE-*Tyle*. See TYLE.

RIDGE, in *Sea Language*, is a long affemblage of rocks, lying near the furface of the fea, fo as to intercept the paffage of a fhip under fail.

RIDGE-*Tackle*. See TACKLE.

RIDGE-*Ropes*. See ROPES.

RIDGEFIELD, in *Geography*, a poft-town of America, in Fairfield county, Connecticut; 10 miles S.W. of Danbury. This townfhip was called by the Indians "Caudotowa," or high land. It was fettled in 1709, and contains 2103 inhabitants.

RIDGES, in *Agriculture*, are pieces of ground laid up between two furrows, having always confiderable length, but different fmall breadths, according to circumftances.

It is ftated by the author of the Prefent State of Agriculture in Great Britain, that in many of the more fertile and populous diftricts, the ridges are found remarkably crooked, unequal in breadth, and made to rife towards the middle, or crown, to the height of feveral feet above the furrows, on either fide. And he fuppofes that thefe are formed in the worft manner, to anfwer the purpofes which are now intended by dividing a field into ridges. But this, he thinks, could not have efcaped the notice of all the farmers of former periods; but that, on the contrary, from the practice being fo general, it is more than probable that fuch form, though now confidered abfurd, was formerly fuppofed an improvement, as in the cafe of many other practices of antiquity; as in many of the hilly fituations in Scotland, where the foils are dry, and in a tolerably level ftate, and where cultivation had without doubt taken place at a very early period, although at prefent abandoned to the growth of heath, the ridges are found as ftraight as thofe in the beft cultivated diftricts in the kingdom. The reafon which induced the cultivators of thefe times to conftruct the ridges in fuch forms, may, he thinks, be explained in this way; that as the lands were moftly cultivated in the open field, or run-ridge ftate, the furrows of the ridges were, for the moft part, the mark or boundary between one farmer and another. The portion of land belonging to a tenant in any one place being on this account fo fmall, as to prevent him from employing any other mode of drainage, than that of raifing the ridge to fuch a height, as to permit the water to difcharge itfelf by the furrows, without injuring the crop. It is ftated, that all the ridges that are broader at one end than the other, will generally be difcovered to be the narroweft at that end which is ftill the moft wet and fpouty. It is of courfe conceived, that this form was purpofely given them, as the only means by which lands in fuch a ftate could be drained. And that, as the moft crooked ridges are found on the fteep and floping grounds, it may be fuppofed that that form and pofition were adopted by the firft cultivators, as the beft for preventing the foil from being wafhed away by fudden falls of rain, which muft no doubt have been the cafe to a greater extent, had the ridges been ftraight. Each furrow, by becoming a fort of fmall rivulet, without any thing to impede its courfe, muft have done more mifchief to the foil than if it had been gradually taken off the circuitous courfe of the crooked ridges.

But from the change in the nature of poffeffing lands, proprietors and tenants having now, except in a few open field diftricts, the means of draining and forming the ridges in the moft effectual manner, thefe old forms of ridges, which can only be ufeful in fuch cafes as the above, are not only rendered ufelefs, but operate ftrongly againft the full improvement of the foil. But notwithftanding this, there is, it is conceived, no fort of bufinefs in which the farmer can be engaged, that demands more judgment and caution than that of levelling and altering the direction of fuch forts of ridges. However, before the mode of managing this in the cheapeft and moft effectual manner is explained, it may be proper to fhew the moft fuitable forms and directions in different forts of foil, and under different circumftances of the grounds.

In forming ridges, great attention is neceffary to the nature and quality of the foil, and the particular fituation of it, as the fize, height, and direction muft, in a great meafure, be governed by them. It has been obferved by a late practical writer, that where the land is of fuch a nature as to be highly retentive of moifture, or, from the peculiarity of its pofition, liable to become too wet for the growth of ufeful crops, the ridges fhould in general be made narrower, and have a more rounded or convex form, than in the contrary cafe, or where it is expofed to injury from becoming too dry. But, in the firft cafe, they ought not, however, to be raifed fo very high as is fometimes the practice, as by fuch means much inconvenience is often fuftained from the crowns becoming too dry, and the grain ripening in a flow and partial manner. Befides, narrow ridges, with but a little elevation, are, in general, much more effectual in taking away the water that may be injurious.

It has been remarked by the writer of the Perthfhire Agricultural Report, in refpect to the height of ridges in lands of more dry defcription, that as the furrows, in general, produce lefs crop than any other part of the ground, the fewer furrows the better, provided the land can bear it. If the field be dry, there is not only more produce by fewer furrows, but the ridges are cloven by every ploughing (a thing that cannot be done in raifed ridges with deep furrows), which keeps them in an uniform level furface, and greatly facilitates the labour of fpring and harveft. Perfons who are not accuftomed to inveftigate the caufe of what they daily fee, are deterred from making their ridges nearly flat by the waters that ftagnate, in the ftrips of grafs and fprits that lie between the ridges, which they have raifed greatly in the middle: never confidering that they are working againft nature, becaufe the more the ridges are rounded the deeper are the furrows, till they become like ditches, and the more readily do clods fall down, fo that they are with their own hands producing the very evil which they wifh to prevent. Whereas, were the ftrips of flags and other trumpery torn up, were the furrows lefs deep, and kept

kept perfectly clean and open, to allow a free paſſage to the water, the whole would flow to the open drain at the extremity of the field; and the higher the furrows are, in reſpect to this drain, their relative height would make the water flow the faſter. Care ſhould always be taken that the clods that fall back into the furrows, and dam the water in ſuch land, ſhould be removed with the ſpade. The ſlovenlineſs of men in this particular circumſtance, more frequently produces the ſtagnation complained of, and all its baneful conſequences, than either ridges moderately raiſed, or any other cauſe. This he conſiders as perfectly ſatisfactory, in reſpect to laying out ſuch lands into ridges in the firſt inſtance. But that, in caſes in which neither the circumſtances of the ſoil, nor the nature of its ſituation, require that the ridges ſhould be formed in a particular manner, or of any certain breadth, that of making them about eighteen feet may be the moſt ſuitable, as they are found to anſwer well in the way of keeping the ground properly dry, and of the moſt convenient dimenſions for turning the teams at the ends in ploughing. And that beſides, the ſeed, where this method is purſued, can eaſily be ſown by one caſt up and another down; an operation which, in other circumſtances, would be attended with conſiderably more labour. That, in the covering of the ſeed by means of harrowing, the work is alſo accompliſhed with more facility and diſpatch, as by employing double implements of this kind, one turn may wholly finiſh the buſineſs. And that in the reaping, too, they have advantages, in allowing the number of reapers that are neceſſary to work with convenience, and without being in the way of each other. This, though a great advantage in ſome caſes, is of leſs conſequence ſince the mowing of grain is become more general.

But it is ſtated, that wet, clayey, or any ſtiff and tenacious loamy ſoils, where the under ſtratum is clay, ſhould be ploughed as much as poſſible into ridges of much leſs ſize, in order that they may be kept in a ſtate of dryneſs, ſuitable to the growth of the crops that are to be put upon them. Three or four feet, according to the degree of tenacity and wetneſs, may, in ſuch ſorts of land, be fully ſufficient. And it is added, that in the counties of Eſſex and Hertford, on this ſort of wet ſoils, three feet are found to anſwer the purpoſe in a very effectual manner. And that it has been obſerved in the Middleſex Agricultural Report, on the authority of much experience, that their ſuperiority over ridges of greater breadths, for taking the water off without waſhing the land, is incontrovertible. That, in ſhort, as there is much variation in lands of theſe kinds, the width and flatneſs of the ridges ſhould be increaſed as they recede from the nature of clay or clayey loam, and approach that of ſand, in order that a larger proportion of moiſture may be preſerved: while, on the contrary, as they are becoming more of a clayey quality, they ought to be narrower, and to have a more high and rounded form, that the diſcharge of injurious moiſture may be more expeditious. In loamy ſoils they ſhould be either broad and flat, or narrow and round, in ſome meaſure, according to the degree in which they approach the ſandy or clayey ſoils. And that, in very wet clayey ſoils, where they reſt upon a ſubſoil of ſome porous kind, great advantage in the way of drainage may often be obtained, by ſinking the furrows ſo deep, as to reach it. But ſome perſons, on theſe ſorts of clayey ſoils, ſuppoſe the beſt breadth to be ten or twelve feet, as where they are narrower there is much diſadvantage, though they keep the land drier. Alſo, in lands of the marſhy or fenny kinds, as moſtly approaching in ſome degree to the nature of theſe, the ridges ſhould be made narrow, and rather round in their forms.

But that as the principal defect of lands of the ſandy kind is that of parting with their moiſture too readily, and of courſe becoming quickly in a ſtate of too much dryneſs for the purpoſe of healthy vegetation, it is the moſt adviſable to plough them into very broad ridges, or even in ſome caſes quite flat, without the leaſt degree of furrow being made; as, in this way, the moiſture may be more effectually retained in ſuch ſoils, to the great advantage of the crops which are grown upon them. But in the conſtructing of ridges on ſuch ſoils as are of the boggy or moſſy kinds, ſome attention is neceſſary in reſpect to their depth, and the proportion of wetneſs that may be preſent; as where they are thin, and have but little injurious moiſture, they may be more broad and flat than where they are deep of moſs, and more retentive of moiſture: ſix or ſeven yards may, in general, be the beſt. It is obſerved, that even in the deeper ſorts, long experience has ſhewn that, in the firſt inſtance, it is improper to make them too high or too narrow; as, in the former caſe, they throw the water off from their ſides, without admitting it to penetrate their ſubſtance, the top of courſe gets too dry; while, in the latter, there is a loſs of ſurface, from too many diviſion furrows. The breadths already mentioned are found to be the beſt; and when the improvement is completed, the ridges appear like ſegments of wide circles, with a clean well-defined diviſion furrow between each of them. The moiſture is thus cauſed ſlowly to filtrate through the moſs, rendered friable by lime, until it reaches the diviſion furrows. It is generally neceſſary to clean theſe out before winter, and at the time the crop is ſown, until the moſs acquires ſolidity. This has been fully ſhewn in a paper, in the ſecond volume of Communications to the Board of Agriculture. See the work.

And it has been remarked, that ridges in theſe ſoils are generally formed by the ſpade, the workmen beginning nearly in the middle of the part which is to form the ridge, only leaving the ſpace of about eighteen or twenty inches, upon which the materials raiſed from the trenches on each ſide are depoſited, ſo as to conſtitute the crown; and in this way, digging up and turning over narrow ſpits on each ſide, the workman proceeds till he comes to the diviſion furrows, which are cut out and laid on the ſides: in which way, the ridge, when completed, appearing as if done by the plough. And in the deeper moſſy ſoils, eſpecially of the more ſpongy kind, it is probable the breadth of the ridges may be increaſed with advantage, after they have collapſed and become ſufficiently firm; as, by ſuch means, they will be more ſuitable for being laid down to graſs or ſward, for the purpoſe of paſturage.

Further, in what reſpects the general diſpoſition of ridges, where there is not a neceſſity of giving them any particular direction, either for the purpoſe of drainage, or other circumſtances, they ſhould be formed as much as poſſible in the direction of north and ſouth; as, by that means, much advantage may be gained in the crops attaining maturity, and in becoming dry, from their having the more full influence of the ſun and wind. And it has been remarked by Mr. Marſhall, in his Midland Economy, that the ſhocks, after grain has been reaped, ſhould be ſet in the ſame direction, and not have an eaſt and weſt poſition; as, in this caſe, the ſheaves on the north ſide are many days later in being in a proper condition for being conveyed to the ſtack, than thoſe on the ſouth. From further experience, he is alſo convinced of the bad effects of ridges having an eaſt and weſt direction; it having been found that corn, on the ſouth ſides of ſuch as were not by any means high, ſhot into ear, and changed and ripened a week at leaſt earlier than that on the north; and that at the time of reaping, the wheat on the

the fouth fides was, in fome patches, too ripe; while that on the north fides was, in many parts, abfolutely in a green ftate.

But where the ridges are to be conftructed in fuch lands as are hilly in their fituation, or have much declivity, it is neceffary that they be neither made too fteep, nor have too much of a horizontal direction given them; being drawn in fuch a manner, as that they may have that fort of eafy floping direction, by which the water may be taken off in a gradual eafy manner; as, in this way, there will not only be great advantage in the faving of labour in ploughing, nearly one-third lefs power in the team being fufficient; but the injury and inconvenience of heavy rains wafhing down the foil and manure will in a great meafure be obviated. It has been ftated by the author of the Gentleman Farmer, that in a hanging field, that had been carefully dreffed with lime and dung for turnips, and in which the turnips were fairly above the ground, a heavy, fummer fhower fwept down the crop, together with the lime, dung, and a portion of the loofe foil, leaving the land naked and expofed. Therefore, in the forming ridges in lands that have fuch fituations, it has been well obferved by the author of the Agricultural Report of Perthfhire, that when the fields hang fo much as to be accounted fteep, the ridges ought neither to be drawn parallel to the bottom of them, nor at right angles, ftraight up and down; either of which would be inconvenient in the ploughing, and injurious to the foil; but they ought to be drawn diagonally. The great point is to underftand in what direction this diagonal flope of the ridges ought to run. In this refpect the tenants of Balgowan, in this diftrict, are perfectly correct; and it is his wifh that their example were followed by all farmers, whofe land has a great declivity, of which there is a confiderable proportion, not only in that, but in all hilly countries whatever. The form and direction of the ridges are, he thinks, contrived with fuch judgment, that the furrow (or, as lord Kaimes with more accuracy calls it, the furrow-flice) falls eafily away from the mould-board, as well in afcending as in defcending the field, which is the principal fecret. There can be no more than two diagonal lines in any four-fided figure, which is generally the form of inclofures; and if you bring a fenfible ploughman to each of the angles below, defiring him to look towards each of the oppofite angles above, he will at once tell you which of thefe diagonal directions is eafieft for himfelf and his horfes, and will accordingly fix on that line by which the furrow, *in afcending*, will fall moft readily into its place, having his right hand and the mould-board of his plough with a fide-afpect to the bottom of the field. But, with the view of rendering this more obvious, fuppofe the field to have a fteep defcent and a fouthern afpect, the ridges are drawn from fouth-weft to north-eaft; which is the cafe in the inftance alluded to. Suppofe, again, the field to have a northern afpect, the ridges are drawn in the fame direction, but with this difference in ploughing, that you *afcend* fouth-weft in the laft cafe, whereas you *defcend* fouth-weft in the firft. If the field fronts the eaft, you afcend north-weft; or invariably four points forward from the flope of the field, in going up the hill. Befides the vaft faving in refpect to the power or ftrength of the team in this way, and that of the foil being lefs liable to be carried away by rains, by the running of the water in the furrows; where the ridges are made parallel to the bottom of the field, all the dexterity of a man and force of cattle that could be applied would be infufficient to turn every fecond furrow up againft the hill.

It is remarked, that the expedient univerfally employed, according to the old fyftem, in ploughing fields of this kind, was either to plough with a double mould-board, or, if the mould-board were fingle, to plough only one furrow in going twice the length of the ridge; but moft frequently the laft. Both are, he thinks, bad hufbandry. In the former method, you lofe none of your time, indeed; but one half of your labour is loft by the latter. His principal objection, he is of opinion, holds equally againft both. All the foil is, year after year, rolling downward; and in procefs of time, the upper part of the field will be peeled to the bone, and quite bare of foil, while a great bank is accumulating at the bottom, like a dunghill, compofed of the richeft land in the field; and withal, the furrows are laid fo completely on their backs, that little benefit is derived from the manure, excepting it be laid on the furface the firft year.

The fame writer further ftates, that where a hill is to be dreffed, in order to be laid down to grafs, it ought to receive the latter furrow by going round in a fpiral line, without ever turning the plough, beginning at the bafe, and ending at the top. This requires lefs labour, and is more beautiful. In preparing the ground for this laft furrow, it may be ploughed diagonally, to keep the foil from tumbling down hill, as has been mentioned above, in refpect to declivities: for this purpofe, the furface of the hill may be divided into three or more fections. And it is remarked by a late practical writer, in addition, that, in this way, no more ftrength of team is required in ploughing fuch elevations than in that of ploughing on a level; while, where the foil is of the gravelly or fandy kind, the great inconvenience of the moifture going off too quickly is guarded againft, by its being detained in the furrows. And the fpiral furrow is, according to the firft writer, the neateft method of finifhing off a lawn, even of flat land, near a gentleman's houfe; as it brings the whole furface to an uniform appearance, and pleafes the eye more than having the lawn ftriped with furrows.

In regard to fuch lands as are level, or have but little inequality of furface, the beft general practice, it is obferved by the author of a late work, is to form the ridges as ftraight and as regular in refpect to breadth as poffible; as, by having them crooked, and of irregular breadths, the water is not only liable to ftagnate and injure the foil, but the friction in ploughing is greatly increafed, and the furrow-flice is not fo well laid over, being more difpofed to fall back. And, befides, many unneceffary turnings are requifite, on account of the inequalities of breadth, by which much time is loft, as well as much trouble given to the ploughman in managing the plough while at work.

In fome of the lefs improved counties in the northern parts of the kingdom, as Lancafhire, and thofe adjoining it, the ridges on the old lands are often narrow, crooked, and very ill laid out, being for the moft part too much rounded in the middle parts, and in the form of butts, which are the ftates in which they are at the prefent time, few or no attempts having been made to alter them in any way. However, from the nature and depths of the foils, it would not appear that there would be any danger or difficulty in doing it; though this may be the cafe in fome other fituations, where it ought to be attempted with proper caution. In fome parts of the above diftrict, as that of the field, the term *farring* or furrowing is often made ufe of, inftead of that of ridge.

Method of Levelling and Straightening old Ridges.—In fuch kind of land as has been long in a cultivated ftate, high, crooked, and irregular ridges are frequently met with, that often become neceffary to be altered, fo as to be rendered more ftraight and level. This, though apparently fimple, is is a matter of more difficulty and trouble, and which demands more knowledge and care in its execution, than is commonly fuppofed by perfons unacquainted with the bufinefs. Various obltacles have been thrown in the way of this fort of improvement by farmers in different diftricts. By fome the expence is confidered as very great, while others oppofe it on the ground of the injury done to the land for fome years afterwards. And according to the Agricultural Report of the county of Perth in Scotland, the objection made by fome farmers in the Carfe of Gowrie is this: in the action of levelling ridges, that have been, time immemorial, raifed high in the crown, much foil is brought up, which for ages had neither feen the fun nor fmelled the air. This, like moft other foils, which has been fo long and fo deep buried, is very unproductive at firft, and blafts all their expectations. It is perfectly confonant to the procefs of nature, the writer fuppofes, that this fhould, in fome meafure, happen; and, as far as it has any weight, is an argument not only againft levelling, but againft ftraightening the ridges of fuch land. But was not, he afks, every particle of that foil, which is fo much reprobated, on the furface of the ground before the ridges were fo raifed by the hand of man? Was not this very foil, at that time, as good as any foil in the field? Nay, was it not much more fertile before it was buried in the middle of the ridge, than the *new* foil, which the ploughman was digging up year after year, out of the fterile furrow, to affift in gradually raifing his ridge higher? Every man muft anfwer in the affirmative. If you therefore bring back your land nearly to the level in which the hand of nature left it, you will find the very foil, which had been fertilized by the deciduous parts of plants, from the creation, until it came into cultivation; the foil which Providence intended for the production of grain for the ufe of man, this foil has not furely loft its fertility, although that fertility has lain long dormant by its being covered up in the bowels of the earth, and removed from the benign influence of heaven. The fertility of a foil cannot be exhaufted by any other means, but by over-cropping. It may be fufpended, as in this inftance, but not annihilated. Reftore the foil to its native place, and to that influence of which it was deprived, and it will foon become equally productive as at firft. It is not pretended that its fertility will be exerted all at once. Clay is a ftubborn foil: it is neither fo eafily ftimulated by manure, nor by the benignity of the atmofphere, as other foil. It requires time and labour and expence to fet it in motion; but when moved it retains its powers longer and makes very ample returns. And in addition to thefe obfervations, vaft benefits muft in many cafes refult from bringing ill-formed ridges into a proper fituation for the advantageous culture of crops upon them.

With regard to the time or feafon for the execution of this fort of work, it has been remarked that the moft fuitable period for accomplifhing it where the plough is employed, is when the land is undergoing a courfe of repeated ploughings, as in the cafe of a fallow; as under fuch circumftances the more elevated parts of the field may be ploughed over as often, and in fuch directions, as is moft fuitable for bringing them into a level ftate. Where the ridges are not raifed to any very confiderable height in their middles, but badly formed in other refpects, they may fometimes be readily brought into proper order by being fplit, or cloven down occafionally; a mode which is performed by beginning at the furrows and terminating at the crown or middle of the ridge, fo that the former furrows become the crowns, and the new furrows are made in the middle of the old ridges, which being filled by a furrow from each fide, has the tendency of foon bringing them into a more equal and level form. But that in cafes where the foil is of the light, gravelly, or open and mellow kind, the plough may be conveniently employed in levelling the ridges, without producing any injury of confequence to the crops that may afterwards be put upon the land. It is proper, however, even in lands of thefe kinds, to ufe fuch caution in performing the operation, in order to avoid the injury that might be caufed by too large a proportion of the under foil being brought to the furface in different parts of the ground, and in that way rendering it lefs productive in crops than it was before.

It has been contended, however, by Dr. Anderfon, in the firft volume of his Effays, that where this fort of work is done by fuch implements as are contrived for expeditioufly bringing high ridges to this fituation, as ploughs, harrows, drags, &c. the farmer of neceffity buries all the good mould that was on the top of the ridges in the old furrows; by which he greatly impoverifhes one part of his field, while he too much enriches another; infomuch, that it is a matter of great difficulty, for many years thereafter, to get the field brought to an equal degree of fertility in different places: which makes it impoffible for him to get an equal crop over the whole of his field by any management whatever: and he has the mortification frequently, by this means, to fee the one half of his crop rotted by an over-luxuriance, while other parts of it are weak and fickly, or one part ripe or ready for reaping, while the other is not properly filled; fo that it were, on many occafions, better for him to have his whole field reduced at once to the fame degree of poornefs as the pooreft of it, than have it in this ftate. An almoft impracticable degree of attention, in fpreading the manures, may indeed in fome meafure, he thinks, get the better of this difeafe: but it is fo difficult to perform this properly, that he has frequently feen fields that had been thus levelled, in which, after thirty years of continued culture and dreffings, the marks of the old ridges could be diftinctly traced when the corn was growing, although the furface was fo level that no traces of them could be perceived when the corn was off the ground. But this, he remarks, is a degree of perfection in levelling that cannot be ufually attained by following this mode of practice, and therefore it is but feldom feen; for all that can be expected to be done by any levelling machine is to render the *furface* perfectly fmooth and *even* in every part at the time that the operation is performed: but as in this cafe the old hollows are fuddenly filled up with loofe mould to a great depth, while the earth below the furface, upon the heights of the old ridges, remains firm and compact, the new-raifed earth, after a fhort time, fubfides very much, while the other parts of the field do not fink at all; fo that in a fhort time the old furrows come to be again below the level of the other parts of the field, and the water, of courfe, is fuffered in fome degree to ftagnate upon them, infomuch that in a few years it becomes neceffary once more to repeat the fame levelling procefs, and thus renew the damage that the farmer fuftains by this pernicious operation. He therefore thinks that on thefe accounts, if the farmer has not a long leafe, it will be found, in general, to be more for his intereft to leave the ridges as as he found them, than to attempt to alter their direction: and if he attends with due caution to moderate the height of thefe old ridges he may reap very good crops, although, perhaps, at a fomewhat greater expence of labour than he would have been put to upon the fame field, if it had been reduced to a proper level furface, and divided into ftraight and parallel ridges. However, where a man is fecure of poffeffing his ground for any confiderable length of time, the advantage that he will reap from having level and well laid out

out fields are fo confiderable, as to be worth purchafing if it fhould even be at confiderable expence. But the lofs that is fuftained at the beginning by this mechanical mode of levelling ridges, if they are of confiderable height, is fo very great, that it is, perhaps, doubtful if any future advantage can ever fully compenfate it. On thefe grounds he rejects the ufe of machinery in thefe operations, and recommends the method defcribed below as being more efficacious and fuccefsful. There have, however, of late been many valuable machines contrived for the purpofe of accomplifhing the work in an eafy and cheap manner, and which have been found to anfwer in practice. An implement of this fort has been defcribed under the head machine. See MACHINE *Land Levelling*.

But where the lands are of the clayey, loamy, or tenacious wet quality, there is much greater difficulty, as well as greater attention required, in levelling down and changing the forms of the ridges, as it frequently happens that in fuch foils, after the earth from the crowns has been removed in order to render them level, a coarfe, unfriendly, ftiff foil is brought up, as has been feen above, that requires a great length of time and much amelioration to bring into a ftate capable of fupporting good crops of any fort of grain. In thefe cafes and forts of foils, in the ftraightening and bringing down the ridges on the coarfe lands in the northern parts of the ifland, the author of the Perth Agricultural Report advifes it as proper to begin the operation by removing the made or ameliorated foil on the crown of the ridge to one fide, which may, he thinks, be done by two or three ploughings in one direction, turning the furrow always one way. This is eafier than doing it with the fpade. Then fuch a quantity of the buried foil may be caft with the fpade from the crown of the ridge, as will fill up the furrows at pleafure; and, laftly, the ameliorated foil may be fpread over the furface of the whole. If it is not thought enough to fave the ameliorated foil on the crown of the ridge alone, firft one fide of the ridge may be taken, and then the fame procefs repeated on the other; by which means almoft all the wrought foil may be kept on the furface. A good fummer fallow and a hearty dofe of lime, and the mixture of wrought mould, will reanimate the new foil, and reftore its vegetative power to its primitive ftate; and a very few feafons will naturalize the whole foil, while the farmer has the advantage of ftraight ridges, moderately raifed. Some, however, think that this bufinefs may be beft performed by the fpade, though it is now obvioufly impoffible in many fituations from the vaftly increafed expence of labour. Where this mode is to be employed, it is advifed by Dr. Anderfon, in his Effays on Agriculture and Rural Affairs, to let a number of men be collected, with fpades, according to the extent of work, and then fet a plough to draw a furrow directly acrofs the ridges of the whole field intended to be levelled. Divide this furrow into as many parts as labourers, allotting to each a ridge or two, more or lefs, according to the number and height of the ridges, and other circumftances. Let each of the labourers have orders, as foon as the plough has paffed that part affigned him, to begin to dig in the bottom of the furrow that the plough has *juft* made, about the middle of the fide of the old ridge, keeping his face towards the old furrow, working backward till he comes to the middle of the old ridge, going deeper as he advances, fuitable to the height he has to bring down; then let him turn towards the other furrow, and repeat the fame on the other fide of the ridge, fo as to leave the bottom of the trench he has thus made acrofs the ridge, entirely level, or as nearly fo as poffible. When he has finifhed that part of the furrow allotted to him, which the plough has made in going, let him then go and finifh in the fame manner his own portion of the furrow which the plough makes in returning. In this manner each man performs his own tafk through the whole field, gradually raifing the old furrows as the old heights are depreffed.

And the old furrow ought to be raifed to a greater height than the middle of the old ridges, fo as to make allowance for the fubfiding of that loofe earth. And the operation is thus finifhed at once. He recommends the making of thefe temporary or crofs ridges 40 or 50 yards broad at leaft: for although fome time will be loft in turning at the ends of the broad ridges, the advantage that is reaped by having few open furrows is more than fufficient to counterbalance this lofs: and in order to moderate the height that would be formed in the middle of each of thefe great ridges, it will always be proper to mark out the ridges, and draw the *furrow* that is to be in the middle of each, fome days before you collect your labourers to level the field, to prevent any hurry or lofs of labour in the future operation of levelling. The field will thus be reduced at once to a proper level, and the rich earth that formed the furface of the old ridges will ftill be kept on the furface of the field to be formed into new ridges. And the fame writer adds, that the direction of the ridges, as noticed before, ought to be north and fouth, if the field will permit, by which means the eaft and weft fides of the ridges, dividing the fun equally between them, will ripen at the fame time. Alfo further, that when the foil is fo wet as to require the raifing of the ridges, they ought to be made twelve feet wide, and twenty inches high, and to be preferved always in the fame form, by *cafting*, that is, by ploughing two ridges together, beginning at the furrow that feparates them, and ploughing round and round till the two ridges be finifhed. The feparating furrow is indeed raifed a little higher than the furrows that bound the two ridges, but at the next ploughing that inequality is corrected by reverfing the operation, which is eafily done.

And in regard to the expence of the different methods, the following ftatements are given by the fame writer, which, though far below the prefent price of labour, may furnifh the means of calculation to the improver. Suppofing the price of labour in Scotland to vary in different places from fixpence to one fhilling, and that the medium price be fixed at nine-pence a day; and that the hire of a plough, with four horfes and two fervants (for fo many, in general, will be requifite to labour properly ground in the condition that this is fuppofed to be in), varies in like manner from three to five fhillings *per* yoking, and that the medium price of this be called four fhillings; in this cafe the comparative expence of levelling, by thefe two different modes, would be as follows.

Expence of Levelling by Spade.

	£	*s.*	*d.*
For wages to eleven labourers one day, at nine-pence each - - - - -	0	8	3
For the hire of a plough $2\frac{1}{2}$ yokings, at four fhillings each - - - - - -	0	10	0
Total expence of one day's work - -	0	18	3

Expence of Levelling by Plough and Harrows.

	£	*s.*	*d.*
For two yokings and a half of a plough, as before - - - - - - -	0	10	0
For harrowing ditto, fuppofed at one-fourth of the ploughing - - - - -	0	2	6
	0	12	6

Total

	£	s.	d.
Total for once ploughing, &c. - -	0	12	6
The same five times more repeated - -	3	2	6
Total expence of levelling by plough and harrow - - - - - - -	3	15	0
Total expence of levelling by the spade	0	18	3
Difference	2	16	9

But another method practised by Mr. Paterson of Castlehuntley is, according to Dr. Robertson, first to open up with the spade a trench of about ten feet broad, from end to end of the field, in the same direction that the ridges are to be made. The upper surface of the ten-feet trench is laid upon one side, to be removed afterwards. Then the under soil of this trench is levelled and dressed by the spade and wheel-barrow, or carts, if necessary, at the same time giving the land a gentle fall at both ends, to enable the water to run off in the furrows towards the main drains. When this under soil has got its proper shape, he marks off another ten-feet trench, and with the spade throws the upper soil of the second trench on the new-formed under soil of the first trench, so as to cover it completely and equally: and so on through the whole field. The upper soil of the first trench was carried round in carts, and laid on the under soil of the last trench. The appearance of the field was then regular, rising in the middle and falling at both ends. He recommends ridges eighteen feet wide. The whole expence is supposed to be 8*l.* an acre. And it is observed in the third volume of the Farmer's Magazine, that ridges in enclosed lands are capable of being straightened with profit, or at least without loss, by wearing down the high ridges by the preceding crops, so as not to leave too much to the fallow, which is by turning one field at least into turnip or fallow every year until the whole is gone over. For as the land is ploughed and harrowed over and over in all directions, until it is brought to a close fine mould, the ridges may then be laid off just as the farmer pleases, without any loss. But that in straightening without this previous operation, the loss cannot be calculated. The advantages are therefore obvious to every man.

A writer in the fifth volume of the same work also observes, that in wet clayey soils, where the operation is undoubtedly most difficult to execute, he has accomplished the business with facility in this way. On dry soils, very little judgment or skill is required to do it, with safety to the ground, and advantage to the occupier. He states, that in 1794 he fallowed and straightened a field of about thirty acres, which had been oats the preceding year. The soil was a wet clay, and the ridges were very unequal in breadth, from ten to thirty feet, intermixed with *butts* or *gussets*, which are always detrimental to such lands, as they occasion the ploughs, &c. to turn often upon the other ridges, by which means the prints or marks of the horses' feet are left unfilled up. The first operation consisted in cleaving down the ridges. The field was then ploughed across, and thoroughly harrowed; but before the broad ridges could be brought to a level, several ploughings were necessary, which were accordingly given. The season, however, was far advanced before these necessary operations could be effected; and, as lime could not at this time be applied with advantage, he was under the necessity of laying it up in heaps, in an adjacent grass field, so as it might be expeditiously laid on whenever the field was straightened. The next consideration was, to form the ridges in such a manner as to prevent water from stagnating upon the ground. With this view, he run them partly east and west, and partly north and south, as the level would admit. When the ridges were thus formed and gathered up, the lime was applied, and a good cross-harrowing given, in order to fill up the furrows. And it being now the latter end of October, and the weather very wet, he thought it advantageous, in giving the seed furrow, to yoke the horses in line, and not a-breast, as is the usual practice. The whole field was sown on the 6th and 7th of November, and the braird appeared about the beginning of December. The weather having been wet for some days after the wheat was sown, it appeared rather thin in March, but always retained a dark green colour. It improved much during the summer months; and at harvest, turned out as good a crop as ever he saw upon such poor wet soil, the produce *per* acre being from thirty-two to thirty-four Winchester bushels of good marketable grain. Next year he ploughed the field again, and sowed one half with oats, and the other half with peas, both which were as good crops as could be expected. Perhaps it may be thought that he should have sown grass seeds among the wheat; but it is his opinion, that when ridges have been altered, a second fallowing is necessary before the field can be profitably laid down to grass. Last year he straightened a field in the above-mentioned way, which has answered his expectations to the full. It was sown with grass seeds, which at present promise well. He concludes by observing, that the advantages resulting from the practice of straightening ridges are obviously many and great. More work is performed both by plough and harrows, and to better purpose, in a given space of time: much seed too is saved; for when the ridges are at or below eighteen feet in breadth, which they ought never to exceed, two casts will suffice: whereas, in their former state, three, or even four casts, will be necessary in some parts, and in others one will be too much. Straightening ridges, and making them all of one size, also greatly furthers harvest work, as it is well known, that shearing is more expeditiously performed upon them, than upon those that are unequal with one another, or such as are broad at one end and narrow at the other. The last, though not the least advantage, which he shall notice at present, is, that wheat is not so apt to canker upon straight as upon crooked ridges. He will not now inquire how this comes to be the case; but leave it to the consideration of those who delight in abstract philosophical researches: it is sufficient for him to be assured, from experience, that it is so. The business of straightening and levelling ridges, in many situations, certainly demands much more attention than it has hitherto met with by the farmer and land proprietor.

But besides these modes of ridging, which are necessary in laying out lands for the purpose of tillage, there are others that become requisite in consequence of the growth of particular sorts of crops, and the particular methods of husbandry by which they are cultivated. Thus we have one, two, and three, or more *bout* ridges, according as the crops are grown to most advantage, on one or other of these sorts of small ridges, or as they suit the different sorts of tools by which they are put into the ground. Some other local modes likewise occur in tillage districts, of forming small ridges, for the cultivation of different kinds of crops. See TILLAGE.

RIDGES, in *Gardening*, portions of ground laid up by means of the spade in a narrow strip, to the height of one, two, or more feet, for the purpose of receiving the benefit of frosts and the influence of the atmosphere, and thereby become more mellow, light, and friable, as well as more fertile and productive. See RIDGING.

RIDGE-*Work*, in *Agriculture*, that sort of tillage which is executed

executed in the ridge method, or by raifing the furface of the land into fome kind of ridges.

RIDGES *of a horfe's mouth*, are wrinkles or rifings of the flefh in the roof of the mouth, running acrofs from one fide of the jaw to the other, with interjacent furrows.

It is commonly in the third or fourth ridge that the farriers ftrike with the horn, in order to bleed a horfe whofe mouth is overheated.

RIDGIL, in *Rural Economy*, a male fheep, in which the tefticles do not come properly down into the fcrotum.

RIDGIL *Lambs*, fuch as have none, or only one tefticle, in the fcrotum or cod. There is often great trouble and danger in thefe forts of animals being mixed with other fheep ftock, as they not only teafe the ewes, but frequently injure them. The lambs fhould, of courfe, always be cut while young, as from fix to ten or twelve weeks old, though the operation may be performed with fafety at a much later period, and even when a year or more old. Mr. Marfhall, in his Norfolk Economy, defcribes the manner of doing it in this way, where only one of the tefticles had come down or entered the cod. Having cut off the end of the fcrotum, bag, or cod, the tefticle was drawn out in the ufual manner of gelding. The other was taken out at the fide contrary to that on which the palpable tefticle was placed. In performing which, the lamb is laid flat on its fide upon the ground, being held in that pofition by one man, keeping its neck and fore legs clofe down, while another ftretches it out by drawing the hind legs backwards, keeping them tight down, fo that the animal cannot ftir. The operator then clips off a fmall patch of wool, about the fize and fhape of a duck's egg, clofe below the loin, and in the middle between the huckle and the fhort ribs; after which he makes an incifion, fufficiently wide to admit his forefinger, with which he fearches for the ftone and brings it out, difengaging it from the tunic or coat in which it is enclofed by a knife, drawing out the cord or ftring. The orifice after this is carefully fewed up, and the wounded parts anointed with elder or fome other ointment.

And it is ftated as remarkable, that the concealed tefticles all laid on the fame fide, namely the right fide; the contrary fide to that on which females are cut, in the cafes he had the operation performed in. And that in one the operation was rendered difficult by the tefticle being very fmall, and braced up clofe to the vertebræ. It is likewife added, that the palpable tefticle being priorily extracted, increafes the difficulty of the operation, as the perfon who performs it does not know which fide to cut on, and is fometimes obliged to cut on both before he finds the concealed tefticle.

This is a nice operation, which requires much care and attention in the perfon who performs it.

RIDGING *of Ground*, in *Gardening*, the practice of throwing it up into high ridges in order to lie fallow in winter, &c. to mellow, and improve in its quality and fertility.

It may be noticed, that this is a work of great utility in the kitchen garden, as well as in other parts, but more efpecially in ftiff heavy foils, and cold wet lands. It is accomplifhed by trench-digging the ground over, laying the earth of each trench in a raifed, rough ridge, lengthways, that by thus lying as high, open, and hollow as poffible, it may meliorate and fertilize more effectually by the weather during the winter. And it receives further improvement from the levelling it down again, which is expeditioufly effected, for the reception of the intended feeds, plants, roots, &c. which breaks, divides, and pulverizes the earth ftill more effectually.

And this fort of ridging is generally performed, either in the latter end of autumn, or any time in winter, or early in the fpring, as the ground is the moft vacant at thofe feafons, and not generally immediately wanted for any principal fowing or planting.

This fort of work is executed by beginning at one end of the plat of ground, and digging out a trench one or two fpades in width, and a full fpade's depth, removing the crumbs from the bottom, in the lengthways acrofs the ground, and wheeling the earth to the finifhing end, to be ready to fill up the laft trench: fo marking out a fecond trench clofe to the firft, of the fame width, then proceeding in the trenching and ridging, previoufly paring the top of the fecond trench, with all weeds, rubbifh, or dung thereon, if any, into the bottom of the firft, and then digging the ground of the fecond along regularly, the proper width and depth as above; turning the earth fpit and fpit into the firft open trench, laying it in a raifed ridge lengthways thereof, without breaking it fine, fo that it may lie fomewhat rough and hollow, according as the nature of the foil may admit: proceeding thus with another trench in the fame manner, and continuing the fame with the whole, trench and trench, to the end of the plat of ground; filling up the laft trench with the earth of the firft opened, laying it now ridgeways, as in the preceding trenches.

But in the work of levelling down ridged ground, as wanted, it fhould proceed regularly, ridge and ridge, longways, levelling the earth equally to the right and left, loofening any folid parts, and breaking all large rough lumps and clods moderately fine; forming the whole in an even regular furface, in order for fowing and planting, as required.

And in general, it is not advifable to lay down more than can be fown the fame or next day, while the furface is frefh ftirred, efpecially in broad-caft fowing and raking in the feed, as, moft generally, all tolerably light mellow foils are more yielding to the rake while the furface is frefh moved; or before rendered wet by rain, &c.; or very dry and hardened in the top earth by the fun, air, and winds, in dry weather, in the fpring months, &c.; and likewife for fowing feeds by bedding in and covering in with earth from the alleys, &c. or with earth raked off the beds for that purpofe, it would generally be moft fuccefsful to perform it in a frefh ftirred furface; though it is not fo material in drill fowing; and befides, when feeds are committed to the earth, while it is in a frefh turned up furface, efpecially in a dry feafon, they are more forwarded in a free regular germination than in ground that has lain fome time after digging or levelling down. Though fome grounds, of a wet, or heavy, ftiff nature, fometimes require to lie a few days after digging or levelling down, in order for the rough cloddy furface to mellow in fome degree, either by drying a little, or by having a moderate rain, or fometimes both, to meliorate the lumpy clods, pliant to the rake, in the cafe of broad-caft fowing, and raking in the feed.

RIDGING-*up*, in *Hufbandry*, a term ufed to fignify the practice of laying up the mould or foil to the rows of particular forts of crops, as thofe of the pea, potatoe, turnip, cabbage, and other fimilar kinds. It alfo implies the laying up land or earth in fuch a manner as that it may receive the moft full and perfect benefit and influence of the atmofphere, and in confequence become in a mellow and pulverized ftate. It is often very neceffary in ftiff lands.

RIDGLET, in *Agriculture*, a provincial word, ufed to fignify a fmall ridge, efpecially when raifed by baulking or ridging up with the plough.

RIDGLING, in *Rural Economy*, the male of any beaft that

that has been partially caſtrated, or which is not properly formed in the cod.

RIDICULE, in *Ethics*, is commonly uſed in the ſame ſenſe with irriſion; and has for its objects the abſurdities and misfortunes of mankind. The latter, however, are very improper objects of ridicule, whoſe province ſhould extend only to the careleſsneſs, inconſtancy, humour, affectation, impertinence, and in ſhort all the leſſer follies and imperfections of mankind. Such are generally the ſubjects of Horace's Satires; and Dr. More obſerves, that irriſion, which is the parent of ridicule, was the original of ſatire.

Dr. Campbell (Philoſ. of Rhet. vol. i.) obſerves, that ridicule is not only confined to queſtions of leſs moment, but is fitter for refuting error than for ſupporting truth, for reſtraining from wrong conduct, than for inciting to the practice of what is right. It is not properly levelled at the *falſe*, but at the *abſurd* in tenets; and it is not the criminal part of miſconduct which it attacks, but that we denominate ſilly or fooliſh. With regard to doctrine, it is not falſity or miſtake, but palpable error or abſurdity (a thing hardly confutable by mere argument) which is the object of contempt; and conſequently thoſe dogmas are beyond the reach of cool reaſoning which are within the rightful confines of ridicule. This ſtatement is obviouſly inconſiſtent with the mode of arguing adopted (very improperly, as we conceive) by thoſe who make ridicule, or raillery, the teſt of truth. To this claſs we may refer a noble writer, who, in his "Characteriſtics" (vol. i.) after alleging that truth may bear *all* lights, obſerves, that *one* of thoſe principal lights or natural mediums, by which things are to be viewed, in order to a thorough recognition, is *ridicule* itſelf, or that manner of proof by which we diſcern whatever is liable to juſt raillery in any ſubject. So much, at leaſt, is allowed by all, who at any time appeal to this criterion. His advocates, however, have aſſerted, that unjuſt repreſentations have often been given of the poſitions which he has maintained in his "Eſſay on the Freedom of Wit and Humour," and it has been ſaid, particularly in the "General Dictionary," that he was very far from vindicating a vague, indecent, and boundleſs ridicule, or inclined to employ his wit and humour otherwiſe than under certain reſtrictions, and when particular occaſions called for and juſtified it. Although it be allowed, that his lordſhip has been in ſome inſtances miſunderſtood and miſrepreſented, and he has written in a manner ſo inaccurate and unguarded, as to have ſubjected himſelf to juſt animadverſion and cenſure, Dr. Brown, in his "Eſſays on the Characteriſtics," has animadverted on his lordſhip's reaſoning; and with great ingenuity contended, that though ridicule is a ſpecies of eloquence, reaſon alone is the detector of falſehood, and the teſt of truth; that ridicule can never pretend to this character; that it is one of the moſt powerful engines by which error can be maintained and eſtabliſhed; and that its proper object is folly of conduct, and chiefly affectation. Other writers have defended his lordſhip, among whom we may reckon the Rev. Mr. Charles Bulkley, an ingenious and learned diſſenting miniſter. In a work aſcribed to Mr. Ramſay, the painter, the author has attempted to ſhew, that ridicule is of two kinds, and that it may be applied to opinions as well as to manners. The uſual objects of ridicule are, indeed, certain improprieties and peculiarities of character and conduct, and to aſſert, in general, that it is the teſt of truth, is advancing a falſe poſition. Reaſon is undoubtedly the genuine and proper teſt of truth. Nevertheleſs, ridicule may in ſome caſes be juſtly applied to opinions. There are tenets ſo flagrantly abſurd, that it is not eaſy to refrain from viewing them in the light of humour and raillery, and perhaps the beſt way of expoſing them may be to diſplay them in that light. Nevertheleſs, it muſt be acknowledged, that ridicule, when applied to grave and important ſubjects, is a very dangerous weapon; that it ought to be adopted with the utmoſt diſcretion, and that it has often been made uſe of in an improper manner.

With regard to conduct, ſays Dr. Campbell, we may diſcover to what kind ridicule is applicable, by directing our attention to the different departments of tragedy and of comedy. In the laſt it has a mighty influence: but into the firſt it never legally obtains admittance. Thoſe things which principally come under its laſh are aukwardneſs, ruſticity, ignorance, cowardice, levity, foppery, pedantry, and affectation of every kind. But againſt murder, cruelty, parricide, ingratitude, or perfidy, to attempt to raiſe a laugh, would ſhew ſuch an unnatural inſenſibility in the ſpeaker, as would be exceſſively diſguſtful to any audience. To puniſh ſuch enormities, the tragic poet muſt take a very different route. It ſhould be carefully remembered, ſays our author, that where nothing reprehenſible, or ſuppoſed to be reprehenſible, either in conduct or ſentiment, is ſtruck at, there is properly no ſatire (or, as it is ſometimes termed, pointed wit), and conſequently no ridicule. We may here obſerve, that the words "banter" and "raillery" are uſed to ſignify ridicule of a certain form, applied, indeed, more commonly to practices than to opinions, and oftener to the little peculiarities of individuals, than to the diſtinguiſhing cuſtoms or uſages of ſects and parties. The only difference in meaning between the two terms is, that the firſt generally denotes a coarſer, the ſecond a finer ſort of ridicule; the former prevails moſt among the lower claſſes of the people, the latter only among perſons of breeding. Dr. Campbell, after remarking that an air of ridicule in diſproving or diſſuading, by rendering opinions or practices contemptible, hath occaſionally been attempted with approbation by preachers of great name, ſuggeſts the abſolute neceſſity, in the uſe of it, of the greateſt care and delicacy, that it may not degenerate into a ſtrain but ill adapted to ſo precious an occupation.

Our author cites the authority of Ariſtotle in favour of the general principles with regard to the ſubject of ridicule which he has endeavoured to eſtabliſh. "The ridiculous," ſays the Stagyrite, "implies ſomething deformed, and conſiſts in thoſe ſmaller faults, which are neither painful nor pernicious, but unbeſeeming: thus a face excites laughter, in which there are deformity and diſtortion without pain." Ariſtotle here ſpeaks of ridicule, not of laughter in general; and not of every ſort of ridicule, but ſolely of the ridiculous in manners, of which he has, in few words, given a very appoſite deſcription. Laughter is not his theme, but comedy and laughter, only ſo far as comedy is concerned with it; and the concern of comedy reaches no farther than to that kind of ridicule which relates to manners. For an account of Hobbes's theory of laughter and Dr. Campbell's objection to it, ſee LAUGHTER.

On the ſubject of laughter, Dr. Hartley (Obſ. on Man) remarks, that young children do not laugh aloud for ſome months. The firſt occaſion of doing this ſeems to be a ſurpriſe, which brings on a momentary fear firſt, and then a momentary joy, in conſequence of the removal of that fear, agreeably to what may be obſerved of the pleaſures that follow the removal of pain. This may appear probable, inaſmuch as laughter is a naſcent cry, ſtopped of a ſudden; and alſo becauſe, if the ſame ſurpriſe, which makes young children laugh, be a very little increaſed, they will cry. As children learn the uſe of language, they learn to laugh at ſentences or ſtories, by which certain alarming notions and expectations are raiſed in them, and again diſſipated inſtantaneouſly.

taneously. Children, and young persons, are diverted by every little jingle, pun, contrast, or coincidence, which is level to their capacities, even though the harshness and inconsistency, with which it first strikes the fancy, be so minute, as scarcely to be perceived. And this is the origin of that laughter which is excited by wit, humour, buffoonery, &c. The most natural occasions of mirth and laughter in adults seem to be the little mistakes and follies of children, and the smaller inconsistencies and improprieties, which happen in conversation in the daily occurrences of life; inasmuch as these pleasures are, in great measure, occasioned, or at least supported, by the general pleasurable state, which our love and affection to our friends in general, and to children in particular, put the mouth and body into. For this kind of mirth is always checked where we have dislike; also where the mistake or inconsistency rises beyond a certain limit; for then it produces concern, confusion, and uneasiness. This account of the original of laughter, and also of its salutary effects which the author mentions, both with respect to the body and mind, is inconsistent with Hobbes's theory, to which we have above referred. The laughter of pride and contempt, and the ridicule connected with it, are very different, not only in their origin, but in their influence.

RIDICULE, in a *Comedy*. See COMEDY.

RIDICULI ÆDICULA, or the *Chapel of Laughter*, in *Roman Antiquity*, was a building erected at Rome, about two thousand paces beyond the gate Capena, in memory of the flight of Hannibal from the siege of the city, on account of the ruin and tempest that befel him on that occasion. The Romans, in ridicule of his flight, built and consecrated this chapel.

RIDING, a corruption of *trithing*, a division of Yorkshire, of which there are three; *viz.* the East-riding, West-riding, and North-riding.

In indictments, in that county, it is necessary that the town and riding be expressed. See REGISTER.

RIDING *Academy*. See ACADEMY and MANEGE.

An academy for riding was founded in this country, by king William III. See RIDE.

RIDING *Armed*, with dangerous and unlawful weapons, is an offence at common law. (4 Inst. 160.) By the statute 2 Edw. III. cap. 3. none shall ride armed by night or day, to the terror of the people; or come with force and arms before the king's justices, &c. doing their office, upon pain to forfeit their armour, and suffer imprisonment at the king's pleasure; and a fine may be set upon them by the justices, by 20 Ric. II. cap. 1. And no person can excuse the riding armed, in public, by alleging that he wears armour for his defence against an assault; but men may wear common arms, according to their quality and the fashion, and have attendants with them armed agreeable to their characters: also persons may ride or go armed to take felons, suppress riots, execute the king's process, &c. 3 Inst. 162.

RIDING *Cast*, in *Husbandry*, a term used by the farmers for a particular method of sowing their grounds, by making two casts upon the ground at the same time. This is not much used, but it is a quicker way than the double cast, which is the method now most used. Plot's Oxfordshire, p. 251.

RIDING-*Clerk*, one of the six clerks in chancery, who in his turn, for one year, keeps the controlment-books of all grants that pass the great seal that year. Blount.

RIDING-*Bitts*, in *Ship Building*, are the largest bitts in a ship, and those to which the cable is fitted when she rides at anchor.

RIDL, in *Geography*, a town of Austria; 10 miles S.S.W. of Aigen.

RIDLEY, NICHOLAS, in *Biography*, an eminent English prelate, and martyr to the cause of the reformed religion, descended from an ancient family in Northumberland, was born early in the 16th century. As he exhibited early proofs of good natural abilities, he was placed in a grammar-school at Newcastle-upon-Tyne, in which he made such progress, that he was taken from thence and entered of Pembroke-hall, Cambridge. This was about the year 1518. In 1522 he was admitted to the degree of B.A.; and in 1524 he was elected a fellow of his college. In the following year he commenced M.A.; and having been ordained priest, he went, for farther improvement, to the Sorbonne at Paris; and from thence to Louvain; continuing on the continent till the year 1529. He had been brought up, and continued a zealous Papist; but on his return home, he applied with great diligence to the reading of the scriptures, as the safest guides in his theological studies. In 1533 Mr. Ridley was chosen senior proctor of the university; and while he continued in this office, the point of the pope's supremacy was brought before the university, to be examined upon the authority of scripture. No one was better qualified to give an opinion on this subject than Mr. Ridley; and after much public disputation, the university came to the following resolution: "That the bishop of Rome had no more authority and jurisdiction derived to him from God, in this kingdom of England, than any other foreign bishop;" and this was officially signed by Mr. Ridley, as well as by the vice-chancellor and the other proctor. In the year 1536, his well-known learning and talents procured him a powerful patron in archbishop Cranmer, who took him into his family, and made him his chaplain. He had, probably before this, abandoned the principles in which he had been educated; and being, in 1538, presented by the archbishop to the vicarage of Herne, in East Kent, he preached certain doctrines attached to the reformation, but nevertheless still adhered to the doctrine of transubstantiation. Among other converts whom he made to his own opinions was lady Fiennes, who proved a distinguished ornament to the cause which she adopted. To excite or enliven the devotion of his parishioners, he had the "Te Deum" sung in English, which was afterwards made the subject of an accusation against him. In 1539, when the act of the six articles was passed, he bore his testimony against it, though he himself was not likely to be affected by the penalties of the statute. In 1540 he went to Cambridge, and proceeded doctor in divinity; and soon after he was chosen to the mastership of Pembroke-hall. About the same time he was, through the influence of the archbishop, nominated chaplain to the king; and this honour was speedily followed by his collation to a prebendal stall in the cathedral church of Canterbury. In this city, when his duty called him to preach, he endeavoured with all his talents to expose to the people the abuses of Popery; which gave so much offence, that charges were exhibited against him for preaching contrary to the statute of the six articles. The attempt, however, of involving him in the penalties of the law, completely failed. Gardiner, bishop of Winchester, next endeavoured to entrap him; and articles were exhibited against him before the justices of the peace in Kent, and afterwards before the king and council, which charged him with preaching against auricular confession, and with directing the Te Deum to be sung in English. The accusation was fortunately referred to Cranmer, by the king, who immediately crushed it, much to the mortification of Dr. Ridley's enemies. About the year 1545 he he began to examine the doctrine of tranfubftantiation, which he and his friend and patron, Cranmer, rejected as unfcriptural. Towards the clofe of the year he was appointed prebend of St. Peter's, Weftminfter. It 1547 he was promoted to the bifhopric of Rochefter; and in the following year he was employed in reforming the liturgy, in conjunction with Cranmer, five other prelates, and fome learned divines; and in 1549 he was appointed one of the commiffioners empowered to fearch after all Anabaptifts, heretics, and contemners of the book of common prayer. In this character he was involved in the foul reproach of having contributed to bring to the ftake Joan Bocher, and others. (See CRANMER.) That he did this from confcientious motives, there can be no doubt; but he ought to have inveftigated the principles, before he proceeded to the horrid act of perfecution; and having a mind open to conviction, he would foon have found that no tenets, inculcated by the mild and holy Jefus, would lead to the infliction of corporal punifhment for the fake of curing mental error. He more than once oppofed the unreafonable commands and wifhes of thofe in power; and would no doubt, in the cafe of Bocher and others, have done fo too, had he felt it his duty.

The bifhop of Rochefter was one of the commiffioners appointed to fit in judgment on the caufe of Bonner, bifhop of London; and by him the fentence of deprivation was pronounced againft the prelate. This was in the reign of Edward. In that of Mary, as we fhall fee, ample revenge was taken of him. Ridley fucceeded to the bifhopric of London in the year 1549-50, when the bifhopric of Weftminfter was fuppreffed as a diftinct fee, and united to that of London. Ridley's conduct towards his predeceffor Bonner, and his family, after taking poffeffion of the epifcopal palace, was honourable to his integrity and benevolence, of which the following facts are fufficient proofs. He took care to preferve from injury the goods, &c. belonging to Bonner, allowing him full liberty to remove them when he pleafed. Such materials as Bonner had purchafed for the repair of his houfe and church, the new bifhop employed to the ufes for which they were defigned; but he repaid him the money which he had advanced for them. He took upon himfelf the difcharge of the fums which were due to Bonner's fervants for liveries and wages; and that the mother and fifter of that prelate, who lived near the palace at Fulham, and had their board there, might not be lofers in confequence of his promotion, he always fent for them to dinner and fupper, conftantly placing Mrs. Bonner at the head of the table, even when perfons of high rank were his guefts.

Soon after his tranflation to the fee of London, bifhop Ridley was nominated one of the commiffioners for examining Gardiner, bifhop of Winchefter, and concurred in his deprivation. In 1550 bifhop Ridley vifited his diocefe, and he directed that the altars fhould thenceforth be taken down in the churches, and tables fubftituted in their room, for the celebration of the Lord's fupper; to take away the falfe perfuafion which the people had, of facrifices to be offered upon altars. In 1551 the fweating ficknefs prevailed in London, and in the fpace of a few days carried off eight or nine hundred perfons; but in the midft of the alarm which this neceffarily occafioned, Ridley adminiftered in the duties of his office, trufting himfelf entirely to the good providence of God for fafety, in the danger to which he was every moment expofed; and he endeavoured, with all the zeal of an exemplary fpiritual paftor, to improve the public calamity to the reformation of the manners of the people. To promote more generally a reformation in the doctrine of the church, the council, this year, appointed Cranmer and Ridley to prepare a book of articles of faith. With this view they drew up forty-two articles, and fent copies of them to the other bifhops and learned divines, for their corrections and amendments; after which the archbifhop reviewed them a fecond time, and then prefented them to the council, where they received the royal fanction, and were publifhed by the king's authority, as an act of the fupremacy. In the year 1552 he paid a vifit to the princefs Mary, and offered to preach before her; but fhe refufed to hear him herfelf, or permit her fervants to attend to his doctrine; telling him, that, in her father's days, he would not have dared to have avouched that for God's word that he then did. Mary never forgot nor forgave this interference on the part of the prelate, which, notwithftanding the remarks of moft of Ridley's biographers, appears to us to have been uncalled for, if it were not even an act of rudenefs not eafily juftified.

When the parliament affembled in 1553, the king, who was languifhing under the decline which foon put an end to his life, ordered the two houfes to attend him at Whitehall, where bifhop Ridley preached before him, recommending with fuch energy the duties of beneficence and charity, that his majefty fent for him, to inquire how he could beft put in practice the duties which he had fo well and fo ftrongly enforced; and the refult of this fermon and conference was a determination in the king to found, or incorporate anew, and endow with ample revenues, thofe noble inftitutions, Chrift's, Bartholomew's, Bridewell, and St. Thomas's hofpitals.

Upon the death of Edward VI., Ridley was earneft in attempting to fet lady Jane Grey on the throne; but when the defign had mifcarried, he went to Mary to do her homage, and fubmit himfelf to her clemency. His reception was fuch as he might have expected: he was immediately committed to the Tower, where, however, he was treated with much lefs rigour than Cranmer and Latimer, who were likewife prifoners in the fame fortrefs. Ridley, it has been thought, might have recovered the queen's favour, if he would have brought the weight of his learning and authority to countenance her proceedings in religion. He was, however, too honeft to act againft his conviction; and he was, after eight months' imprifonment in the Tower, conveyed from thence to Oxford, where he was, on the 1ft of October 1555, condemned to death for herefy. During the fortnight between his condemnation and execution, the priefts tried all their means of perfuafion to gain him over to their caufe. He was deaf to their remonftrances, and was not to be fhaken in the principles which he had adopted.

The 15th of October being the day appointed by the court for his execution, he met the trial with calmnefs and fortitude. He called it his marriage-day, and fupped on the preceding evening with the utmoft cheerfulnefs, having invited fome friends on the occafion. When they rofe to depart, one of them offered to fit up with him through the night, which he would not permit, faying, he meant to go to bed, and, by God's will, to fleep as quietly that night as he ever had done in his life. On the following morning, having dreffed himfelf in his epifcopal habit, he walked to the place of execution, between the mayor and one of the aldermen of Oxford; and feeing Latimer approach, from whom he had been feparated fince their condemnation, he ran to meet him, and with a cheerful countenance embraced him, and exclaimed, "Be of good heart, brother, for God will either affuage the fury of the flames, or elfe give us ftrength to endure them." Then walking to the ftake, he kneeled down, kiffed it, and prayed with great fervour. A fermon was now preached, at the conclufion of which he was afked to recant; but he refufed, and with a fteadfaft voice cried out, "May God's will be done." He was then ftripped to his fhirt, and faftened by an iron chain to the fame ftake with bifhop Latimer. Every thing being ready, a kindled faggot was laid at Ridley's feet, who, when he faw the fire flaming up towards him, with a loud voice commended his foul to God. Latimer's fufferings were foon at an end, but Ridley endured the agonies of dying a much longer time, till they were terminated by the explofion of a bag of gunpowder, which had been fufpended from his neck: after this he difcovered no figns of life. Such was the end of bifhop Ridley, who was unqueftionably one of the moft eminent inftruments in promoting the caufe of the reformation. In private life he was a pattern of all the virtues. His temper was excellent; his manners very affable and agreeable; and of the benevolence of his heart he gave abundant proofs, in his extraordinary liberality to the poor. He was unqueftionably a man of great learning, and was author of a number of works. Many of his letters have been publifhed by Fox, in his "Acts and Monuments;" and may likewife be feen in Glofter's Life of Bifhop Ridley, to which, to Wood's Athen., and Neal's Hift. of the Puritans, our readers are referred.

Ridley, *Sir* Thomas, a learned civilian, of the fame family as the preceding, was born at Ely, and educated firft at Eton, and then at King's-college, Cambridge. He afterwards became a mafter in chancery, and vicar-general to the archbifhop of Canterbury. He died in 1628, and was author of "A View of Civil and Ecclefiaftical Law."

Ridley, Gloster, of the fame family with the preceding, was born in 1702, on board the Gloucefter Eaft Indiaman, whence he derived his name. He was educated in fchool-learning at Winchefter; from which place he was removed to New-college, Oxford, where he laid the foundation for thofe acquirements, by which he was afterwards diftinguifhed as a poet, hiftorian, and divine. He obtained fome preferment in the church; and in 1740 and 1742 he preached eight fermons at lady Moyer's lecture, which were publifhed. In 1763 he publifhed the "Life of Bifhop Ridley," to which we have referred; and fhortly after, "A Review of Philips's Life of Cardinal Pole." In reward for his labours in this controverfy, and in another which Mr. Archdeacon Blackburn's Confeffional produced, he was prefented by Secker to a golden prebend at Salifbury. He died in 1774, leaving a widow and four daughters, one of whom, Mrs. Evans, publifhed feveral novels. In the latter part of his life he loft two fons, young men of confiderable talents. The elder, James, was author of "The Tales of the Genii;" a humorous paper, called "The Schemer," afterwards collected into a volume; "The Hiftory of James Lovegrove," and feveral other literary pieces. Two poems by Dr. Ridley, one ftyled "Jovi Eleutherio, or an Offering to Liberty;" and the other entitled "Pfyche," were printed in Dodfley's Collection. "Melampus," the fequel of the latter, was printed by fubfcription. His tranfcript of the Syriac Gofpels was publifhed with a Latin tranflation, by profeffor White, in 2 vols. 4to. Gen. Biog.

Ridley, in *Geography*, a townfhip of America, in Delaware county, Pennfylvania, containing 991 inhabitants.

RIDOLLY, a town of Hindooftan, in the fubah of Agra; 35 miles S. of Agra.

RIDZIN. See Reussin.

RIE, in *Rural Economy*, a provincial term, applied to the operation of turning grain in a fieve, fo as to bring the *capes* into an eddy at the top. It is performed by a particular kind of circular motion.

RIEBACH, in *Geography*, a town of Germany, in the county of Hohenloe; 7 miles S.S.E. of Weichenfheim.

RIEBECK-CASTEEL, or the caftle of Van Riebeck, one of the divifions in the diftrict of Stellenbofch and Drakenftein, in the Cape diftrict, Southern Africa, which may be confidered as a prolongation of the *Paardeberg* (which fee), terminating to the northward in a high rocky fummit. It took its name from the founder of the colony having travelled to this diftance from the Cape, which is about 60 miles, and which, in that early period of the fettlement, was as far as it was confidered fafe to proceed, on account of the numerous natives, whofe race has now almoft difappeared from the face of the earth. The produce is the fame as that of Paardeberg, in both which there are as many corn-farms as freehold eftates.

RIEBEN, a town of Brandenburg, in the Middle Mark; 3 miles S. of Belitz.

RIECHENAU, a town of the country of the Grifons; 9 miles S.S.W. of Coire.

RIED, a town of Bavaria; 18 miles S. of Paffau.—Alfo, a town of Bavaria, in the principality of Aichftatt; 4 miles S.E. of Harrieden.

RIEDEN, a town of Germany, belonging to Anfpach, infulated in the principality of Culmbach; 22 miles N. of Anfpach.—Alfo, a town of Bavaria, in the Upper Palatinate; 9 miles S. of Amberg.

RIEDENBURG, a town of the bifhopric of Paffau, on the Inn; 12 miles S.S.W. of Paffau.—Alfo, a town of Bavaria, on the Altmuhl; 17 miles N.E. of Ingolftadt.

RIEDLIN, Vitus, in *Biography*, a diftinguifhed German phyfician, was born at Ulm in March, 1656, where many of his anceftors had practifed the fame profeffion with confiderable repute. He obtained his early education principally at his native city, and terminated his ftudies by going to Tuningen in 1674, where he made great acquifition, during a refidence of two years, and afterwards into Italy; and he graduated at Padua, about the end of the year 1676. He wifhed to have refided longer at this diftinguifhed univerfity; but his father having died in his boyhood, he was unable to procure the neceffary means, and therefore he returned to Ulm in the following year. In 1679 he was elected a member of the college of phyficians at Augfburg, where he fettled, and obtained a confiderable fhare of practice among the firft people; but on the preffing folicitations of his countrymen, he returned to Ulm in 1704, and remained there, in the enjoyment of extenfive reputation, till his death, which took place in 1724. His principal work is entitled "Lineæ Medicæ, continentes Obfervationes, Hiftorias, Experimenta, Cauteles, &c. à Menfe Januario 1695 ad Menfem Junium 1700," in ten fmall volumes. It is a fort of journal, in which he not only recorded his own obfervations, but thofe of others. It does not, however, commend itfelf by much originality or good method. Eloy Dict. Hift.

RIEDLINGEN, in *Geography*, a town of Wurtemberg; 27 miles S.W. of Ulm. N. lat. 48° 11′. E. long. 9° 30′.

RIEFF. See Riva.

RIEGEL, Henry Joseph, in *Biography*, a mufician born at Wertheim, in Franconia, in 1741. M. Laborde does him the honour to call him a French compofer. He ftudied mufic under Jomelli, at Stutgard, and was recommended by Richter to complete the mufical education of a young lady of rank in France; which having finifhed, he eftablifhed himfelf at Paris in 1765. His paffion for the harpſichord confined his ſtudies chiefly to that inſtrument for a conſiderable time; but after having acquired a diſtinguiſhed reputation for his execution, he attended ſcholars, and applied to compoſition. Beſides many quartets, concertos, ſonatas, duos, &c. he compoſed ſymphonies à grand orcheſtra, which had conſiderable ſucceſs at the concert of amateurs. He gained reputation by a French oratorio, "The Flight from Egypt," the firſt work of that kind that was executed at the Concert Spirituel, where it was well received for four ſucceſſive years. A ſecond oratorio, "The Taking of Jericho," had likewiſe merited applauſe.

His comic opera, "The Cobler and Financier," was at firſt repreſented at court, but afterwards well received in the capital, at the Italian theatre, though not performed by the beſt actors.

What characterizes his compoſitions is the great purity of his harmony. His effects are ingenious: in his capital pieces of ſymphonic compoſition, there is always a natural and regular melody. This compoſer, paſſionate for his art, enjoyed, free from envy, the talents of others. An enemy to cabal, he was excluſively attached to no kind of ſtyle; but enjoying whatever was good in all ſtyles, (French, Italian, German,) he was one of the few foreigners who did the moſt honour to the profeſſion in France. Laborde.

RIEHEN, in *Geography*, a town of Switzerland, in the biſhopric of Bâle, and principal place of a bailiwic; 3 miles E. of Bâle.

RIELVES, a town of Spain, in New Caſtile; 11 miles N.W. of Toledo.

RIEMLING, in *Ichthyology*, a name given by ſeveral to the ſmall freſh-water fiſh, called by the Latins *poxinus*, and vulgarly the *pink*.

RIENECK, in *Geography*, a town and citadel of Germany, and capital of a county of the ſame name, on the Sinn; 36 miles E. of Frankfort on the Maine. N. lat. 50° 11′. E. long. 9° 47′.

RIENS ARREAR, in *Law*, a kind of plea uſed to an action of debt upon arrearages of accounts; by which the defendant alleges, that there is nothing in arrear.

RIENS *paſſe par le fait, nothing paſſes by the deed*, is the form of an exception taken in ſome caſes to an action.

RIENS *par deſcent, nothing by deſcent*, is the plea of an heir, when ſued for his anceſtor's debt, though he had no lands from it by deſcent, nor has aſſets in hand.

RIENTZ, in *Geography*, a river of the county of Tyrol, which joins the Eyſach, at Brixen.

RIENZI, in *Biography*. See GABRINI.

RIER, or REER-COUNTY, *Retro-comitatus*, in *Law*, is uſed in the ſtatute of Weſtm. 2. c. 39. 2 Edw. III. cap. 5. and in our law-books, in oppoſition to *open county*.

This appears to be ſome public place, which the ſheriff appoints for the receipt of the king's money, after the end of the county-court. Fleta ſays it is *dies craſtinus poſt comitatum*.

RIERSDORFF, in *Geography*, a town of Auſtria; 3 miles W. of Mauttern.

RIESENBURG, a town of Pruſſia, in the province of Oberland; 18 miles S.W. of Konigſberg. N. lat. 53° 43′. E. long. 19° 24′.

RIESENKOPPE, or SCHNEE, a mountain of Sileſia, and one of the moſt elevated in Europe, in the principality of Jauer.

RIESSA, a town of Saxony, in the margraviate of Meiſſen, on the Elbe; 12 miles N.W. of Meiſſen. N. lat. 51° 18′. E. long. 13° 15′.

RIETBERG, a town of Germany, and capital of a county of the ſame name, on the Embs, which county is about 18 miles long and 6 broad; 12 miles W.N.W. of Paderborn. N. lat. 51° 55′. E. long. 18° 32′.

RIETI, a town of Italy, in the duchy of Spoleto, the ſee of a biſhop; containing, beſides the cathedral, three collegiate and ſix pariſh churches, and 12 convents. In the year 1785, it was much damaged by an earthquake; 25 miles E.S.E. of Spoleto. N. lat. 42° 44′. E. long. 12° 56′.

RIEV VOLODIMEROV, a town of Ruſſia, in the government of Tver; 64 miles S.W. of Tver. N. lat. 56° 5′. E. long. 34° 44′.

RIEUMS, a town of France, in the department of the Upper Garonne, and chief place of a canton, in the diſtrict of Murat; 9 miles S.W. of Murat. The place contains 1425, and the canton 6316 inhabitants, on a territory of 200 kiliometres, in 15 communes.

RIEUPEIROUX, a town of France, in the department of the Aveiron, and chief place of a canton, in the diſtrict of Villefranche; 15 miles W. of Rodes. The place contains 1752, and the canton 6299 inhabitants, on a territory of 182½ kiliometres, in 13 communes.

RIEUX, a town of France, and principal place of a diſtrict, in the department of the Upper Garonne; and before the revolution, the ſee of a biſhop; 24 miles S. of Toulouſe. N. lat. 43° 15′. E. long. 1° 17′.—Alſo, a town of France, in the department of the Morbihan; 10 miles S.E. of Rochefort.—Alſo, a town in the department of the Ille and Vilaine, on the Vilaine; 6 miles S. of Redon.—Alſo, a town in the department of the Aube; 10 miles E. of Carcaſſonne.

RIEZ, an old, populous town of France, formerly Civitas Reienſium, a biſhop's ſee, and the ſeat of a council in 439, ſituated on a plain between the Aſſe and Verdun, in the department of the Lower Alps, and chief place of a canton, in the diſtrict of Digne; 18 miles S. of Digne. The place contains 2784, and the canton 9963 inhabitants, on a territory of 330 kiliometres, in 14 communes. Its environs abound in wine and fruits.

RIEZE, a river of France, which runs into the Garonne, near Saverdun.

RIF, one of the largeſt provinces of the empire of Morocco, ſituate in that chain of mountains which forms a part of the Leſſer Atlas. This province, the ſoil of which is ſtony, is bounded by that of Garet to the eaſt, the Mediterranean to the north, on the coaſt of which is the ancient city of Gomera, and alſo Melilla and Veles de Pegnon, belonging to Spain; by the province of Garb to the weſt, and to the ſouth by thoſe of Shaus or Chaus, and Fez.

RIF. See BAHIRA.

RIF-DYKE, one of the ſmaller Orkney iſlands, eaſt of North Ronaldſha. N. lat. 59° 13′. W. long. 2° 17′.

RIFENBACH, a river of Germany, which runs into the Inn, 2 miles N. of Kufſtain.

RIFFREDO, a town of Etruria; 20 miles N.N.E. of Florence.

RIFLE GUNS, in the *Military Art*, are thoſe whoſe barrels, inſtead of being ſmooth on the inſide, like our common pieces, are formed with a number of ſpiral channels, reſembling female ſcrews; except only that the threads or rifles are leſs deflected, making only one turn, or a little more, in the whole length of the piece. This conſtruction of the barrel is employed for correcting the irregularity in the flight of balls from ſmooth barrels, of which we have mentioned ſeveral inſtances under our articles GUNNERY and PROJECTILES. It has, for inſtance, been found, from the experiments of Mr. Robins, that notwithſtanding the piece was firmly fixed, and fired with the ſame weight of powder,

powder, ſometimes the ball was deflected to the right, ſometimes to the left; ſometimes above, and at others below, the true line of direction. It has alſo been obſerved, that the degree of deflection increaſes in a much greater proportion than the diſtance of the object fired at: thus, at double the diſtance, the deflection of the ball from the line in which the piece is pointed is conſiderably more than double, and at treble the diſtance more than treble, what it was at firſt. Mr. Robins ſecured a muſket barrel upon a block of wood, and firing it with a ball at a board of a foot ſquare, at 60 yards diſtance, found that it miſſed the board only once in 16 ſucceſſive diſcharges; yet when fired with a ſmaller charge, at the diſtance of 760 yards, the ball was thrown ſometimes 100 yards to the right or left of the line in which it was pointed. The direction upwards and downwards was alſo found equally uncertain; the ball, in ſome diſcharges, having ſtruck the ground 200 yards nearer the piece than it did at others.

It is not difficult to account for theſe irregularities: they doubtleſs proceed from the impoſſibility of fitting a ball ſo accurately to any plain piece, but that it will rub more againſt one ſide of the barrel than another, in its paſſage through it. Whatever ſide, therefore, of the muzzle the ball is laſt in contact with, on quitting the piece, it will acquire a whirling motion towards that ſide, and will be found to bend the line of its flight in the ſame direction, whether it be upwards or downwards, to the right or left; or obliquely, partaking in ſome degree of both; and after quitting the barrel, this deflection, which, though in the firſt inſtance it is but trifling and inconſiderable, is ſtill farther increaſed by the reſiſtance of the air; this being greateſt on that ſide where the whirling motion conſpires with the progreſſive one, and leaſt on that ſide where it is oppoſed to it. Thus, if the ball, in its paſſage out, rubs againſt the left ſide of the barrel, it will whirl towards that ſide; and as the right ſide of the ball will, therefore, turn up againſt the air during its flight, the reſiſtance of the air will become greateſt on the right ſide, and the ball be forced away to the left, which was the direction it whirled in. If the axis, about which the rotatory motion of the ball is made, preſerved its poſition during the whole flight, the deflection would be in the ſame direction from one end of the track to the other; though it is obvious, that the quantity of this deflection would ſtill not be proportional to the diſtance: for if all reſiſtance of the ball were to ceaſe at any part of its flight, ſtill the ball would neceſſarily purſue the line in which it then moved, and the deflection be double at a double diſtance, treble at a treble diſtance, and ſo on. But as this reſiſtance does not ceaſe, but continue to act upon the ball throughout its whole flight, (though leſs in the latter part of it than at the commencement, in conſequence of the decreaſe of velocity,) it is obvious that the deflection of the ball will be accelerated at every inſtant, and conſequently increaſe in a greater proportion than the diſtance; as we have ſeen it has been found to do, from the experiments above alluded to. It happens, however, from various accidental circumſtances, that the axis of the ball's rotation frequently changes its poſition ſeveral times during the flight; ſo that the ball, inſtead of bending its courſe uniformly in the ſame direction, often deſcribes a track variouſly contorted. So great, however, is the tendency of the ball to deflect itſelf againſt the ſide it rubs againſt, that it has been ſaid, though we never ſaw the experiments authenticated, that a ball, when fired out of a barrel bent towards the left hand, (and which will, therefore, be thrown from the piece in the direction of the bend,) yet as the ball, in this caſe, will be forced to rub againſt the right ſide of the muzzle, and thus turn its left ſide up againſt the air, ſo it will be found to alter its courſe during the flight, and bend towards the right hand, ſo as to fall a conſiderable way to the right hand of the line in which the piece was pointed.

It will readily appear, therefore, from what has been ſtated, that theſe variations will be more frequent and conſiderable when the ball runs very looſe in the piece; or when, from any roughneſs on its ſurface, or on the middle of the barrel, a conſiderable degree of friction takes place between them. With a view to prevent friction, it has been propoſed to greaſe the ball; but this we ſhould imagine would be of very little ſervice. All that can be done in a plain barrel is to have the balls caſt very ſolid and true, and afterwards milled in the ſame manner as is now practiſed upon ſhot: the barrel alſo ſhould be very ſmooth on the inſide, and the ball fit it very accurately, ſo as to leave ſcarcely any windage: yet, with all theſe precautions, it is very difficult, we may ſay impoſſible, to prevent it entirely; for gravity will conſtantly act, and friction on the under ſide will naturally be occaſioned by the weight of the ball. In fact, when we conſider the cauſes of the aberration in the flight of balls, it will be pretty evident that the only means of correcting it is by preventing the ball from rubbing more againſt one ſide of the barrel than another in paſſing through it; and by giving to the bullet a motion which will counteract every accidental one, and preſerve its direction, by making the reſiſtance of the air upon the fore part continue the ſame during its whole flight; that is, by giving it a rotatory motion perpendicular to the line of direction. The contrivance for this purpoſe is called rifling, and conſiſts of forming upon the inſide of the barrels a number of threads and furrows, either in a ſtraight or ſpiral direction, into which the ball is moulded, whereby any rolling motion along the ſides of the barrel is effectually prevented.

The numbers of theſe threads in a gun are different, according to the fancy of the workman and the ſize of the barrel; and, in like manner, the depth to which theſe channels or rifles are cut down, is not regulated by any invariable rule; but differs according to the country where the work is performed, or the caprice of the artificer. There are alſo different methods of charging pieces of this kind, but the uſual one is as follows: after the powder is put in, a leaden bullet, ſomewhat larger than the bore of the gun, is taken, and having greaſed it well, it is laid on the mouth of the piece, and rammed down with an iron rammer, hollow at the end; the ſoftneſs of the lead giving way to the violence with which the bullet is impelled, that zone of the bullet which is contiguous to the piece, varies its circular form, and acquires the ſhape of the inſide of the barrel, ſo that it becomes the part of a male ſcrew, exactly fitting the indents of the rifle. And hence it happens that, when the piece is fired, the indented zone of the bullet follows the ſweep of the rifles, and thereby, beſides its progreſſive motion, acquires a circular one round the axis of the barrel, which motion will be continued to the bullet after its ſeparation from the piece; by which means a bullet diſcharged from a rifled barrel is conſtantly made to whirl round an axis, which is coincident with the line of its flight. And hence it follows, that the reſiſtance on the foremoſt ſurface of the bullet is equally diſtributed round the pole of its circular motion, and acts with an equal effort on every ſide of the line of direction, ſo that this reſiſtance can produce no deviation from that line: and if, by the caſual irregularity of the foremoſt ſurface of the bullet, or by any other accident, the reſiſtance ſhould be ſtronger on one ſide of

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the pole of the circular motion than on the other; yet, as the place where this greater resistance acts must perpetually shift its position round the line, in which the bullet flies, the deflection, which this inequality would occasion, if it acted constantly with the same given tendency, is now continually rectified by the various and contrary tendencies of that disturbing force, during the course of one revolution; so that the ball will always go right forwards, and thus that deflection or deviation, already taken notice of under the article PROJECTILE, and in the preceding part of this article, will be prevented. This may be explained by the motion of an arrow; for if an arrow that is not feathered be shot from a bow, its motion will be very irregular; but when the feathers of the arrow are properly arranged in a spiral form, so as to make the arrow spin round its axis, it will always fly straight forward. Upon the same principle, every school-boy finds himself under the necessity of making his shuttle-cock spin, before he can depend upon the truth of its flight. Mr. Robins observes, that the actual motions of bullets discharged from rifled pieces correspond very well with these speculations. Although the use of pieces of this kind had long prevailed in Europe, particularly in Germany and Switzerland, the advantages resulting from them have been very imperfectly understood, and, as Mr. Robins observes, unaccountably misrepresented. The three following reasons have been constantly alleged in favour of this construction: either that the inflammation of the powder was greater by the resistance which the bullet thus forced into the barrel gave it, and that by it the bullet received a much greater impulsion than it would have done from the same quantity of powder in a common piece, or that the bullet, by the compounding of its circular and revolving motion, did, as it were, bore the air, and thereby flew to a much greater distance, than it would otherwise have done; or that, by the same boring motion, it made its way much easier through all solid substances, and penetrated much deeper into them, than if discharged in the common manner. But the ingenious writer just mentioned, satisfied himself by numerous experiments made with rifled barrels of various sizes, that none of these reasons hold true in the use of such pieces; but that the advantage of their construction results from its preventing the deflection of the ball, as we have above represented it. And that it produced this effect he found by observing, that the same hemisphere of the bullet which lies foremost in the piece, continued foremost during the whole course of its flight.

In Germany and Switzerland, an improvement is made in the method, already recited, of charging these pieces; especially those of the larger sort, which are used for shooting at great distances. This is done by cutting a piece of very thin leather, or of thin fustian, in a circular shape, somewhat larger than the bore of the barrel. This circular piece being greased on one side is laid upon the muzzle with its greasy parts downwards, and the bullet being placed upon it, is then forced down the barrel with it; by which means the leather or fustian incloses the lower half of the bullet, and by its interposition between the bullet and the rifles, prevents the lead from being cut by them. But in those barrels where this method is practised, the rifles are generally shallow, and the bullet ought not to be too large. The rifle-barrels, which have been made in England, where they are not very common, are contrived to be charged at the breech, the piece being, for this purpose, made larger there than in any other part. The powder and bullet are put in through the side of the barrel by an opening, which, when the piece is loaded, is filled up with a screw. By this means, when the piece is fired, the bullet is forced through the rifles, and acquires the same spiral motion as in the former kind of pieces; other barrels unscrew at the breech, for the convenience of charging them. With regard to the defects of these rifled pieces, Mr. Robins observes, that if either the angle of elevation, or the curvature of the bullet's track through the air be great, the inclination of the axis round which it whirls will cause irregularities, which will often produce considerable deflections. Accordingly he proposes to make use of bullets of an egg-like form, instead of spherical ones, and to fire them with their broad ends foremost, that thus their longer axes may be always carried, by their centres of gravity, into the lines of their flight. Upon the whole, he concludes, that whatever tends to diminish the friction of these pieces, tends, at the same time, to render them more complete; and consequently the less the rifles are indented, the better they are, provided that they are just sufficient to keep the bullet from turning round in the piece. Besides, the bullet ought to be no larger than to be just pressed by the rifles, for the easier the bullet moves in the piece, supposing it not to shift its position, the more violent and accurate its flight will be. And to render them in this respect still more complete, the sweep of the rifles should be in each part exactly parallel to each other: for then, after the bullet is once put in motion, it will slide out of the barrel without any shake, and with a much smaller degree of friction than if the threads of the rifles have not all of them the same degree of incurvation. The foreigners are so exact in this respect, that they try their pieces, with a view to this particular, in the following manner: they first pour melted lead into them, and letting it cool, they procure a leaden cylinder of perhaps two or three diameters in length, exactly fitted to one part of the inside of the piece; then if this leaden cylinder, being gently pushed by the rammer, will pass from one end of the barrel to the other, without any sensible strain or effort, they pronounce the piece perfect; but if it any where sticks or moves hard they esteem it defective.

We have stated that some rifle-pieces are charged at the breech; these, however, are necessarily much dearer than the others, and excepting the expedition in charging them, are really inferior to those in which the ball is introduced at the muzzle, on which account they are not much employed at present, at least not in this country. The want of expedition in the charging pieces of this kind is, however, a very serious defect, to remedy which, it has been proposed to have the balls cast with projections upon them, in the same manner as described in the following article on RIFLE *Ordnance*. This may be done with great ease and accuracy, by making corresponding hollows round the zone of the bullet-mould; by this means the balls may be fitted so accurately to the rifles, as to leave scarcely any windage; while the friction will be less than it is either when the ball is put in at the breech, or forced in at the muzzle.

In treating of the causes of aberration in the flight of balls, we have supposed the air to be perfectly at rest; but it is evident that the force of the wind will affect balls considerably, whether they are fired from a plain or a rifle barrel; this effect, however, will be much less in the latter than in the former; but in neither case is it possible either to avoid it entirely, or to estimate the quantity of aberration that it may, under different circumstances, occasion.

Pieces intended for shooting with ball, whether they be plain or rifled, ought to be of much more equal thick-

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nefs from the breech to the muzzle, than thofe that are intended for fhot only. In every barrel there is an undulating vibration communicated to the metal by the explofion. This is moft remarkable in a thin barrel, and when the charge is great, and in an equal degree, whether the piece be rifle or plain, and therefore ought to be equally attended to by gunfmiths in both cafes. For more on the fubject of rifle mufket barrels, fee Robins' Tracts, vol. i. p. 328, &c.; fee alfo Nicholfon's Philofophical Journal, vol. i. p. 382; and for rifle ordnance, fee the Memoir of the National Inftitute mentioned in the following article.

RIFLE *Ordnance*. After the important advantages attending rifled barrel mufkets were well underftood, the idea naturally occurred of carrying the fame improvements into cannons and field-pieces, and many experiments have been made with a view of conftructing thefe on fimilar principles to the mufket. The firft attempt of this kind was made by Dr. Lind, and Capt. Alexander Blair, of the 69th regiment, in 1774. The pieces are of caft iron, and are not bored like the common cannon, but have the rifles moulded on their core, after which they are cleaned out, and furnifhed with the proper inftruments.

Guns of this defcription, which are intended for the field, ought never to be made to carry a ball of above one or two pounds weight at moft; a leaden bullet of that weight being fufficient to deftroy either man or horfe. A pound gun of this defcription, of good metal, need not weigh above an hundred weight, and its carriage about another hundred, and may therefore be eafily tranfported from place to place by a few men, and a couple of good horfes may tranfport fix of thefe guns and their carriages, if put into a cart. But for other purpofes, in which a greater momentum is neceffary, there is nothing to prevent them being made of the ufual calibre.

The following are the dimenfions that have been recommended for thefe kinds of cannon. The length of the gun being divided into feven equal parts, the length of the firft reinforce is two of thefe parts; the fecond reinforce $1\frac{15}{16}$ of the diameter of the calibre; the chafe $3\frac{1}{16}$ diameter of the calibre. The diftance of the hind part of the bafe ring to the beginning of the bore is $1\frac{3}{16}$ calibre. The trunnions are each one calibre in length, and the fame in breadth; their centres are placed $\frac{3}{7}$ths of the length of the gun from the hind part of the bafe ring, in fuch a manner, that the axis of the trunnions pafs through the centre line of the bore, which prevents the gun from kicking, and breaking its carriage. The length of the cafcable is $1\frac{3}{16}$ of a calibre.

The calibre of the gun being divided into 16 equal parts; then

The thicknefs of metal from the bafe ring to the bore, is - - - - - - -	18.5
At the end of the firft reinforce - -	17
At the fame place for the beginning of the fecond reinforce - - - - - -	17
At the end of the fecond reinforce - -	15
At the fame place for the beginning of the chafe	13.75
At the end of the chafe, or muzzle, the mouldings excluded - - - - - -	9
At the fwelling of the muzzle - -	12
At the muzzle fillet - - - -	9.5
At the extreme moulding - - - -	8
Bafe ring - - - - - -	5.5
Ogee next the bafe ring - - -	5.5
The aftragal, or half round - - -	4.75
Its fillet - - - - - - -	1
Total aftragal and fillets at the vent-field - -	4
Firft reinforce ring - - - - -	4.5
Second reinforce ring - - - -	3.5
Its ogee - - - - - -	3
Its aftragal - - - - - -	1.5
And its fillet - - - - -	1
The muzzle, aftragal and fillet - - -	4
Breadth of the fillet at the bafe ring - -	1
Diftance of the fillet at the button from the fillet at the bafe ring - - - - -	5
Breadth of the fillet at the button - -	1
Diameter of the fillet at the button - -	18
Diftance of the centre of the button from its fillet	12
Diameter of the button - - - -	18
Diameter of its neck - - - -	10.5

The vent fhould be placed about half an inch from the bottom of the chamber or bore, that the cartridge may be pricked, left fome of the bottom of the cartridges fhould be left when the gun is fponged, which might retard the firing till the ball be again drawn, which is very difficult in pieces of this kind.

The rifles in this gun make one fpiral turn in the length of the bore, but go no nearer to the breech, in their full fize, than two calibres, and terminate in a gentle flope in half a calibre more, fo as not to prevent the cartridge, with the powder, from being eafily fent home to the bottom of the gun, which would otherwife conftantly happen with the flannel cartridges, and even fometimes with paper ones, if not made to enter very loofely. The fhape of the rifles is femicircular, their breadth being equal to the diameter, which is $\frac{3}{16}$ths of the calibre, and their depth $\frac{6}{16}$ths of a calibre. The bullets are of lead, having fix knobs caft on them, to fit the rifles of the gun; and being thus made of foft metal, they do not injure the rifles.

Rifle ordnance, however, of any calibre, might be made to carry iron fhot for battering, or for other purpofes; provided holes, that are a little wider at their bottoms than at their upper parts, be caft in a zone round the ball, for receiving afterwards leaden knobs to fit the rifles of the cannon; by which means the iron fhot will have its intended line of direction preferved, without injuring the rifles more than if the whole ball was of lead, the rotatory motion round its axis, or the line of its direction, which corrects the aberration, being communicated to it by the leaden knobs following the fpiral turn of the rifles in their progrefs out of the gun. It is particularly to be obferved, that the balls muft be made to go eafily down into the piece, fo that the cartridge with the powder, and the bullet, may be both fent home together with a fingle pufh of the hand, without any wadding above either the powder or the ball, by which means the gun is quickly loaded, and the ball flies farther than when it is forcibly driven into the gun, as was found from many experiments. The only reafon why, in common rifle mufkets, the bullets are forcibly rammed in, is, that the zone of the ball which is contiguous to the infide of the bore, may have the figure of the rifles impreffed upon it, in fuch a manner, as to become part of a male fcrew, exactly fitting the indents of the rifle, which is not at all neceffary in the prefent cafe, the figure of the rifles being, in the firft inftance, caft upon the ball. Thefe knobs retard the flight of the ball in fome degree, but this fmall difadvantage is fully counterbalanced by the eafe with which the gun is loaded, its fervice being nearly as quick as that of a common field-piece, and the retardation and quantity of the whirling motion which is communicated to the bullet being conftantly the fame, it will not in the leaft affect the experiments

ments made with them, in order to determine the reſiſtance of the air.

The French, in the courſe of the late war, have made experiments on rifle ordnance of a different kind to that above explained; in which, in fact, the gun is of the uſual form, the principal difference being in the nature and form of the ball, which M. Guyton (who has given an account of theſe experiments in vol. vii. of the National Inſtitute of France) calls *bullets a bague de plomb*, which in form are cylindrico-ſpherical, the cylindric part being next the charge. A rim of lead is fixed round the centre of the ball, rather exceeding the bore of the gun, which is cut off by the edge of the muzzle, in introducing the ball into the piece, whereby all the advantages of the rifle are obtained, although the rotatory motion above deſcribed, and which is ſuppoſed to have ſo great an influence on the direction, has not place in the preſent inſtance. According to M. Guyton's report, the accuracy in the rectilinear motion of theſe balls exceeded any thing before known in artillery practice; beſides, that although the weight of the bullet was nearly double that of a common ſhot of a piece of the ſame calibre, the range in very few inſtances fell ſhort of the common range, and in ſome even conſiderably exceeded it. The difficulty and time requiſite in loading a gun with a ball of this kind, however, are ſo great, as, in our opinion, to render it uſeleſs, although it ſeems to have been recommended for adoption, in a few particular ſituations, by a committee of French artillery officers. In the courſe of the memoir in which the above experiments are detailed, M. Guyton mentions another kind of rifle cannon, invented by an Italian officer, which was found remarkably correct in projecting the ball in a right line. The bore of this gun is ſlightly conical, being greateſt at the breech, where the piece is loaded by unſcrewing the breech, as in ſome rifle muſkets and piſtols: the ball is of lead, which muſt neceſſarily, from the conſtruction of the gun, change its form in paſſing through the bore. But this, as well as the one above-mentioned, ſeem to require too much time in loading to be ever adopted as regular pieces of ordnance.

RIFTS, in *Farriery*, are ſmall cracks, clefts, chaps, or any other ſimilar fiſſures or openings in the hoofs of horſes' feet. See thoſe heads.

RIG. See RIDGLING.

RIG, in *Rural Economy*, a male ſheep, with none, or one teſticle only in the ſcrotum.

RIGA, in *Geography*, a ſea-port town of Ruſſia, formerly the capital of Livonia, now of the government of its own name, is ſituated in the gulf of Riga, and the ſee of an archbiſhop. This town derives its conſequence from its ſituation on the Duna, which, being navigable from the frontiers of the government of Polotſk, brings the productions of the north-eaſtern parts of Poland and the weſtern provinces of Ruſſia, and has depth enough to receive, cloſe to its walls, ſhips of burden, which ſail to and from the Baltic. Next to St. Peterſburg, it is the moſt commercial town in the Ruſſian empire. The trade is chiefly carried on by foreign merchants, who reſide in the town. Thoſe of the Engliſh factory poſſeſs the greateſt ſhare of the commerce, and live in an hoſpitable, ſplendid manner. The principal exports are corn, hemp, flax, iron, timber, maſts, leather, tallow; and the imports are ſalt, cloth, ſilks, wine, grocery, potaſh, and ſalted herrings. The maſt trade is peculiarly beneficial to the town; the burghers of Riga ſend perſons, who are called maſt-cutters, into the Ruſſian provinces, to mark the trees, which are purchaſed ſtanding. They grow moſtly on the diſtricts which border the Dnieper, are ſent up that river to a landing-place, tranſported 30 verſts to the Duna, are then formed into floats of from 50 to 200 pieces, and deſcend the ſtream to Riga. The tree which produces the largeſt maſts is the Scotch fir. Thoſe pieces which are from 18 to 25 inches in diameter, are called maſts; under thoſe dimenſions, ſpars, or, in England, Norway maſts; becauſe Norway exports no trees more than 18 inches in diameter. The Engliſh merchants, who contract with government, buy the maſts from the burghers of Riga, which are ſkilfully examined in order to aſcertain their ſoundneſs, and are uſually from 70 to 80 feet in length.

The hemp is brought from the Ukraine and Poland, and requires two years in its paſſage to Riga. The barks in which it is conveyed are from 250 to 300 tons burden, are covered with mats, ſloping like a pent-houſe roof, and have a falſe bottom. They aſcend the Dnieper and Duna; but on account of numerous ſhoals, can only paſs the Duna in the ſpring, or about three weeks after the ſnow begins to melt, and if they miſs that time, they are delayed till autumn. The hemp exported from Riga is generally more eſteemed, and 30 *per cent.* dearer than that exported from Peterſburg; the former comes from the Ukraine, the provinces of Mohile and Polotſk, and the neighbouring parts of Poland; the other from the governments of Tver and Novogorod. The Riga hemp is chiefly uſed for ſhrouds and ſtays of men of war, and procured by contract for the Engliſh admiralty and the Eaſt India company.

The inhabitants of Riga carry on alſo a conſiderable commerce in ſalt. They import it from Spain, and ſend it up the Duna, to ſupply the diſtricts bordering on that river; and by land into Courland, and into the neighbouring provinces of Poland. This town, ſays Mr. Coxe, contains within the fortifications 9000 inhabitants, and in the ſuburbs 15,000, excluſive of a garriſon of 1000 ſoldiers. According to Heym, the town and ſuburbs contain 14,280 males, and 13,516 females.

Over the Duna at Riga is a floating wooden bridge, 40 feet in breadth, and 2600 in length. A row of piles extends from one ſhore to the other; each pile is from 25 to 40 feet long, according to the depth of the river, and appears about four feet above the level of the water. To theſe piles the ponts of the bridge are looſely faſtened, by means of iron chains fixed to the tranſverſe beams. The bridge riſes and falls with the river; and, under the wheels of heavy-laden carriages, plays as if actuated by a ſpring. This is the faſhionable walk, and is an agreeable buſy ſcene, when crowded with people, and lined on each ſide with ſhips taking in or unloading their cargoes. In the beginning of winter, when the froſt ſets in, the bridge is removed; the piles, remaining in the water, are forced up by the ice, and conveyed to land; and the whole is laid down again in the ſpring.

Riga was built in the year 1200, and ſoon after incloſed by a wall. At different periods it hath ſuffered much by fires and ſieges. N. lat. 56° 55′. E. long. 23° 54′.

RIGA, Ital., a line of the ſtaff, in *Muſic*; and ſpeaking of muſic in general, the whole five lines, or ſtaff, are called *una riga*.

RIGADON, RIGODON, and *Rigaudon*, a gay and lively dance, written all theſe ſeveral ways. Some ſay it came from Provence; but Rouſſeau affirms, that he has been told by an old dancing-maſter, that it had its name from its inventor, Rigaud.

At the beginning of the laſt century, there were three dances which every eminent maſter taught, and every nobleman's man's and gentleman's child learned, in the courfe of their education: thefe were the minuet, rigaudon, and l'ouvre, all natives of France, during the reign of Louis XIV.

The air to the rigaudon is always in jig time of $\frac{6}{8}$, beginning with an odd quaver. See DANCE, MINUET, and L'OUVRE.

RIGAL, in *Mufic*. See RIGOLL.

RIGAUD, HYACINTH, in *Biography*, was born at Perpignan, in Languedoc, in 1663, and was the fon of Matthias Rigaud, a painter of fome note, from whom, of courfe, he received his initiation into the myfteries of his art. He had the misfortune to lofe his inftructor, when he was only eight years of age; and for a while, he was at the mercy of incapable mafters. At length he became acquainted with a portrait-painter, of the name of Ranc, under whom he acquired confiderable freedom of tafte; and, after a few years, was enabled to produce works which rivalled thofe of his mafter, for truth, for livelinefs, and expreffion.

He was impatiently defirous of vifiting Italy, but was diffuaded from it by Le Brun, who advifed him to continue at Paris, and ftudy portraiture; by which he might affure himfelf of fortune and reputation: and his fubfequent fuccefs proved the propriety and kindnefs of the advice. He foon diftinguifhed himfelf by a richnefs and boldnefs of ftyle, that induced the king of France, Louis XIV., to fit to him for his portrait; and in fucceffion, he painted the princes of the blood, and prime nobility of the kingdom. Many foreign princes, nobles, and generals, alfo had their portraits from his hand; and he treated them with a fplendour in compofition, of which he is the inventor, and which unfortunately governed the French fchool of portrait-painters till the revolution. We fay, unfortunately!—for though Rigaud managed it with great dexterity, yet not being founded in nature, it neceffarily led to error. To produce fuperior grace, the actions of the figures are twifted, and too often diftorted: they are engaged about trifles, with an air of immenfe importance; and the draperies arranged in flowing lines, which convey an idea of motion in fubftances which would require a guft of wind to move them, while the wearers are tranquilly feated in fplendid apartments, and under complete fhelter. He died in 1743, at the advanced age of 80.

RIGAULT, NICHOLAS, was born at Paris in 1577, and was educated among the Jefuits, who in vain attempted to induce him to enter into their fociety. As a literary character, he made himfelf known by a fatirical work, entitled "Funus Parafiticum," publifhed in 1596; with which the celebrated de Thou was fo much delighted, that he entrufted him with the education of his fon. When the learned Cafaubon, who had the care of the royal library, removed to England, Rigault fucceeded him in that employment. His fervices were fo well approved, that he was created attorney-general of the fovereign chamber of Nanci, counfellor to the parliament of Metz, and, finally, intendant of that province. He died at Toul in 1654, at the age of 77, with a character for generofity, modefty, and benevolence, that contributed as much to his reputation as his numerous writings. It was chiefly as an editor of Greek and Latin authors that he made himfelf known to the learned world. Of thefe were "Minutius Felix," 1643; "St. Cyprian," 1648; and "Tertullian," 1664; enriched with ufeful notes, corrections, and obfervations. He gave tranflations of the Greek writers, "Onofander," "Artemidorus," and others; and he edited, with notes, "Phædrus," "Martial," "Rei Agrariæ Scriptores," &c. He alfo wrote and edited fome works on juridical fubjects; and he was appointed, together with Peter Dupin, by the will of the prefident de Thou, to give a complete edition of his hiftory, which appeared at Geneva in 1620.

RIGEL, in *Aftronomy* See REGEL.

RIGEL, or RIEGEL, ANTHONY, in *Biography*, a harpfichord mafter and compofer. In 1780 he was at Spire, Manheim, and Paris, where he publifhed pieces for the harpfichord, with a violin accompaniment in duo, *a parte equali;* and afterwards capriccios for the harpfichord. His ftyle is flight, with little invention, but not vulgar.

RIGG, in *Agriculture*, a provincial word, ufed to fignify the fame as ridge.

RIGGEN, in *Rural Economy*, the ridge of the roof of a building. See FARM-*Building*.

RIGGEN-*Tree*, the piece of timber laid along the ridge of a roof, to fupport the heads of the fpars or rafters, which, in modern buildings, is found unneceffary.

RIGGIL. See RIG and RIDGIL.

RIGGING, a general name given to all the ropes employed to fupport the mafts, and to extend or reduce the fails, or arrange them to the difpofition of the wind.

The former, which are ufed to fuftain the mafts, remain ufually in a fixed pofition, and are called *ftanding* rigging: fuch are the fhrouds, ftays, and backftays. (*Plate* III. *Rigging*, *fig*. 1.) The latter, whofe office it is to manage the fails, by communicating with various blocks, &c. fituated in different parts of the mafts, yards, fhrouds, &c. are comprehended in the general term of *running* rigging: fuch are the braces, fheets, haliards, clue-lines, brails, &c. *Plate* III. *fig*. 2.

The principal objects to be confidered in rigging a fhip appear to be ftrength, convenience, and fimplicity; or the properties of affording fufficient fecurity to the mafts, yards, and fails; of arranging the whole in the moft advantageous manner, to fuccour the mafts, and facilitate the management of the fails; avoiding perplexity, and rejecting whatever is fuperfluous and unneceffary. The perfection of this art, then, confifts in retaining all thefe qualities, and in preferving a judicious medium between them.

Rigging is in part prepared on fhore, in a rigging-houfe, which has the following conveniencies, &c.; *viz.* at the upper end is a windlafs; and at certain diftances down the middle are two rows of large ftrong pofts, for ftretching ropes, and laying on fervice; and on each fide of the houfe are births for the men to ftrop blocks, and prepare fmall rigging on.

There is much fubordinate knowledge neceffary, before a perfon can either prepare rigging in the houfe, or fit it on board the fhip. This confifts of *knotting;* as the overhand knot (*Plate* I. *fig*. 1.); reef-knot, *fig*. 2; bowline-knot, *fig*. 3; wall-knot, *figs*. 4 and 5; double wall-knot crowned, *fig*. 6; buoy-rope-knot, *fig*. 7; ftopper-knot, *fig*. 8; diamond-knot, fingle, *fig*. 9; diamond-knot, double, *fig*. 10; fhroud-knot, opened for knotting, *fig*. 11; as knotted, *fig*. 12; ends tapered and ferved, which completes it, *fig*. 13; tack-knot, *fig*. 14; fprit-fail fheet-knot, *fig*. 15.

Hitches.—Sheepfhank, *fig*. 16; half-hitches, *fig*. 17; clove-hitch, *fig*. 18; rolling-hitch, *fig*. 19; midfhipman's hitch, *fig*. 20; Blackwall-hitch, *fig*. 21; magnus-hitch, *fig*. 22; timber-hitch, *fig*. 23; racking-hitch, *fig*. 24.

Bends.—Sheet-bend, *fig*. 26; Carrick-bend, *fig*. 27; fifherman's bend, *fig*. 30; hawfer-bend, *fig*. 31; temporary bend, *fig*. 32.

Gafket, *fig*. 25; outfide-clinch, *fig*. 28; cat's-paw, *fig*. 29.

Splices.

Splices.—Eye-ſplice, ends opened, *fig.* 33; finiſhed, *fig.* 34; ſhort-ſplice, ends opened and laid together, *fig.* 35; finiſhed, *fig.* 36; long-ſplice, ends opened and laid for ſplicing, *fig.* 37; finiſhed, *fig.* 38; cunt-ſplice, ends opened and laid for ſplicing, *fig.* 39; finiſhed and ſerved over the ſplice, *fig.* 40; cable-ſplice for drawing, ends opened, tapered, and pointed, *fig.* 41; tapered ſhort-ſplice, *fig.* 42. This ſplice is ſerved all over the ſplice.

Hawſer, the ends opened, *fig.* 43; tapered and pointed, *fig.* 44; ditto with a becket, *fig.* 45.

Worming, *fig.* 46; parſling, *fig.* 47; ſerving, *fig.* 48; platting, *fig.* 49.

The ropes, &c. for the ſeveral parts of rigging are, in circumference and in length, according to the eſtabliſhed dimenſions for ſhips of every claſs, particularly in the navy.

There is no one undeviating mode which is purſued in the progreſſive rigging of ſhips. It is an operation which muſt at all times depend upon the time allotted for its performance, and the neceſſity of immediate fitting. The nature of it, however, is ſuch, that all parts may be advancing at the ſame time, the lower maſts and bowſprit being fixed.

Fore, *main*, and *mizen maſts*, have girtline-blocks laſhed round the maſt-head, above the top of the cap, one to hang on each ſide. The girtlines that reeve through them lead down upon deck, for hoiſting the rigging, tops, &c. and the men employed to place the rigging over the maſt-head.

Pendants of tackles are wormed, parcelled, and ſerved with ſpun-yarn, in the way of the ſplice (which is to the ſize of the maſt-head); they have large iron thimbles ſpliced into their lower ends; are then wormed, &c. as above, the whole length in the houſe; and are the firſt thing put over the maſt-head, reſting on the bolſters, they being firſt clothed with worn canvas ſeveral times doubled and tarred. Thoſe over the mizen-maſt are called burton-pendants, as , 2, 3, *Plate* III. *fig.* 1.

Shrouds.—The cablet is warped round two iron fids fixed in the floor, diſtant from each other the length of the firſt warp; that is, from the top of the bolſter to the foremoſt dead-eye; one end of the cablet is made faſt to the lower fid, and the remainder paſſed round the upper fid; and ſo on alternately, one turn cloſe to the back of another. The additional length, gained by the turns lying round each other, is ſufficient for the lengthening of each pair of ſhrouds, as they rake aſt. When the whole gang of ſhrouds is warped out, the bights at the lower end are cut through, in a ſtraight direction, with the fids.

Brigs have four pair of ſhrouds forward, and the foremoſt ſhroud and pendant are in one. The upper bights are deſigned for the eyes, and the outer turns are called *ſwifters*, and are left from four to five feet at each end longer than the ſhrouds, and have an eye ſpliced in them to the ſize of the maſt-head.

The ſhrouds, when cut to their length, are ſtretched for worming by the windlaſs and tackle, and then wormed with double ſpun-yarn one-fourth the length from the centre of the eye on each ſide: but the fore leg of the foremoſt pair is wormed all the whole length. Each length, after being wormed, is hove out, till each pair has acquired, by ſtretching, one and a half the length of the eye; and ſhould remain on that ſtretch twenty-four hours, before the ſervice is laid on.

The eyes of all ſhrouds are parcelled with worn canvas, well tarred, about one fathom and a half on each ſide of the middle for large ſhips, and proportionably for ſmaller; and then ſerved with ſpun-yarn one-fourth of their length; each turn of the ſerving is laid very cloſe, and ſtrained tight round, to prevent the water penetrating. The fore leg of the foremoſt pair of ſhrouds is ſerved the whole length.

Swifters, when ſtretched, have the length of the ſplice ſet off on each ſide of the middle, and likewiſe the length of the eye, or circumference of the maſt-head. The latter is parcelled and ſerved as above. They are then cut aſunder in the middle, and ſpliced to the circumference of the maſt-head; then got on the ſtretch, and ſerved over the ſplice one-fourth of the length.

The bights of ſhrouds are ſeized together to the circumference of the maſt-heads, 1, 2, (*Plate* II. *figs.* 14 and 15.); the ſeizing of the firſt ſhroud is put on below the bolſter or treſtle-trees, with ſeven under and ſix riding turns, and a double croſs over all. The ſeizing of each ſhroud is to be laid its breadth below the next, and clear of each other, to prevent chafing.

Thus far the ſhrouds are prepared in the houſe: they are next hoiſted over the maſt-head. The firſt pair leads down on the ſtarboard ſide forward; the next pair forward on the larboard ſide; then the ſecond pair on the ſtarboard, and the ſecond on the larboard, and ſo on, till all are fixed. By this method, the yards are braced to a greater degree of obliquity, when cloſe hauled; which could not be were the foremoſt ſhrouds laſt fitted on the maſt-head.

Swifters (which are the after ſhrouds) are ſwayed next over the maſt-head above the ſhrouds, and are fixed on the ſtarboard and larboard ſides of the ſhip, to ſupport the maſts, and enable them to bear the ſtrain of a heavy preſs of ſail; as 4, 5, 6, *Plate* III. *fig.* 1.

Stays have an eye ſpliced in one end, 1, (*Plate* II. *fig.* 16.) ſufficiently to receive itſelf through. Each ſtay is got on the ſtretch, and hove well out, as the ſhrouds were; then wormed with ſpun-yarn one-third the length; and then hove out, till the middle ſtrand or heart is made to break in ſeveral places. The mouſe, 2, (*Plate* II. *fig.* 16.) made with ſpun-yarn, &c. in the ſhape of a pear, is then raiſed on the ſtay, at one-third of its length, or by ſome at two ſides of the maſt-head, added to twice the length of the treſtle-trees from the eye to the mouſe. The warp of the mouſe to be marline, and the pointing continued the circumference of the ſtay for the length of the tail. The collar, 3, the eye, 1, and one fathom below the mouſe, 2, to be parcelled with worn canvas, well tarred, and ſerved over with ſpun-yarn. (*Plate* II. *fig.* 16.) The ſtay is hoiſted over the maſt-head, and ſupports the maſt, by extending from its upper end towards the fore part of the ſhip, and counteracts the ſtrain of the ſhrouds which lead aft; and thus is the maſt kept in a firm poſition fore, aft, and ſideways.

Preventer-ſtay is next hoiſted over the maſt-head, the ſame as the former.

Collars.—Fore-ſtay-collars are fitted to the circumference of the bowſprit, and ſpliced together at the ends; wormed, parcelled, and ſerved the whole length; then doubled, and a heart ſeized in the bight. The ſplice is to lie on the back of the heart with *quarter-ſeizings*, a ſcore being cut on each ſide of the heart, large enough to admit from nine to twelve turns of ſeizing; the ſeizing to be ſnaked on the back, to lie cloſely.

Main-ſtay-collar, 4, (*Plate* II. *fig.* 16.) is made by the rope-maker with an eye in one end: in the houſe it is wormed, parcelled, and ſerved round the eye and the whole length.

The fore-ſtay, 7, (*Plate* III. *fig.* 1.) and main-ſtay, have a heart turned into the lower end with a throat-ſeizing, 5, (*Plate*

(*Plate* II. *fig.* 16.) and two round-feizings, 6 and 7, above, and the end of the ftay capped with canvas, whipped and tarred, 8; then fet up with its laniard, 9, (*Plate* II. *fig.* 16.) which is alternately reeved through the heart in the ftay and the heart in the fore-ftay-collar on the bowfprit. The laniard is fet up with a luff-tackle, or luff upon luff, and the four firft turns are ftopt, and fo on, till the laniard is expended: the end is then well ftopt.

The fore-preventer-ftay, 8, (*Plate* III. *fig.* 1.) fets up as the fore-ftay.

The main-ftay, 9, (*Plate* III. *fig.* 1.) fets up as the fore-ftay. Its collar reeves from the ftarboard fide, through a hole in the upper part of the knee next the ftem, (or large triangular eye-bolt drawn through the ftem, in fome merchant fhips,) then paffed through the eye, 10, in the other end, and is brought down to its ftanding-part, and fecurely feized and croffed in two or three places, 11, 12, 13, (*Plate* II. *fig.* 16.) and the end capped; the heart is then feized in the bight above the bowfprit-chock.

The main-preventer-ftay, 10, (*Plate* III. *fig.* 1.) fets up as the fore-ftay, to a heart feized in the bight of its collar, which lafhes round the fore-maft, on the fore-fide through the eyes in the ends, or through bolts in the knight-heads or ftem.

The mizen-ftay, 11, (*Plate* III. *fig.* 1.) fets up through a thimble feized in the collar, which is lafhed round the main-maft, about twelve feet up from the deck. A thimble is turned into the end of the ftay, after it is reeved through the collar, and is fet up with a laniard through an eye-bolt in the deck, abaft the main-maft.

The fhrouds have a dead-eye turned into the lower ends, as 3, (*Plate* II. *fig.* 15.) left-handed, (being cable-laid rope,) with a throat-feizing, 4, clapt on clofe to the dead-eye; and above that a round-feizing croffed, 5, and the end of the fhroud whipt with fpun-yarn, and capped with canvas, 6, well tarred. The laniards, 7, are then reeved through the dead-eyes thus: the end of the laniard is thruft through the after-hole of the dead-eye in the fhroud, and ftopt with a walnut-knot; the other end is paffed through the after-hole of its refpective dead-eye in the chains, 8, then returns upwards, and reeves alternately through the holes in each, and is fet taught with a tackle. It is cuftomary to fet up the fhrouds the firft time with temporary laniards of worn rope and fpun-yarn feizings; and the proper laniards and feizings, when fet up the laft time for fea.

The tops, 12, 13, 14, (*Plate* III. *fig.* 1.) are gotten over their refpective maft-heads by the girtlines.

The futtock-ftaves are wormed, parcelled, and ferved with fpun-yarn the whole length, in the houfe; and then cut to their lengths, as wanted, on board; and are feized along the lower fhrouds horizontally, as much below the upper fide of the treftle-trees as the cap is above. The fhrouds are then *fwiftered* together, thus: a fpar is lafhed to the outfide of the fhrouds, about a fathom below the futtock-ftave; a fingle block is then lafhed round each fhroud and fpar, except the foremoft and aftermoft fhroud, fo that all come in together; the fwiftering-line is then reeved through each block from fide to fide, beginning in the middle, one end leading aft, the other forward; it then croffes, and reeves through two leading blocks, one on each fide the deck, and is bowfed tight, till the fhrouds come in to the length of the catharpin-legs.

Catharpin-legs are four in number. The foremoft is the fhorteft, and they increafe an inch in length as they go aft. The length of the foremoft one is from four feet in fmall, to eight feet in large fhips. They have an eye fpliced in each end, and then wormed, parcelled, and ferved with fpun-yarn the whole length, in the houfe. They are feized through the eye at each end, round the futtock-ftave and fhroud.

Ratlings, 23, 24, 25, (*Plate* III. *fig.* 1.) are faftened horizontally to the fhrouds the firft thirteen inches below the futtock-ftave, and all the others the fame diftance afunder; they are faftened round each fhroud with a clove-hitch, except at the ends, which have an eye, and feized round the fhroud. The foremoft and aftermoft fhrouds are left out for the firft fix ratlings down from the futtock-ftave, and likewife the fix lower ratlings next the dead-eyes. Small fpars, or boats' oars, are feized to the fhrouds, about five feet afunder, for the men to ftand on to rattle down the fhrouds. The fwifters on the fhrouds are next removed half way down between the dead-eyes, and bowfed tight, and fo remain as long as convenient.

The cap is next fwayed up into the top by the girtlines.

Bowfprit.—— *Horfes*, 15, (*Plate* III. *fig.* 1.) The outer ends are fpliced round a thimble in the upper eye-bolt, on each fide the bowfprit-cap. The inner ends have a thimble feized in, and fet up to an eye-bolt in the knight-heads on each fide the ftem with a laniard; the turns are *frapped* together, and the end hitched.

Gammoning, 16, 17 (*Plate* III. *fig.* 1.) The end of the rope is firft whipt, then paffed through the hole in the knee, (but where there is no knee, through a large triangular ring-bolt driven through the ftem,) and over the bowfprit with a round turn, and clinched clofe againft the cleats; the other end is paffed through the fore part of the hole and over the bowfprit, croffing every turn, keeping each turn forward on the bowfprit and aft in the hole, from nine to eleven turns, and every turn is hove tight and *nippered.* The outer end of the bowfprit is fwayed down by a chain-boat, or the fhip's long-boat, loaded with cafks of water, to make it fit clofe on the bed. When all the turns are hove tight, they are frapped together in the middle by as many crofs-turns as are paffed over the bowfprit, which are alfo hove very tight: the end of the gammoning-rope is then whipt, and feized to one of the turns.

Bobftays are wormed, parcelled, and ferved with fpun-yarn three-fourths of their length; and their collars are fitted to the circumference of the bowfprit, with an eye fpliced in each end; they are then wormed, parcelled, and ferved from eye to eye; and have a heart feized in the bight, with a long and fhort leg, with feven under and fix riding turns, well ftrained and croffed with two turns; the end whipt, and fecured with a walnut-knot, in the houfe. The bobftay-collar is lafhed upon the upper fide of the bowfprit at two-thirds out, or within the faddle for the fpritfail-flings, with from eight to ten turns through the eyes, and hove tight by a *heaver.* Ships in the navy generally have two pairs of bobftays, 18, 19, (*Plate* III. *fig.* 1.), merchant-fhips commonly but one pair; one end is paffed through a hole in the front of the knee, or large triangular eye-bolt in the ftem; the ends are then fpliced together. A heart, or dead-eye, is feized in the bight, the fplice to come on the heart; it is then fet up with a laniard, paffing through the heart in the ftay, and its collar by a luff-tackle.

Shrouds, 20, (*Plate* III. *fig.* 1.) are cable-laid rope; they have an iron hook and thimble fpliced in the inner ends, and are ferved over the fplice. They hook to an eye-bolt on each fide the bow; the fore-ends have a heart, or dead-eye, feized in, and they are fet up the fame as the bobftays.

The ufe of the bobftays and fhrouds is to draw down, and keep fteady, the bowfprit; to counteract the force of the ftays of the fore-maft, which draw it upwards.

Topmafts.—The girtlines may now be taken down from the

the lower maſt-heads, and one of the top-blocks ſecurely laſhed round the maſt-head below the cap. The end of a hawſer is then led up from aft, outſide the treſtle-trees, and reeves through the top-block at the maſt-head, then leads down inſide the fore part of the treſtle-trees, and reeves through the ſheave-hole in the heel of the topmaſt, and is racked to the topmaſt in two or three places between the heel and the hounds; it is there well ſtopt with three-quarter laſhing, and enough of the end left to make faſt round the maſt-head. The other end of the hawſer is led to the capſtan. When the topmaſt is hove high enough to enter the treſtle-trees, the end of the hawſer is made faſt round the maſt-head: the lower cap, 32, 33, 34, (*Plate* III. *fig.* 1.) is then lifted over the head of the topmaſt, and ſecurely ſtopt with laſhing a little below the hounds. The topmaſt is now hove high enough for the cap to enter over the lower maſt-head, and then lowered, that the cap may be beaten down firmly on the maſt-head with malls; then the laſhings may be caſt off, and as the topmaſt is raiſed the rackings are cut looſe.

Top-rope-pendants have a large thimble ſpliced in the lower end, and are marled over the ſplice in the houſe, and pointed when on board. The top-rope-pendant is then reeved through the top-block, which is hooked to an eye-bolt on one ſide the lower cap, next through the ſheave-hole in the heel of the topmaſt, then led upwards, and made faſt to an eye-bolt in the cap oppoſite to the top-block. Through the thimble, at the lower end of the pendant, is hooked the block of the top-tackle; its lower block is hooked to an eye-bolt in the deck, and the fall brought to the capſtan. The girtline-blocks are now laſhed to the topmaſt-head, and the topmaſt-croſs-trees and cap are ſwayed up into the top, and the croſs-trees, 35, 36, 37, (*Plate* III. *fig.* 1.) fixed on the maſt-head.

Burton-pendants for the mizen-maſt, 3, and topmaſts, fore and main, 21, 22, (*Plate* III. *fig.* 1.), have a ſplice in the middle to the circumference of their reſpective maſt-heads; thimbles ſpliced in their lower ends; and ſerved with ſpun-yarn over the ſplices in the houſe. The burton-pendants are hoiſted by the girtlines, and placed over the topmaſt-head, that the thimbles may hang on each ſide, to which are hooked the burton-tackles.

Shrouds are warped out on the floor, as the lower ſhrouds are, and fitted to the circumference of the topmaſt-head. In the foremoſt ſhroud, on each ſide, is ſeized a ſiſter-block, 2, (*Plate* II. *fig.* 14.), below the futtock-ſtave, in the houſe. They are ſwayed up and placed over the topmaſt-head, 41, 42, 43, (*Plate* III. *fig.* 1.); the firſt pair to lead down on the ſtarboard ſide forward, the next pair on the larboard ſide forward, and ſo on with the other two pair. The dead-eyes are turned in to their ends the ſame as the lower eyes are, and are ſet up with laniards to the dead-eyes in the futtock-plates by the burton-tackles.

Futtock-ſhrouds, 26, 27, 28, (*Plate* III. *fig.* 1.) The whole-lengths are divided into four, and cut in the bights. Each length has a hook and thimble ſpliced in each end, and the ends of the ſplices ſtopt with ſpun-yarn; then doubled, and a ſpun-yarn tied in the middle for the cutting-mark. The hooks are then hooked in each other, and got upon the ſtretch. They muſt be well hove out, in order to try the hooks and ſplices, as the topmaſt, &c. depends very much thereon. If a hook ſhould break, or a ſplice draw, the former muſt be ſhifted, and the latter hauled tighter through. After they are ſufficiently ſtretched, the ends of the ſplices are tapered, marled down, and ſerved with ſpun-yarn within two feet of the cutting-mark; then cut aſunder, and the ends whipt. On board, their upper ends hook to a hole in the lower end of the futtock-plates, and the lower ends of the futtock-ſhrouds are made faſt to the lower ſhrouds, with a round turn round the futtock-ſtave and ſhrouds, and ſeized up on the ſtanding-part of the ſhroud with two ſeizings croſſed.

Stays are ſwayed up and placed over the topmaſt-head next the ſhrouds, in their order thus: the breaſt-backſtay firſt, and the ſtanding-backſtay next; then the topmaſt-ſtay; and, laſtly, the topmaſt-preventer-ſtay.

Topmaſt-caps, 38, 39, 40, (*Plate* III. *fig.* 1.) may now be lifted on the topmaſt-head, and beat down firm; the girt-lines unlaſhed and taken down, and the topmaſt hove up and fidded. Then ſet up the ſhrouds, 41, 42, 43, (*Plate* I. *fig.* 1.), and rattle them down, as before directed. Set up the breaſt-backſtay, &c. thus: the ***breaſt-backſtay***, 44, 45, (*Plate* III. *fig.* 1.) has a ſingle block turned into the lower end, with a throat and round-ſeizing, through which reeve the runner, one end of which is made faſt to the chain-plates, abreaſt the maſt, with a half-hitch, and the end ſeized down. In the other end is ſpliced a double block, connected by its fall to a double block that is ſtrapped with an eye, through which a ***ſpan*** is reeved, that has an eye ſpliced in each end, by which it is laſhed to the chain-plates.

Standing-backſtays, 46, 47, 48, (*Plate* III. *fig.* 1.) are ſet up, the ſame as a ſhroud, to a ſmall dead-eye in the after-end of the channel.

Shifting-backſtays, 49, 50, 51, (*Plate* III. *fig.* 1.) are clinched round the topmaſt-head and a thimble ſpliced in the lower end, to which is hooked a tackle, the lower block of which is hooked to an eye-bolt over the ſide, and frequently ſhifted, ſo as to render the topmaſt under a preſs of ſail of the greateſt aſſiſtance.

Fore-topmaſt-ſtay, 52, and *fore-topmaſt-preventer-ſtay*, 53, (*Plate* III. *fig.* 1.) are ſet up by paſſing the end through a ſheave under the ***bees*** of the bowſprit; then a long tackle-block is turned into the ends, which is connected by its fall to a ſingle block hooked to an eye-bolt in the bow on each ſide, and ſet up with a luff-tackle, cat's-pawed to its fall. When the ſtay is ſet up, the parts of the tackle are ſtopt together with a rope-yarn, and the fall of the long-tackle is paſſed through the eye-bolt and arſe of the block alternately till it is expended; the end is then made faſt round all the parts with two half-hitches.

Main-topmaſt-ſtay, 54, (*Plate* III. *fig.* 1.) reeves through a ſingle block, ſtrapped with a long and ſhort leg; the ſhort leg has an eye ſpliced in it, the long leg goes round the fore-maſt-head above the rigging, and through the eye of the ſhort leg, and is turned back and ſeized. The ſtay, having a thimble turned in the lower end, leads down between the cat-harpins and the maſt, and ſets up with a laniard to an eye-bolt in the deck, cloſe abaft the maſt.

The ***preventer-ſtay***, 55, (*Plate* III. *fig.* 1.) reeves through a thimble ſeized in the bight of a collar, that is laſhed cloſe up to the ***bibs*** of the fore-maſt, and then ſet up to an eye-bolt, as the topmaſt-ſtay.

Mizen-topmaſt-ſtay, 56, (*Plate* III. *fig.* 1.) reeves through a thimble ſeized in the bight of the collar, that is laſhed cloſe up to the ***bibs*** of the main-maſt; a thimble is then ſpliced into the end of the ſtay, which is ſet up by its laniard to a thimble in another collar, that is laſhed round the maſt, a little below the cat-harpins.

When the *ſtays* are ſet up very tight, the ſhrouds and backſtays muſt be caſt off, and the maſt-head gotten ſo far forward as nearly to touch the fore part of the partners by the runners and tackles, 29, 30, (*Plate* III. *fig.* 1.) or burtons of the mizen-maſt, 31, (*Plate* III. *fig.* 1.) The pendants are frapped together abaft their reſpective maſts, and the runners made faſt as far as convenient before the maſt, and the falls led to the capſtan or windlaſs.

Lower

Lower Yards.—The lower yards muft firft be gotten on board thus: the hawfer that hove up the topmaft is made faft round the yard with a round turn and two half-hitches, fecurely ftopt with fpun-yarn along the yard in feveral places, and well ftopt at the upper arm. As the yard is hove on board, the ftops are cut, and the runner-tackle of the oppofite fide is brought on to the quarter of the yard, to affift it in lowering as the yard advances on board beyond the flings. They are laid athwartfhips before their refpective mafts, but the fore-yard muft be kept above the main-ftay by the runners, which are made faft round each quarter of the yard. They are then rigged as follows.

Horfes, 1, 2, 3, (*Plate* III. *fig.* 2.) have an eye fpliced in one end to the circumference of the yard-arm, and ferved with fpun-yarn over the fplice. The eye goes over the yard-arm, 1, and ftops againft the cleats, and the other end reeves through the thimble in the lower end of the ftirrups, 2, which are from three to four in number; the inner end of the horfes then have a thimble turned in, with a throat and round feizing, through which they are lafhed to the yard, juft beyond the fling-cleats on the oppofite fide. The ftirrups, 3, (*Plate* II. *fig.* 17.) have their upper ends opened and plaited, and are faftened to the yard at equal diftances with three round turns, and nailed, fo as that the horfes may hang fufpended about three feet below the yard.

Yard-tackle-pendants, 4, 5, 6, 7, (*Plate* III. *fig.* 2.) have an eye fpliced in one end the fize of the yard-arm, 4, and a double block in the other end, 5, and the fplices ferved over with fpun-yarn in the houfe. The eye is put over the yard-arm next the horfes, and the double block is connected by its fall to a fingle block ftrapped with a hook and thimble, 6, *Plate* II. *fig.* 17.

Brace-pendants, 8, 9, 10, 11, 12, 13, (*Plate* III. *fig.* 2.) have an eye fpliced in one end, as in the former, and a fingle block in the lower end, and the fplices ferved over with fpun-yarn in the houfe. They, like the former, are next put over the yard-arm, 7, and the brace reeved through the fingle block, 8, (*Plate* II. *fig.* 17.) Sometimes in the navy, but moftly in merchant-fhips, the block is lafhed clofe up to the yard, without a pendant. *Fore-braces* have their ftanding-part made faft round the collar of the main-ftay, on each fide, with a hitch, and the end feized. The leading-part reeves through a fingle block, lafhed on each fide the main-ftay-collar, clofe up to the rigging, and leads down and paffes through a fheave in the brace-bitts, at the fore part of the quarter-deck. The *main-braces* have their ftanding part made faft with a clinch round an eye-bolt in the upper part of the quarter-piece: the leading-part reeves through a fixed block clofe aft upon the plank-fheer, or a block lafhed to an iron ftay projecting on the fide, and leads in and belays round a cleat on the infide. The ftanding and leading-parts of the main-brace are led aft through a thimble fpliced in the end of a *fpan* with two legs, which is made faft with a half-hitch round the mizen-fhrouds on each fide.

Preventer-braces to the fore-yard, in war, reeve through a block lafhed round the yard-arm, 9, (*Plate* II. *fig.* 17.) and through a block in a fpan, hitched round the bowfprit-cap; they lead in upon the forecaftle, and the ftanding-part makes faft round the cap. Thofe to the main-yard reeve through the block on the yard-arm, then through a block lafhed to the fore-fhrouds, clofe below the cat-harpins, lead down upon the forecaftle, and the ftanding-part makes faft to the fhrouds above the block with a hitch, and the end is feized.

Topfail-fheet-blocks are next put over the yard-arms, 8, 9, 10, 11, (*Plate* III. *fig.* 2.), ftrapt with an eye to the fize of the yard-arm, 10, *Plate* II. *fig.* 17.

Lift-blocks are then fpliced into the ftraps of the topfail-fheet-blocks, 11, (*Plate* II. *fig.* 17.); the lifts, 12, 13, 14, 15, 16, 17, (*Plate* III. *fig.* 2.) reeve through a block in a fpan, hitched round the maft-head, between that and the topmaft, then lead down abreaft the fhrouds, and reeve through a block faftened to the fide, and there belay.

Quarter-blocks, 18, 19, (*Plate* III. *fig.* 2.) are ftrapt with a long and fhort leg, with a lafhing-eye fpliced in each end, through which they lafh round the middle of the yard, within the cleats, the block hanging downwards, 11, *Plate* II. *fig.* 17.

The quarter-block is a double block, with a thick and thin fheave running on the fame pin, through which reeve the topfail-fheets, and the thin fheave is intended for the clue-lines; but a fingle block, in lieu of them, is recommended, as they would lead fairer and work eafier. Large merchant-fhips have a fingle block lafhed on each fide of the middle of the yard, and the fheets reeve on their refpective fides, and lead down by the fides of the maft. Smaller fhips have a double block lafhed in the middle of the yard, as the quarter-block, through which the fheets reeve, and lead down on oppofite fides.

Clue-garnet-blocks, 12, (*Plate* II. *fig.* 17.) lafh through the eyes upon the yard, the blocks to hang downwards, four feet without the fling-cleats, on each fide.

Leech-line-blocks, 13, (*Plate* II. *fig.* 17.) are lafhed through the eye and round the yard, ten feet within the cleats at each yard-arm. The blocks to hang on the fore-fide of the yard.

Bunt-line-blocks, 14, (*Plate* II. *fig.* 17.) are lafhed, like the former, midway between them and the flings.

Slab-line-blocks, 15, (*Plate* II. *fig.* 17.) are ftrapt with a fhort lafhing-eye, and are feized to the fpan of the quarter-blocks underneath the yard.

Tricing-blocks, 16, (*Plate* II. *fig.* 17.) for the yard tackles are ftrapt as the above, and are feized round the yard about one-third the length within the arm-cleats. The blocks to hang under the yard.

The *inner tricing-line*, 20, (*Plate* III. *fig.* 2.) reeves through a block lafhed to the futtock-ftave, has a long-eye fpliced in the outer end, the bight is put over the hook of the fingle block with a couple of turns, 17, (*Plate* II. *fig.* 17.), and the leading-part belays to the fhrouds. At fea it is hooked to a becket, or ftrap, round the futtock-ftaff. The *outer tricing-line*, 21, (*Plate* III. *fig.* 2.) is fpliced round the ftrap of the yard-tackle-block, 18, (*Plate* II. *fig.* 17.), and reeved through a block on the yard, it then reeves through a block lafhed in the fhrouds near the futtock-ftaff, and leads down upon deck.

Jeers, in large fhips, are two large tackles, 22, 23, (*Plate* III. *fig.* 2.) The blocks at the maft head are hove up clofe on each fide by the top-burton tackles, and fo lafhed, that every turn of the lafhing is alternately paffed through the ftrap of the block (*Plate* II. *fig.* 11.), and over a broad elm-cleat, nailed on the oppofite fide of the maft-head, and the ends of the lafhing are well ftopt. The other two blocks are ftrapt with a double ftrap to the fize of the yard, with a long and fhort leg (*Plate* II. *fig.* 10.) (See *Strapping of Blocks*, below.) They lafh on each fide the middle, or flings, within the cleats, 19, 20, (*Plate* II. *fig.* 17.) The long leg of the ftrap is paffed down the aftfide of the yard, and meets the bight of the fhort leg on the forefide, and lafhes, every turn paffing alternately through each bight, rofe-fafhion. The falls reeve through the blocks at the maft-head and on the yard, and lead down upon deck. Jeers, in merchant-fhips, and fmall fhips in the navy, have two fingle blocks lafhed on each fide the maft-head, as above, and another, the fame fize, in the middle of the yard. The *tye* then reeves through one of the blocks at the maft head, then through the block on the yard, and then through the block

on

on the oppoſite ſide of the maſt-head. In the lower ends of the tye is ſpliced a double block, with its fall, which reeves through another double block, that hooks to an eye-bolt in the deck. The fall of the jeers leads through the bitts to the capſtan, by which the yards are hoiſted up in their place.

Truſs-pendants are doubled, and cut in the bight; they have a thimble ſpliced into one end, and are ſerved with ſpun-yarn one-third the length, in the houſe. The ends that have the thimbles are paſſed round the yards within the ſling-cleats, and are well ſeized. One end paſſes over the yard, the other under, and both ends round the maſt. The ſtarboard end reeves through the larboard thimble, and the larboard end through the ſtarboard thimble. The lower end has a double block turned in, with a throat and round-ſeizing, and its fall reeves through a double block that hooks to an eye-bolt in the deck, on each ſide the maſt, by which the truſs-pendant is ſtraightened or ſlackened, conſequently the yard is cloſe confined, or removes from the maſt.

The *nave-line* reeves through a ſingle block laſhed under the aftſide of the top, and through a block or thimble ſeized to the truſs-pendants; one end leads upwards, and makes faſt round the treſtle-trees. The leading-part goes down upon deck.

Slings and Straps.—The ſtrap has an eye ſpliced in each end, with a long and ſhort leg, to the circumference of the yard, and ſerved with ſpun-yarn from eye to eye, with a thimble ſeized in the bight. The ſlings have an eye ſpliced in one end, then wormed, parcelled, and ſerved almoſt the whole length, in the houſe.

The long leg of the ſtrap paſſes down the aftſide of the yard, exactly in the middle, comes up the foreſide, meets the ſhort leg, and laſhes through the eyes, the thimble to be upwards. The ſlings have a large thimble ſeized to the bight with a long and ſhort leg. The long leg paſſes round the after-part of the maſt, and reeves through the eye in the ſhort leg; it is then returned back, and ſecurely ſeized to its own part in ſeveral places. By theſe the yards are ſlung at the maſt-head by a laniard, that ſplices in the thimble in the ſlings at the fore-part of the maſt, and then reeves through the thimble in the ſtrap upon the yard, and alternately till the laniard is expended; the end then fraps round the turns, and makes faſt with two half-hitches. In time of action, the yards are ſlung with chains.

Strapping of Blocks in the Houſe.

A TABLE of the Dimenſions of Straps for Laſhing and Seizing Blocks.

Size of the Blocks.	Size of the Straps.	Length of the Straps.	
Inches.	Inches.	Feet.	Inches.
17	5	7	6
16	4½	6	9
15	4	6	0
14	3½	5	6
13	3½	5	0
12	3½	4	6
11	3	4	3
10	3	3	9
9	2½	3	6
8	2½	3	0
7	2½	2	9
6	2	2	6
5	1½	1	9
4	¾	1	6

The whole length of all the different ſizes of block-ſtrapping is gotten upon the ſtretch, and hove out tight for worming and ſerving; after that is performed, it is cut into lengths agreeable to the above table, according to the ſize of the blocks. The ſcores of all blocks, if required, are to be opened, or eaſed, ſo as to receive the ſtrap, and then to be well tarred, and the pin and ſheave examined, before the ſtrap is put on (*Plate* II. *fig.* 1.) The block is then ſet well into the ſtraps with wedges, thus: the ſtrapping is frapped together with rope-yarn under the block, with a chock between, and the wedges are ſet between the breaſt of the block and the chock. The ſtrap is next nippered, with a heaver, round the block; the wedge, chock, and frappings are then removed, and the block hung up, that the ſtrap may be well ſeized together, cloſe under the block, with nine under and eight riding turns; every turn ſtrained tight round with a heaver, and croſſed each way with two turns.

Jeer-blocks (*Plate* II. *figs.* 10, 11.) are double ſcored, conſequently ſtrapped with a double ſtrap, thus: it is ſpliced together at the ends, and when doubled, ſhould be the ſize of the block and the circumference of the yard. It is then doubled, and the block ſeized in the bight, with a long and ſhort leg, the ſplice lying in the arſe of the block. Jeer-blocks for the maſt-heads are ſtrapped with long-eyes, to receive many turns of the laſhing.

Blocks ſtrapped with a thimble, or hook and thimble, (*Plate* II. *fig.* 3.) have the ends of the ſtraps ſpliced together. The block is fixed in one bight, for the ſplice to lay, as above, and the thimble in the other bight; the ſeizing is clapt on, between the block and the thimble, with eight under and ſix riding turns, according to the ſize of the block; each turn ſtrained by a heaver, turns double-croſſed, and the end ſtopt with a wall-knot crowned.

Blocks ſtrapped with eyes (*Plate* II. *figs.* 4, 5, 6.), or thimbles ſpliced in the ends, are ſeized tight into the bight, and the legs left long enough to laſh through the eyes, round their reſpective maſt, yard, &c. as the topſail, clue-lines, clue-garnets, &c.

Blocks ſtrapped with double tails are ſeized in the bight as the former; but thoſe with a ſingle tail are ſpliced in, and ſerved with ſpun-yarn over the ſplice.

The ſtrapping of jeer-blocks is wormed, parcelled, and ſerved. Strapping of four inches diameter, and above, is wormed and ſerved; and all under four inches is only ſerved with ſpun-yarn; except the ſpritſail-brace, buntline, and leech-line blocks, that are laſhed under the tops, which are only ſerved with ſpun-yarn over the ſplice, and the tail left half a fathom in length.

Rigging the Topſail Yards.

The topſail-yards are firſt hove on board by the top-rope, which is faſtened to the ſlings of the yard, and ſtopt from thence with ſpun-yarn to the yard-arm, and placed athwart their reſpective maſts.

Horſes, 1, rig the ſame as the lower yards, with the addition of *Flemiſh horſes*, 2, (*Plate* II. *fig.* 18.) which have an eye ſpliced in each end; one eye is put over the eye-bolt in the yard-arm, and the other is ſeized round the yard within the arm-cleats, 24, 25, 26, *Plate* III. *fig.* 2.

Brace-pendants, 3, (*Plate* II. *fig.* 18.) are next put over the yards, as on the lower ones. The fore-topſail-braces reeve through the block in the pendant, and then through a block laſhed on each ſide to the main-ſtay-collar, a little below the fore-braces; the ſtanding-part makes faſt to the ſtay with a hitch, and is ſeized below the block. The leading-part leads from the block on the collar, through a block laſhed on the ſtay,

ſtay, over the fore hatchway, and through a block ſtrapped with a thimble into an eye-bolt in the aft-part of the fore-caſtle, and belays to a pin in the ſkid-beams, 27, 28, *Pl.* III. *fig.* 2.

The main-topſail-braces reeve through the block in the pendant, and the ſtanding-part makes faſt to the mizen-ſtay collar. The leading-part reeves through a block in the ſpan round the mizen-maſt-head below the hounds, and through a ſheave-hole in the mizen-topſail-ſheet-bitts, abaft the mizen-maſt, and belays there; 29, 30, *Plate* III. *fig.* 2.

The mizen-topſail-braces reeve through the block in the pendant. The ſtanding-part makes faſt round the peek-end, and the leading-part reeves through ſingle blocks at the peek, and comes down and belays to the fore-ſide of the taffarel to a cleat; 31, 32, *Plate* III. *fig.* 2.

Reef-tackle-pendants, 4, (*Plate* II. *fig.* 18.) reeve through the upper ſheave in the *ſiſter-block* in the topmaſt-ſhrouds, thence through a ſheave-hole in the yard-arm, and are ſtopt with an over-hand knot, till the ſail is bent. A double block is turned in to the lower ends of the pendants, and its fall reeves through another double block, that is ſeized to the after-part of the lower treſtle-trees, and the falls lead down upon deck; 33, 34, 35, 36, *Plate* III. *fig.* 2.

Lift-blocks, 5, (*Plate* II. *fig.* 18.) are ſtrapt with an eye to the ſize of the yard-arm. The lift reeves through the lower ſheave in the ſiſter-block in the topmaſt-ſhrouds, and through the block on the yard-arm. The ſtanding-part hooks to a becket round the top-maſt-cap, and the leading-part leads down the ſide of the maſt, and belays to the dead-eyes in the lower ſhrouds; 37, 38, 39, 40, 41, 42, *Plate* III. *fig.* 2.

Tye-blocks, thoſe at the topmaſt-heads, laſh cloſe up to the rigging, under the collar of the ſtay; and the blocks on the yard, 6, (*Plate* II. *fig.* 18.) laſh under the fore-part of the yard, as the lower ones. The ſtanding-part of the double-tyes in large ſhips clinch round the maſt-head, then reeve through the double block upon the yard, return upwards, and reeve through the block on each ſide the maſt-head; 43, 44, 45, (*Plate* III. *fig.* 2.) The fly-blocks are then ſpliced in their lower ends, and connected by their haliards to a ſingle block, that is ſtrapt with a long ſtrap, with a hook and thimble, that hooks to a ſwivel-eye-bolt in the channel on each ſide: the leading-part comes in-board through a block laſhed on each ſide; the foremoſt ones abaft the forecaſtle, and the after-ones on the quarter-deck. A ſingle tye rigs like the lower yards in ſmall ſhips.

Buntline-blocks are ſpliced round the ſtraps of the top-ſail-tye-block upon the yard, 7, *Plate* II. *fig.* 18.

Clue-line-blocks are ſtrapt with two laſhing-eyes, and laſh upon the yard, three feet without the ſlings, the blocks hanging under the yard, through which the clue-lines reeve and lead down upon the deck, 8, *Plate* II. *fig.* 18.

Top-gallant-ſheet-blocks, 9, (*Plate* II. *fig.* 18.) are ſtrapt with two laſhing-eyes, and laſh upon the yard, cloſe within the clue-line blocks on each ſide.

Parral. (*Plate* II. *fig.* 20.) The parral-ropes in the houſe have an eye ſpliced in each end, are wormed and ſerved with ſpun-yarn from eye to eye, then doubled, and cut aſunder in the bight. The end of one rope is thruſt through the upper hole in the ribs, and a truck, alternately. The end of the other rope is paſſed through the lower hole in the ribs and a truck the reverſe way. The parral is fitted to the aft-ſide of the topmaſt, and the eye in one end paſſed under the yard, and the other over, till both eyes meet and are ſeized together on the fore-ſide with ſpun-yarn. The other ends of the parral-rope are paſſed round the yard and aftſide of the parral alternately, till the latter is well ſecured to the former; and the whole of the turns are marled together with quarter-ſeizings, to confine them cloſe in the cavity on the aftſide of the ribs. Thus the yard is confined to the maſt, but eaſily hoiſted or lowered when the maſt is kept clean and greaſed.

Jib-boom to be rigged.—The jib-boom is hoiſted on board and laid on the bowſprit, and its fore end pointed through its hole in the bowſprit-cap. The heel-rope or top-rope may be reeved through the ſheave-hole at the heel, and one end made faſt to the eye-bolt on one ſide of the bowſprit-cap, the other reeved through a ſingle block made faſt to an eye-bolt on the oppoſite ſide, and lead in upon the forecaſtle, 46, *Plate* III. *fig.* 2.

The *traveller* is firſt put over the outer end of the jib-boom, and the hook kept inwards; 47, *Plate* III. *fig.* 2.

Horſes are doubled, and ſerved with ſpun-yarn one fathom in length in the bight, and knotted with an over-hand knot, at the diſtance of every yard, in the houſe. On board, the bight is taken over the outer end of the jib-boom, with a jambing-knot, cloſe againſt the ſtop, which prevents them coming in. The inner ends are brought aft and made faſt, with a round turn round the jib-boom, within the cap. The ends are ſtopt back with two or three ſeizings of ſpun-yarn, to prevent their being caſt off by miſtake; 57, *Plate* III. *fig.* 1.

Guy-pendants are put over the jib-boom, the ſame as the horſes, and the inner ends reeve through a thimble, on the quarters of the ſpritſail-yard, and turn in to the ſtrap of a double block, with a throat and round-ſeizing, and its fall reeves to a ſingle block, that hooks to an eye-bolt near the cat-head, and leads in upon the forecaſtle; 49, 50, *Plate* III. *fig.* 2.

A *ſtrap* is put over the end of the jib-boom, with three thimbles ſeized in it; the middle thimble is the largeſt, and reeves the fore-top-gallant-ſtay, and the ſmaller thimbles on each ſide the fore-top-gallant-bowlines.

The *ſpritſail-yard* is hove on board, and laid fore and aft the forecaſtle for rigging with its *horſes*, 51, 52, (*Plate* III. *fig.* 2.) The eye in the outer end is put over the yard-arm on each ſide, and ſtops againſt the cleats. The eye in the other end is well ſeized to the yard, at three feet beyond the ſlings, with *ſtirrups* and *Flemiſh horſes*, the ſame as the topſail-yards, 53, *Plate* III. *fig.* 2.

Braces and Pendants.—The eye in one end of each pendant goes over the yard-arm cloſe againſt the horſes, and the brace reeves through a ſingle block ſpliced in the other end; the ſtanding-part makes faſt to the ſtay-collar, and the leading-part reeves through a double block, made faſt under the fore-top, and then leads through another, made faſt to the aft-part of the top, and down to the aft-part of the forecaſtle; 54, 55, *Plate* III. *fig.* 2.

Lifts.—The blocks are ſtrapped with an eye to the ſize of the yard-arm, and driven thereon cloſe to the braces. The lift reeves through a ſingle block in the end of a *ſpan*, which is paſſed with a hitch round the cap under the jib-boom, and through the block on the yard-arm, and the ſtanding-part returns upwards, and is made faſt to an eye-bolt in the ſide of the cap; the leading-part comes in upon the forecaſtle. They are occaſionally uſed for ſpritſail-topſail-ſheets.

The *ſtanding-lift* has an eye ſpliced in one end, and laſhes to the yard one-fourth from the ſlings: the other end has a thimble ſpliced in, and is ſet up with a laniard to a thimble ſpliced in a ſtrap that is hitched round the bowſprit within the *bees*; 56, 57, *Plate* III. *fig.* 2.

Clue-line-blocks are ſtrapped with two eyes, and are laſhed

lashed through those eyes round the yard three feet without the slings, the lashing to be upon the yard.

The *strap* has a thimble seized in the bight, and is spliced or seized round the yard in the middle, between the cleats. Also on each quarter of the yard is seized a strap, with a thimble, through which are led the jib-guys. The yard may now be hove out towards its place, and the long-tackle block of the haliards hooked into an eye-bolt in the after-part of the bottom of the bowsprit-cap; the hook to be moused with spun-yarn, to prevent its slipping loose. The single block is hooked to the thimble in the strap at the slings, and the fall then leading in upon the forecastle, the yard is hove to its place.

The *slings* have an eye spliced in each end, one of which goes round the yard close within the cleats near the middle, and seizes with a quarter-seizing close to the yard; the other end goes over the bowsprit before the saddle, and under the yard, then over the bowsprit again, till the eyes in the ends, meeting close together, are well lashed.

Preventer-slings are used when the haliards are taken in. The outer end has a hook and thimble spliced in and served down over the splice, that hooks to the eye-bolt in the bottom of the cap. The inner end reeves through the thimble in the strap at the slings, and is hitched with two half-hitches, or spliced.

The *spritsail-topsail-yard* is hove on board, &c. as the former, and the

Horses, having an eye in their outer ends, are put over the yard-arm on each side, and stop against the cleats; the inner end has an eye, which is seized to the yard, three feet without the slings, 58, *Plate* III. *fig.* 2.

The *braces* have an eye spliced in one end, that goes over the yard-arm on each side; the inner ends lead through a block made fast to the under side of the fore-top, from thence through another at the aftside under the top, and lead down to the aft-part of the forecastle, and there belay; 59, *Plate* III. *fig.* 2.

The *lifts* have an eye spliced in their outer ends, and are driven over the yard-arm close to the braces; the inner end reeves through a thimble, seized on each side a strap hitched over the end of the jib-boom, and leads in upon the forecastle through a saddle on the bowsprit, and belays to the rack over the bowsprit, 60, *Plate* III. *fig.* 2.

The *clue-line-blocks* are strapped with two eyes, and are lashed through those eyes round the yard, about two feet without the slings.

Haliard.—The standing-part is made fast with a bend through the becket of its block, lashed under the outer end of the jib-boom; then reeves through a single block, lashed round the middle of the yard between the cleats; then forward, and reeves through the block at the outer end of the jib-boom, and leads in upon the forecastle, and belays to a rack over the bowsprit, 61, *Plate* III. *fig.* 2.

Top-gallant Masts.—The *top-rope* reeves for the top-gallant-mast as it does for the topmast, observing to stop it to the top-gallant-mast-head with spun-yarn, to keep it steady till it has entered the topmast-cap; the stop is then cut, and the end of the top-rope made fast to the eye-bolt in the topmast-cap.

A grommet of rope, spliced to the size of the mast, is first put over the head, and beat down close to the stop of the hounds.

Shrouds, *backstays*, and *stays*, are fitted in the house, and hoisted over the top-gallant-mast-head, the same as the topmasts, and the top-gallant-mast is then swayed up and fidded.

The *shrouds* are then thrust through a hole in the end of the topmast cross-trees, and between the topmast shrouds, over the futtock-staff. A thimble is seized in the ends that set up with the laniard through a thimble seized in the bight of a strap, made fast round the futtock-plates, close under the dead-eyes, with a turn through the bight, 58, 59, 60, *Plate* III. *fig.* 1.

Backstays set up, the same as the topmast-backstays, to a small dead-eye in the aft-part of the channel, or in a stool abaft the channel, 61, 62, 63, *Plate* III. *fig.* 1.

Fore-top-gallant-stay, 64, (*Plate* III. *fig.* 1.) reeves through a single block in large ships, or a thimble in the strap at the outer end of the jib-boom of frigates and smaller vessels. The former sets up by its tackle to an eye-bolt in the head; the latter with a jigger-tackle occasionally, and is secured by a laniard to the gammoning or eye-bolt in the head.

Main-top-gallant-stay, 65, (*Plate* III. *fig.* 1.) is cable-laid in large ships, and fitted with a collar and moused, as the lower stays. Smaller ships are hawser-laid, have an eye spliced in the upper end to the circumference of the mast-head, and served with spun-yarn over the splice, in the house. It reeves through a single block at the fore-top-mast-head, has a thimble turned into the end of the stay, and sets up to a thimble in a span, made fast to the trestle-trees of the foremast by its laniard.

Staysail-stay, 1, (*Plate* IV. *fig.* 1.) is spliced into the top-gallant-stay, one fathom below the top of the mast, it then reeves through a block or thimble lashed to the fore-top-mast-head, takes a turn round the trestle-trees, and belays there.

Mizen-top-gallant-stay, 66, (*Plate* III. *fig.* 1.) sets up to the main-topmast-head, as the main-top-gallant-stay sets up to the fore-topmast-head.

Flag-staff-stays go round their respective top-gallant or royal mast-heads with a running-eye, and are kept close up under the truck, by a small cleat nailed on each side. The fore one reeves through a thimble at the jib-boom end, and belays round the fore-stay-collar. The main one reeves through a thimble above the fore-top-gallant rigging, and belays in the top. The mizen one the same above the main-top-gallant rigging.

Royal masts are rigged as top-gallant-masts, and often abaft the mast.

The *top-gallant-yards* are hove on board, and rig with horses, braces, and lifts, over the yard-arm, the same as the topsail-yards.

Braces, 1, (*Plate* II. *fig.* 19.) The fore-top-gallant-braces, 56, (*Plate* III. *fig.* 2.) reeve through the block in the pendant of large ships, or the block in the yard-arm of small. The standing-part makes fast with a hitch, and the end seized back round the collar of the main-topmast-stay on each side; and the leading-part reeves through a block lashed round the collar a little below the standing-part; then leads through a block at the aft-part of the fore-top, and belays to a pin at the aftside of the forecastle.

The *main-top-gallant-braces*, 57, (*Plate* III. *fig.* 2.) reeve as the former. The standing-part makes fast with a hitch, and the end seized back round the collar of the mizen-topmast-stay, and the leading-part through a block seized just below the standing-part, and leads down into the mizen-shrouds.

The *mizen-top-gallant-braces*, 58, (*Plate* III. *fig.* 2.) are single, and go with a splice over the yard-arm. They lead through a thimble at the mizen-peek, come down, and belay to a cleat on the fore-side of the taffrail.

The *lifts*, 59, 60, 61, (*Plate* III. *fig.* 2.) are single, and go over the yard-arm with an eye; the other end reeves through

through a thimble in the top-gallant ſhrouds, leads down into the top, and belays round the dead-eyes.

Clue-line-blocks, 2, (*Plate* II. *fig.* 19.) are ſtrapped with two laſhing-eyes, and laſh upon the yard three feet without the ſlings. The clue-line reeves through the block which hangs under the yard, which is ſtopt with a knot till the ſail is bent. The leading-part comes down the maſt, and belays to the ſhroud-rack.

The *tye*, 3, (*Plate* II. *fig.* 19.) reeves through the ſheave-hole in the top-gallant-maſt hounds, and clinches round the yard at the ſlings; in the lower end is turned a double or ſingle block, according to the ſize of the ſhip, through which reeves the haliard, and through a ſingle block laſhed to the after-part of the lower treſtle-trees, under the top, and belays round the croſs-piece of the bitts abaft the maſt.

Parral, the ſame as the topſail-yard, after the yard is ſwayed up.

Rigging of Royal-Yards.

When they have royal maſts, they rig as the top-gallant-yards above; but if there are no royal maſts, they ſet flying; that is, the *haliard* reeves through a ſheave-hole cloſe up under the truck; the ſtanding-part clinches to the middle of the yard, and the leading-part comes down and belays in the top.

Rigging of the Mizen-Yards.

Mizen-yards are now ſeldom uſed, and that only in line of battle ſhips in the navy, and large Eaſt India ſhips.

They are hove on board as the lower yards, and the

Derrick-block is ſtrapt with two eyes, that go round the yard and laſh underneath, between the ſlings and outer yard-arm or peek. The *Derrick-fall* reeves through the double block that is croſs-ſeized in the ſtrap, has an eye ſpliced in each end, and laſhes to the mizen-cap; then through the ſingle block upon the yard. The ſtanding-part is again taken up and reeved through the block at the mizen-cap; an eye is then ſpliced in the end to the ſize of the yard-arm, that jambs over the peek-end. The leading-part comes from the double block at the cap, leads down through the treſtle-trees to a block in the larboard, mizen channel, and through the ſide upon deck.

Brail-blocks are ſtrapt together in one ſtrap, and lie over the yard, and ſeized together underneath; the throat-blocks next the cleats near the maſt; the middle-blocks in the middle between the throat-blocks and the peeks; the peek-blocks about three or four feet within the cleats at the peek.

Vangs.—The pendants are doubled, and ſerved with ſpun-yarn two fathoms long in the bight, and a double block ſpliced in each end, and ſerved with ſpun-yarn over the ſplice in the houſe. The bight is put over the peek-end with a hitch. The falls reeve through the double block in their ends, and a ſingle block is hooked to an eye-bolt in the quarter-piece on each ſide. The ſtanding-part makes faſt to the becket of the ſingle block, and the leading-part from the double block, belays to a cleat on the taffrail.

Signal haliard-block is laſhed to an eye-bolt in the peek of the yard.

Jeers.—The fall reeves through a treble or double block laſhed at the maſt-head, and likewiſe a double or ſingle block laſhed between the ſling-cleats, and the leading-part comes into the mizen-chains on the ſtarboard ſide as the derrick did on the larboard ſide. The yard is then ſwayed up, and the fall made faſt with a hitch, and ſeized.

Slings go round the maſt-head, and round the yard between the ſling-cleats, which are kept abaft the maſt.

Bowlines reeve through a ſingle block ſtrapt with a thimble into an eye bolt, in the lower end of the yard, and through a block hooked to an eye-bolt in the ſide abreaſt the lower end of the yard, or laſhed to the mizen-ſhrouds.

Horſe for the mizen-ſheets clinches to an eye-bolt on each ſide the fore part of the taffrail with a thimble, to which is ſtrapped the ſheet-block.

Gaff.—If the mizen-yard is not uſed, there muſt be a *gaff*, 20, (*Plate* IV. *fig.* 1.) as in ſmaller veſſels, which is rigged ſimilarly to the mizen-yard, excepting only that it has a throat-haliard inſtead of jeers, which hooks to an eye-bolt over the jaws: and a ſpan inſtead of a derrick, 21, *Plate* IV. *fig.* 1.

The *driver* or *ſpanker-boom* rigs with a *topping-lift*, 25, (*Plate* IV. *fig.* 1.) which goes over the outer end of the boom with a clove-hitch, and ſtops againſt the ſhoulder; the ends are reeved through a ſingle block laſhed on each ſide of the mizen-maſt-head; then have a double block ſpliced in each lower end, which reeves with its fall to a ſingle block, hooked to an eye-bolt in each mizen-channel. The ſtanding-part makes faſt to the becket of the ſingle block, and the leading-part belays to a cleat on each ſide of the mizen-maſt.

Guy-pendants, 26, (*Plate* IV. *fig.* 1.) have a hook and thimble ſpliced in one end, that hook to a thimble on each ſide of a ſtrap ſpliced round the boom, over the horſe at the fore-ſide of the taffrail; a thimble is ſpliced in the inner ends of the pendants, to which is hooked the tackle on each ſide, that are uſed where moſt ſupport can be given to the boom.

Rigging and Bending the Sails.

Rigging and bending the fore-courſe, 5, (*Plate* IV. *fig.* 2.) This ſail is hoiſted on board by the yard-tackles, and laid athwart the main-ſtay, ready for bending, thus; the *ſheet-block* is ſtrapped with an eye, and put over the clue on each ſide. The tack is next thruſt through the clue for the knot to come on the aftſide.

Clue-garnet Block.—The eyes of the ſtrap are put through the clue, brought up on each ſide, and ſeized on the top.

Tacks are cable-laid, and tapered in the making. The biggeſt end is opened out long enough to heave the knot cloſe together; the knot is double-walled and crowned; the ends are thruſt through the walling, then ſcraped down, ſerved over with ſpun-yarn, and are wormed, parcelled, and ſerved with ſpun-yarn one-fourth of the whole length, in the houſe. (*Plate* I. *fig.* 14.) *Single tacks*, as the above, reeve through the block laſhed round the outer end of the boomkin, on each ſide; then lead in upon the fore-caſtle or upper deck, and belay round a large cleat upon the cat-tail, or the bitts near the maſt. In *double tacks*, the ſtanding-part makes faſt round the outer end of the boomkin, and the leading-part reeves through a ſingle block laſhed to the clue of the ſail, then through the block at the outer end of the boomkin, and leads in as the above, 21, *Plate* IV. *fig.* 2.

Sheets, 23, (*Plate* IV. *fig.* 2.) are reeved through the ſheet-block at the clues, and the ſtanding-part ſeizes or ſplices with a thimble to an eye-bolt in the ſide a little before the gangway. The leading-part reeves through a ſheave in the ſide above the eye-bolt, leads forwards, and belays round a large cleat in the ſide.

Yard-ropes are temporary, and are only uſed to get up the ſail; they reeve through tail-blocks, that are made faſt round the boom-iron at each yard-arm, and one end comes down

down and makes faſt to the upper reef-earing cringle. The leading-part comes in upon deck, through a leading-block laſhed to a timber-head or eye-bolt. The ſail is then run up to the yard, where the men go and paſs the

Earings: one end of the earing ſplices to the head-cringle with a long-eye; the other end paſſes over the yard-arm, without the rigging, and through the cringle alternately, two or three times, and likewiſe paſſes round the yard, within the rigging, and through the cringle, till the earing is expended, making faſt the end with two half-hitches. The outer turns are to ſtretch the head of the ſail tight along the yard, and the inner turns to draw it cloſe up.

Reef-earings, when uſed, the ſame.

Rope-bands, which faſten the head of the ſail along the yard, are braided cordage, with an eye in one end, and one leg longer than the other. The eye of the long leg is put over the ſhort leg, and the eye of the ſhort leg is thruſt through the eye-let hole at the aftſide of the ſail, and paſſes through the eye of the ſhort leg; and ſo of the reſt. The rope-bands, being previouſly reeved through the head of the ſail, faſten to the yard as follows. The long leg comes over the yard from the foreſide, with a round turn between the head of the ſail; the ſhort leg comes up the aftſide, and makes faſt with a reef-knot upon the yard. The ſail is then let fall to ſee it is clearly bent.

Points are uſually put in the ſail at the ſail-loft. See SAIL-*Making*.

Gaſkets are braided cordage, which go round the yard with a running-eye, two on each quarter, and one at each yard-arm: the bunt-gaſket in the middle has two legs, and laſhes to the yard on each ſide of the quarter-blocks. Theſe are uſed when the ſail is *furled,* to bind it firmly up to the yard, by paſſing the gaſket ſix or ſeven times round the yard and ſail, each turn a certain diſtance apart, or ſpirally, making faſt the end with two half-hitches.

Clue-garnets, 24, (*Plate* IV. *fig.* 2.) reeve through their block upon the yard on each ſide, then through the block at the clue of the ſail. The ſtanding-part is carried up, and made faſt round the yard by its block with a timber-hitch, and the end ſtopped. The leading-part comes down upon deck, and reeves through its ſheave-hole in the topſail-ſheet-bitts, and there belays.

Bowlines, 25, (*Plate* IV. *fig.* 2.) reeve through a ſingle block laſhed round the collar of the fore-ſtay, or the fore-preventer-ſtay on the bowſprit, and the outer part reeves on the bowline-bridle, with a thimble ſpliced in the end, and the bridle clinches to the cringle on the leech of the ſail. The leading-part comes in upon the forecaſtle, and belays to the fore-topſail-ſheet-bitts.

Leech-lines, 26, (*Plate* IV. *fig.* 2.) reeve through the ſpritſail-brace-block, under the top, then through the block upon the yard, and the ſtanding-part makes faſt with a clinch to the upper bowline-bridle; the leading-part then reeves through a double block, at the aft-part of the top, and comes down upon the forecaſtle.

Bunt-lines, 27, (*Plate* IV. *fig.* 2.) reeve through the leg and fall-block, and through a double block at the aft-part of the top, and through the blocks upon the yard, and lead down the fore-ſide of the ſail, and clinch to the cringles in the foot. The fall reeves through the leg-block; the ſtanding-part makes faſt to an eye-bolt near the maſt, and the leading-part through a live-block under the croſs-piece of the breaſt-bitts.

Slab-lines, 28, (*Plate* IV. *fig.* 2.) reeve through a ſmall block laſhed to the ſtrap of the quarter-block, and the ſtanding-part clinches with two legs to the middle bunt-line cringles. The leading-part leads to the topſail-ſheet-bitts, and belays to the croſs-piece.

Spilling-lines, 29, (*Plate* IV. *fig.* 2.) reeve through blocks laſhed on each ſide of the quarter-blocks of the lower yards, then lead down before the ſail, return upwards under the foot of the ſail, and make faſt round the yard with a timber-hitch.

Life-lines are ſometimes uſed for the preſervation of the ſeamen. They are generally of worn hawſer-laid rope, and are made faſt with the two half-hitches round the ſtrap of the lift-block, and jeer or tye-block, in the middle of the yard.

Rigging and Bending the Main-Courſe, 1, *Plate* IV. *fig.* 2.

This ſail is hoiſted on board, and laid athwart, ready for bending, as the fore-courſe. Sheet-blocks, tacks, and clue-garnet-blocks, are fitted in the clues as the fore-courſe.

Tacks, ſingle, 31, (*Plate* IV. *fig.* 2.) reeve through the ſheave-hole in the cheſtree, on each ſide, and lead on board through a ſheave-hole in the ſide, and belay round a range-cleat in the waiſt.

Tacks, double, 32, (*Plate* IV. *fig.* 2.) The ſtanding-part clinches to an eye-bolt before the cheſtree, and the leading-part reeves through a ſingle block laſhed to the clue of the ſail; then leads in upon deck, through the cheſtree and ſheave-hole in the ſide, and belays as the above.

Sheets, 33, (*Plate* IV. *fig.* 2.) reeve through the ſheet-block at the clues. The ſtanding-part is ſeized to an eye-bolt with a thimble on the quarters; the leading-part comes on board through a ſheave-hole in the ſide, and belays to a range-cleat in the waiſt. The preſent cuſtom is for the leading-part of the ſheets to reeve through a block laſhed to the eye of an iron ſtay, projecting from the ſide, called a *ſpider,* and comes in upon deck through a port that has a roller fitted vertically at its aftſide.

Yard-ropes and *bending,* as the fore-courſe.

Earings, rope-bands, points, gaſkets, and *clue-garnets,* as the fore-courſe.

Bow-lines, 34, (*Plate* IV. *fig.* 2.) reeve through a double block, laſhed round the fore-maſt five feet above the fore-caſtle, and the outer part reeves upon the long leg with a thimble. The lower bridle is the longeſt, and clinches to the lower cringle on the ſail. In the other end is ſpliced a thimble, through which reeves the upper leg, that clinches to the upper cringle. The ſtarboard bow-line belays on the larboard, and the larboard bow-line leads over and belays on the ſtarboard ſide. Four feet from the bridle on each bow-line is ſpliced a thimble, and pointed over, called a *lizard,* to which is hooked a bow-line tackle that makes faſt to the bitts, and is bowſed upon until the bow-line can be made faſt to the bitts.

Leech-lines, 35, (*Plate* IV. *fig.* 2.) reeve through the block upon the yard, and the outer end makes faſt with a clinch to the upper bow-line bridle. The leading-part reeves through a double block at the fore part of the top, and another at the aft part of the top. A ſingle block is turned into the lower end, and a whip-fall reeved through it. The ſtanding-part makes faſt to an eye-bolt in the deck; and the leading-part reeves through a block under the croſs-piece of the bitts, near the maſt.

Bunt-lines, 36, reeve as the fore-courſe, and lead forward upon the forecaſtle.

Slab-lines, 37, *ſpilling-lines,* 38, and *life-lines,* 39, (*Plate* IV. *fig.* 2.) as the fore-courſe.

Rigging and Bending the Mizen-Courſe, 9, *Plate* IV. *fig.* 2.

Earing reeves, with an eye in one end, through the cringle in the peek of the ſail, and makes faſt round the peek as the earings above.

The nock-earings the ſame as the peek.

Lacing is ſpliced to the peek-earing-cringle, and laces round the yard or gaff, through the eye-let holes in the head of the ſail, and makes faſt to the nock-earing-cringle. Lacing round the maſt is ſpliced to the nock-cringle, and round the fore-ſide of the maſt, backwards and forwards, and through each cringle on the fore-leech of the ſail, making faſt to the tack at the lower end.

Tack ſets up with a laniard reeved through the tack-cringle in the foot of the ſail, and through an eye-bolt in the deck.

Sheet reeves through a block on the horſe, at the fore part of the taffrail; then through the block that hooks to the thimble, in the clue of the ſail; again through the block on the horſe, and belays to a cleat on the ſide.

Brails, 41, (*Plate* IV. *fig.* 2.) throat, middle, and peek, reeve through their reſpective blocks on the yard or gaff, and make faſt to cringles on the after-leech of the ſail on each ſide. The throat-brails lead down by the maſt, and the middle brails lead down to the after-mizen-ſhroud on each ſide, and the peek-brails to a cleat on each quarter.

Fancy-line, 42, (*Plate* IV. *fig.* 2.) has two ſpans, with a thimble ſeized in the bight, and a thimble ſeized in each end; one thimble reeves upon the throat-brail, the other on the middle brail, on each ſide the ſail. The fancy-line reeves through blocks laſhed at the peek end, and each end bends to the thimble in the bight of the ſpan on each ſide. When the mizen is ſet, the brails are hauled up by the fancy-line, that they may be ſlack, and not girt the lee-ſide of the ſail.

Rigging and Bending the Topſails.

The *fore-topſail*, 6, (*Plate* IV. *fig.* 2.) is ſwayed up into the top by the topſail-haliards, that make faſt to ſlings round the middle of the ſail, and then laid in the fore part of the top fair for bending.

Sheets, 44, (*Plate* IV. *fig.* 2.) are paſſed through the fore part of the clue of the ſail, and ſtopt with an overhand-knot. They reeve through the ſhoulder-block at the lower yard, then through the quarter-block, and come down before the maſt; reeve through the ſheave-holes in the bitts, and there belay.

Clue-lines, 45, (*Plate* IV. *fig.* 2.) The ſtraps of the blocks are paſſed through the clues of the ſail, and brought round the clue to the fore part, and ſecurely ſeized. The clue-lines are paſſed the ſame as the clue-garnets of the courſes, and ſometimes have no block, but bend to the clue of the ſail.

Bow-lines, 46, (*Plate* IV. *fig.* 2.) reeve through the blocks at the bowſprit-cap. The outer part reeves on the lower bow-line bridle with a thimble, as the main-courſe. The leading-part comes in upon the forecaſtle, and belays to the topſail-ſheet-bitts.

Bunt-lines, 47, (*Plate* IV. *fig.* 2.) reeve through the block upon the yard, lead down on the fore-ſide of the ſail, and clinch to the cringles in the foot-rope. The leading-part reeves through a ſingle block, laſhed cloſe under the topmaſt croſs-trees, leads down through the ſquare hole in the top, and belays to the ſhrouds.

Reef-tackle-pendants, 48, (*Plate* IV. *fig.* 2.) reeve through the upper ſheave in the ſiſter-block in the topmaſt-ſhrouds, then through the ſheave-hole in the yard-arm, and clinch to the reef-cringle in the leech-rope of the ſail.

Reef-earings reeve through their bights in each reef-cringle, and are ſtopt to the next cringles and the head of the ſail, till uſed.

Spilling-lines have two legs, which are each made faſt with a timber-hitch round the quarters of the topſail-yard, then lead down on the aftſide, return upwards under the foot of the ſail, and reeve through a block on the fore-ſide, laſhed to the tye-block on the yard, then lead down upon deck abaft the maſt.

Life-lines, *earings*, *rope-bands*, and *points*, as the fore-courſe.

Gaſkets.—The yard-arm gaſket reeves with an eye round the yard-arm, within the cleats. Quarter-gaſkets reeve as the above, between the yard-arm and ſlings. Bunt-gaſkets have two legs, and laſh to the yard with an eye on each ſide the tye-block, and faſten thereto, when the ſail is hauled up in the bunt.

The Main-topsail, 2, (*Plate* IV. *fig.* 2.) is ſwayed up into the top, as the fore-topſail.

Sheets, 51, *clue-lines*, 52, *bunt-lines*, 53, *reef-tackle pendants*, 54, *earings*, *rope-bands*, *points*, and *gaſkets*, as the fore-topſail.

Bow-lines reeve through blocks laſhed round the fore-maſt-head, cloſe under the cap; the outer part reeves on the lower bowline-bridle with a thimble, as the fore-topſail. The leading-part comes down through the ſquare hole of the cap, reeves through a ſheave-hole in the bitts upon the forecaſtle, and there belays.

The Mizen-topsail, 10, (*Plate* IV. *fig.* 2.) in large ſhips, is ſwayed as the foregoing.

Sheets, 56, *clue-lines*, 57, *bunt-lines*, 58, *reef-tackle pendants*, 59, *earings*, *rope-bands*, *points*, and *gaſkets*, as the fore-topſail.

Bow-lines, 60, (*Plate* IV. *fig.* 2.) bend to the ſail as the fore-topſail, and reeve through a ſingle block, ſeized to the main-ſhrouds on the oppoſite ſide near the futtock-ſtaff; then lead down through a ſeizing-truck to the quarter-deck, and belay to the rack at the ſhrouds.

Rigging and Bending the Top-gallant Sails.

The Fore-top-gallant-sail, 7, (*Plate* IV. *fig.* 2.) is either ſwayed up to the topmaſt croſs-trees by the clue-lines, or bent to the yard upon deck. It is hauled out to the yard-arm by earings, and bends or laces to the yard, as before obſerved.

Sheets, 62, and *clue-lines*, 63, are bent to the clues of the ſail, and lead down upon deck, as the fore-topſail.

Bunt-lines, 64, reeve through a ſmall block, ſeized to the top-gallant-maſt-head; then through a thimble ſeized to the tye, cloſe down upon the yard, and bend, with legs, to cringles in the foot of the ſail. The leading-part comes down into the top.

Bow-lines, 65, (*Plate* IV. *fig.* 2.) reeve through the thimbles at the jib-boom-end, and faſten to the ſail as the topſail, only with a toggle, to caſt off the bow-line readily for ſending the yard down. The leading-part comes down the forecaſtle, and belays to a pin in the hook over the bowſprit.

The jack-block is ſtrapped with a ſeizing-eye, through which reeves a ſhort piece of rope, with an eye ſpliced in one end, and a double walnut-knot made at the end, called a button and loop, which encircles the maſt, by thruſting the knot through the eye, and is triced up and down the maſt by the top-gallant-tye, which bends through the eye

of

of the ſtrap. It is uſed for ſending the top-gallant-yards up or down. When the yard is ſwayed up, the top-rope reeves through the jack-block, and makes faſt with a hitch round the yard in the ſlings, then ſtopt at the outer quarter to the eye-bolt in the yard-arm. When lowered, the ſame, except the ſtop at the eye-bolt. The rigging is taken off or put on by the men at the maſt-head, when the yards are ſwayed up or lowered down.

The MAIN-TOP-GALLANT-SAIL, 3, (*Plate* IV. *fig.* 2.) rigs and bends as the former. Bow-lines, 67, reeve through the ſheave-holes in the after-ends of the fore-topmaſt croſs-trees, and lead down upon deck. *Sheets*, 68, *clue-lines*, 69, *bunt-lines*, 70, *Plate* II. *fig.* 2.

The MIZEN-TOP-GALLANT-SAIL, 11, rigs and bends as the former. Bow-lines, 72, reeve through the ſheave-holes in the after-end of the main-topmaſt croſs-trees.

Rigging and Bending the Royals.

Royals, fore, 8, main, 4, and mizen, 12, (*Plate* IV. *fig.* 2.) are ſet flying; the clues laſhed to the top-gallant yard-arms.

When royal maſts are uſed, the royals rig ſimilar to top-gallant ſails.

Rigging and Bending the Jib and Stayſails.

Jib, 7, (*Plate* IV. *fig.* 1.) bends to its ſtay with hank and ſeizings.

Stay, 57, reeves through the upper ſheave of the cheek-block at the fore-topmaſt-head, from aft on the ſtarboard ſide, then through the hanks, and clinches to the traveller on the boom; a double block is then turned in the lower end, and its fall reeves through it; and a ſingle block, laſhed to the after-end of the fore-maſt treſtle-trees, leads down upon deck, and belays to the bitts abaft the fore-maſt.

Haliards, 58, reeve through the lower ſheave of the cheek-block at the fore-topmaſt-head, from aft on the ſtarboard ſide, and bend to the head of the ſail. The leading-part leads abaft the top to the aft part of the forecaſtle. Large ſhips have a ſingle block turned into the lower end of the haliards, and a whip-fall; the ſtanding-part makes faſt into the ſide.

Sheets, 59.—The bight is bent to the clue of the ſail, and a ſingle block turned in each inner end, that reeves a whip-fall. The ſtanding-part makes into the ſide, and the leading-part leads in upon the forecaſtle, and belays to a timber-head, or a cleat before the ſhrouds on each ſide.

Downhauler, 60, reeves through a ſmall block laſhed to the traveller, then leads upwards through the hanks, and bends to the head of the jib. The leading-part leads in upon the forecaſtle.

Outhauler reeves through a ſheave-hole at the outer end of the jib-boom, and clinches to the ſpan-ſhackle of the traveller. The inner end has a double block turned in, which reeves with its fall to a ſingle block, hooked to an eye-bolt in the fore part of the bowſprit-cap, and the fall leads in on the forecaſtle.

Inhauler reeves through a ſmall block laſhed on the traveller. The ſtanding-part makes faſt to an eye-bolt in the ſide of the bowſprit-cap, and the leading-part comes in upon the forecaſtle.

The FORE-TOPMAST-STAYSAIL, 6, (*Plate* IV. *fig.* 2.) bends to its ſtay with hanks and ſeizings. *Stay*, 62, reeves through the hanks, then makes faſt with a running-eye round the bowſprit, between the collars and the ſpritſail-yard; then reeves through the upper ſheave of the cheek-block, at the fore-topmaſt-head, on the larboard ſide; the lower end has a double block turned in, and reeves with its fall to a ſingle block laſhed at the after-end of the fore-maſt treſtle-trees, leads upon deck, and belays to the bitts abaft the fore-maſt.

Haliards, 63, reeve through the lower ſheave of the cheek-block at the fore-topmaſt-head, on the larboard ſide, and bend to the head of the ſail. The leading-part leads down abaft the top to the after-part of the forecaſtle, and belays to a cleat in the ſide.

Sheets, 64.—The bight is bent to the clue of the ſail, and leads through a ſingle block, laſhed to an eye-bolt on each ſide of the forecaſtle.

Downhauler, 65, reeves through a ſmall block that laſhes at the tack of the ſail, then leads up through the hanks, and bends to the head of the ſail; and the leading-part comes in upon the forecaſtle.

Outhauler reeves through a block laſhed at the outer end of the bowſprit; the ſtanding-part makes faſt to the tack of the ſail, and the leading-part comes in upon the forecaſtle.

FORE-STAYSAIL, 5, (*Plate* IV. *fig.* 1.) bends to the preventer-ſtay with hanks and ſeizings.

Haliards, 67, reeve through a ſingle block bent to the head of the ſail. The ſtanding-part makes faſt round the head of the fore-maſt; and the leading-part reeves through a block laſhed to the rigging under the top, and leads down abaft the maſt.

Sheets, 68, are doubled, and the bight put through the clue of the ſail; and a ſingle block ſpliced in each end. The ſtanding-part of the fall is made faſt round a timber-head on the forecaſtle or eye-bolt, and the leading-part comes in through a block made faſt to the ſaid eye-bolt.

Tack, 69, bends to the tack of the ſail, and laſhes the tack of the ſail to the ſtay near the heart.

Downhauler, 70, reeves up through the hanks, bends to the head of the ſail, and leads in upon the forecaſtle through a ſingle block laſhed near the tack.

MAIN-STAYSAIL, 1, (*Plate* IV. *fig.* 1.) is ſeldom bent in ſhips but at ſea, though commonly in brigs. It bends to the main-ſtayſail ſtay with hanks and ſeizings.

Stay, 72, has its upper end clinched round the main-maſt-head above the rigging, and the lower end ſet up with a luff-tackle round the foremaſt.

Haliards, 73, reeve through a ſingle block laſhed to the head of the ſail. The ſtanding-part makes faſt at the main-maſt-head, and the leading-part reeves through a block laſhed to the rigging under the top, and leads down abaft the maſt: a double block is turned in to the end, and connected, by its fall, to a ſingle block, hooked to an eye-bolt in the ſide abaft the maſt.

Sheets, 74, are doubled, the bight is put through the clue of the ſail, and the ends through the bight. A block is ſpliced into each end, and the ſtanding-part of each fall makes faſt on its reſpective ſide at the fore part of the quarter-deck, and the leading-part through a ſnatch-block. Sometimes a luff-tackle is clapt on to bowſe the ſheets aft.

Tacks, 75, bend to the tack of the ſail, and laſh the tack of the ſail to the foremaſt, or the bitts abaft it.

Downhauler, 76, reeves up through the hanks, bends to the head of the ſail, and belays to the main-top bow-line bitts.

MAIN-TOPMAST-STAYSAIL, 2, (*Plate* IV. *fig.* 1.) bends to the main-topmaſt preventer-ſtay with hanks and ſeizings.

Haliards, 78, reeve from the aftſide through the cheek-block at the main-topmaſt-head on the larboard ſide, come

down

down and bend to the head of the ſail. The leading-part reeves through a block in the ſide.

Sheets, 79, are doubled, the bight is put through the clue of the ſail, and the ends through the bight. A block is ſpliced in each end, and the ſtanding-part of each fall makes faſt on its reſpective ſide to the boat-ſkid beam next before the quarter-deck, and the leading-parts reeve through a block on the gunwale abaft the gangway, and belays to a pin in the boat-ſkid beam.

Tacks, 80, are doubled, the bight is put through the tack of the ſail, and the ends reeve through the bight, and lead through a thimble ſeized to the lower ſhrouds on each ſide; they lead down and belay to a ſhroud-cleat.

Brails, 81, reeve through blocks laſhed to the ſtrap of the main-bowline-block, and through blocks ſeized to the topmaſt preventer-ſtay, at the cat-harpins on each ſide, and then make faſt on each ſide the ſail to a cringle on the after-leech.

Sheets, 82, are doubled, the bight is put through the clue of the ſail, and the ends through the bight. A block is ſpliced in each end, and the ſtanding-part of each fall is made faſt on its reſpective ſide to the boat-ſkid beam next the quarter-deck, and the leading-part reeves through a block on the gunwale on each ſide abaft the gangway.

Tacks, 83, are doubled, the bight is put through the tack of the ſail, and the ends through the bight, and lead through a thimble ſeized on the lower ſhrouds on each ſide; they then lead down and belay to one of the ſhroud-cleats.

MIDDLE-STAYSAIL, 3, (*Plate* IV. *fig.* 1.) bends to the middle-ſtayſail-ſtay with hanks and ſeizings.

Stay, 85. The ſtanding-part reeves through the hanks, and makes faſt to a thimble ſeized in a ſtrap or grommet made faſt round the fore-topmaſt-head, below the parral. The leading-part reeves through the upper ſheave-hole at the main-topmaſt-head: a double block is then turned into the end, and connects by its fall with a ſingle block, that laſhes to the main-treſtle-trees, and the fall by which it is ſet up leads upon deck abaft the maſt.

Haliards, 86, reeve through the lower ſheave of the cheek-block at the main-topmaſt-head, and bend to the head of the ſail; the other end leads upon deck abaft the maſt.

Sheets, 87, are doubled, the bight is put through the clue of the ſail, and the ends through the bight, and lead down through a block on each ſide near the gangway.

Tacks, 88, are doubled, the bight is put through the tack of the ſail, and the ends through the bight, and each end through a thimble ſeized in the fore-topmaſt-ſhrouds, and belays in the top.

Downhauler, 89, reeves through a ſingle block ſeized to the ſtay at the nock of the ſail, then leads up through the hanks, and bends to the head of the ſail, and the lower end comes down upon deck abaft the maſt.

Tricing-line clinches to the grommet round the fore-topmaſt, and reeves through a block under the fore-topmaſt-croſs-trees, and leads down into the top.

MAIN-TOP-GALLANT-STAYSAIL, 4, (*Plate* IV. *fig.* 1.) bends to the ſtay, or main-top-gallant-ſtay, in ſmall ſhips, with hanks and ſeizings.

Stay, 91. The upper end ſplices into the top-gallant-ſtay below the rigging, and the lower end reeves through a thimble ſeized to the fore-topmaſt-croſs-trees, leading down into the top.

Haliards, 92, reeve through a ſheave-hole above the hounds of the main-top-gallant-maſt, and bend to the head of the ſail; the leading-part comes down upon deck, and belays to the bitts abaft the main-maſt.

Sheets, 92, and *tacks*, 93, as the middle ſtayſail.

Downhauler, 94, reeves up through the hanks, and bends to the head of the ſail; and the leading-part comes upon deck abaft the fore-maſt.

MIZEN-STAYSAIL, 8, (*Plate* IV. *fig.* 1.) bends to the mizen-ſtayſail ſtay with hanks and ſeizings.

Stay, 96, hitches round the head of the mizen-maſt, then reeves through a thimble ſeized in a collar laſhed round the main-maſt, and ſets up with a laniard through a thimble turned in to the ſtay, and an eye-bolt in the deck abaft the maſt.

Haliards, 97, reeve through a block at the head of the ſail, the ſtanding-part makes faſt round the mizen-maſt-head, and the leading-part reeves through a block laſhed to the treſtle-trees, and through a block in the ſide at the deck.

Sheets, 98, bend to the clue of the ſail with a long and ſhort leg, having a thimble ſpliced in the latter. The long leg reeves through a block in the ſide, and through the thimble in the ſhort leg, and belays to the rack at the ſide.

Tack, 99, ſplices to the tack of the ſail, and laſhes it to an eye-bolt in the deck abaft the mizen-maſt.

Downhauler, 100, reeves through a block made faſt to the collar of the ſtay, then upwards through the hanks, and bends to the head of the ſail, and belays to the fore-brace bitts.

Brails, 101, reeve through blocks laſhed on each ſide the collar, then through thimbles in a ſtrap put through the ſail, and make faſt to a cringle on the after-leech. The leading-part belays a-breaſt of the quarter-deck.

MIZEN-TOPMAST-STAYSAIL, 9, (*Plate* IV. *fig.* 1.) bends to the mizen-topmaſt-ſtay with hanks and ſeizings.

Haliards, 103, reeve through the ſheave-hole in the top-maſt above the rigging, or through a block laſhed round the maſt-head; one end bends to the head of the ſail, the lower end leads down upon deck abaft the maſt.

Sheets, 104, are doubled, the bight put through the clue of the ſail, and the ends through the bight; then through a thimble ſeized in the mizen-ſhrouds on each ſide, and lead down and belay to a pin in the ſhroud-rack.

Tacks, 105, are doubled, the bight put through the tack of the ſail, and the ends through the bight, then through a thimble ſeized to the main-topmaſt-ſhrouds on each ſide, and lead down and belay in the top.

Downhauler, 106, reeves up through the hanks, and bends to the head of the ſail; the lower end leads down upon deck, and belays at the fore part of the quarter-deck.

MIZEN-TOP-GALLANT-STAYSAIL, 10, (*Plate* IV. *fig.* 1.) bends to the mizen-top-gallant-ſtay with hanks and ſeizings.

Haliard, 108, reeves through the ſheave-hole above its top-gallant-maſt hounds; one end bends to the head of the ſail, the lower end leads down upon deck abaft the maſt.

Sheets, 109, are doubled, the bight put through the clue of the ſail, and the ends through the bight, and lead down upon deck through a thimble ſeized in the mizen-ſhrouds, on each ſide near the cat-harpins, and belay to a pin in the ſhroud-rack.

Tacks, 110, bend to the tack of the ſail as the ſheets, and lead down into the top through a thimble ſeized in the main-topmaſt-ſhrouds on each ſide.

Downhauler, 111, reeves up through the hanks, and bends to the head of the ſail, the lower end comes into the main-top, and belays to the top-rail.

Rigging

Rigging and Bending the Studding-Sails.

Studding-ſails bend their yards at the head with rope-bands, the ſame as other ſquare ſails.

Lower ſtudding-ſails, main, 15, (*Plate* IV. *fig.* 2.) *Outer haliards,* 61, reeve through a ſpan-block hitched round the lower cap, and through a block at the lower yard-arm or boom-iron, and bend between the cleats of the ſtudding-ſail-yard; the other end leads down upon deck.

Inner haliards, 62, bend to the upper inner cringle on the head of the ſail, then reeve through a tail-block made faſt round the quarter of the lower yard, then through another block made faſt round the yard near the maſt, and lead down upon deck.

Sheets, 63, are doubled, the bight is put over, and the ends through the inner clue on the foot of the ſail; one leads forward, and the other aft.

Fore-ſtudding-ſail, 18, (*Plate* IV. *fig.* 2.) ſets flying, or with a boom at the foot. If flying, the foot of the ſail ſpreads on a yard, that rigs with a ſpan clinched round each yard-arm. A guy is bent to an eye that is croſſed in the middle of the ſpan, and leads aft through a block laſhed to the main-chains, leads in through a port, and belays round a cleat in the waiſt. The ſail thus rigged has no tacks. Booms rig as follow: the hook in the inner end hooks to an eye-bolt between the fore-chains and cat-head, and the hook of the main-ſtudding-ſail-boom in an eye of an iron ſtrap on the fore part of the main channel; the end is confined down with a laſhing to the chain-plates; the inner end of the fore-boom is confined down with a tackle, made faſt round the inner end of the boom, and the lower block is hooked to an eye-bolt in the wale; the guy clinches round the middle of the boom, reeves through a block laſhed round the ſpritſail-yard, and leads in upon the forecaſtle.

Topmast-studding-sails, *Main,* 16, *Fore,* 19, (*Pl.* IV. *fig.* 2.) *Haliards,* 90, 91, reeve through a block in the ſpan round the topmaſt-head, under the cap, and through the jewel-block, at the outer end of the top-ſail-yard-arm, and bend to the topmaſt-ſtudding-ſail-yard; the other end leads down upon deck, and belays to the bitts next the maſt.

Sheets are doubled, the bight is put through the inner clue, and the ends through the bight. The after-ſheet, 92, of the fore-topmaſt-ſtudding-ſail leads in abaft the fore-ſhrouds, and the fore-ſheet, 93, leads in upon the forecaſtle. The after-ſheet, 94, of the main-topmaſt-ſtudding-ſail leads down to the quarter-deck, and the fore-ſheet, 95, upon the gangway.

Tacks, 73, bend to the outer clue of the ſail, reeve through a block laſhed to the outer end of the boom, and lead aft through a block at the gangway. Tack, 74, of the main-topmaſt-ſtudding-ſail leads in upon the after-part of the quarter-deck through a block laſhed upon the quarter.

Downhauler, 75, reeves through a block laſhed to the outer clue of the ſail, and through a thimble on the outer leech: it is then made faſt to the topmaſt-ſtudding-ſail-yard, juſt within the earing, and leads into the waiſt.

The Booms, 76, 77, are run out by the tackles. The ſtrap of the double-block makes faſt through a hole in the heel of the boom, and the outer block to the boom-iron, and the fall leads along the yard. On the middle of the boom is faſtened a ſelvagee, or a ſtrap with a thimble, to which is hooked the top-burton-tackle, to ſupport the boom in the middle.

Top-gallant-studding-sails; fore, 20, main, 17, (*Plate* IV. *fig.* 2.) *Haliard* reeves through a block ſeized round the head of the top-gallant-maſt, above the hounds or rigging, then through the jewel-block, ſtrapt with a thimble through an eye-bolt at the ends of the top-gallant-yards, and bends to the top-gallant-ſtudding-ſail-yard; the other end leads down the maſt into the top.

Sheets, 80, are doubled, the bight is put through the lower inner clue of the ſail, and the ends through the bight; one end leads forward, and makes faſt to the quarter of the topſail-yard, and the other end leads into the top, and belays to the topmaſt-ſhrouds.

Tacks, 81, bend to the outer clue of the ſail, and reeve through a thimble in a ſtrap round the outer end of the top-maſt-ſtudding-ſail-boom; and in merchant ſhips that have no boom, through a thimble in a ſtrap round the outer yard-arm of the topmaſt-ſtudding-ſail. The fore-top-gallant-ſtudding-ſail-tack leads aft to the main-chains, and the main leads to the quarter-piece.

Downhauler, 82, makes faſt to the outer yard-arm within the earing, and leads down into the top.

Rigging and Bending the Spritſail-Courſe.

The ſpritſail-courſe, 13, (*Plate* IV. *fig.* 2.) bends to its yard as the fore-courſe.

Sheets, double, 84, reeve through a block ſeized to the clue of the ſail; the ſtanding-part clinches to an eye-bolt in the bow, and the leading-part comes in on the forecaſtle.

Sheets, ſingle, bend to the clue of the ſail, and lead in-board.

Clue-lines, 85, reeve through the blocks upon the yard, and bend or reeve through a block at the clue of the ſail, and lead in upon the forecaſtle.

Bunt-lines, double, 86, reeve through the block on the yard, and clinch to the cringles at the foot of the ſail, and lead in upon the forecaſtle.

Bunt-lines, ſingle, reeve through a block in the ſlings of the yard, and clinch with legs to the cringles in the foot of the ſail, and lead in upon the forecaſtle.

Rigging and Bending the Spritſail-Topſail.

The ſpritſail-topſail, 14, (*Plate* IV. *fig.* 2.) bends to the yard with lacing and earings.

Sheets, 88, reeve through the ſheet-block at the ſpritſail-yard-arm, and hook to the clue of the ſail, and lead in upon the forecaſtle, through a block laſhed on each ſide of the bowſprit.

Clue-lines, 89, the ſame as the ſpritſail.

Rigging and Bending the Driver or Spanker-ſail, 11, *Plate* IV. *fig.* 1.

This ſail is only uſed occaſionally, and is bent or hoiſted in a temporary manner, thus; it is made faſt at the peek, 113, and nock, 114, with an earing, as the mizen, and makes faſt to the yard and gaff with four or five pairs of haliards, that reeve through blocks made faſt with tails round the yard and gaff, one end of the haliard being bent to the head of the ſail. The throat-haliards, 115, reeve with a double and ſingle block: the former is made faſt round the maſt-head, and the latter hooks to the nock-cringle on the ſail.

Sheet, 116, reeves through a block or ſheave-hole at the outer end of the boom, and bends to the clue of the ſail; a luff-tackle is cat's-pawed to the other end of the ſheet; the inner block hooks to the taffarel, and the fall leads in upon the quarter-deck. When this ſail is bent to the maſt, yard, or gaff, inſtead of the mizen, it bends exactly the ſame, only the foot of the ſail is extended on the boom, as above.

Tack,

Tack, 117, is ſet tight with a luff-tackle, that hooks to the cringle in the tack of the ſail, and to an eye-bolt in the throat of the boom.

Downhauler, 118, reeves through a block made faſt to the middle of the driver-yard, and leads down to the taffarel.

Rigging of Snows, Brigs, &c.

A *Snow* has her ſails and rigging on the fore and main-maſt, ſimilar to thoſe on the ſame maſt in a ſhip. The braces of the yards on the main-maſt lead forward. The tryſail abaft the main-maſt bends to the tryſail-maſt, ſimilar to the mizen of a ſhip.

Veſſels in the navy reſembling ſnows have a rope-horſe, that ſets up abaft the main-maſt, with dead-eyes and a laniard, to an eye-bolt in the deck, to which the tryſail is bent by hanks and ſeizings, ſimilar to the tryſail of a ſnow.

Brigs.—The rigging of a brig differs little from the fore and main-maſt of a ſhip; the braces of yards on the main-maſt lead forward. The after-main-ſhroud is ſerved from the maſt-head to the dead-eye, to prevent its being chafed by the main-boom and gaff. The after-backſtay is fitted with a tackle, that it may be ſlackened when the main-ſail jibes, or is bowſed forward by the boom-pendant and tackle.

Boom-topping-lift is taken up on the ſtarboard ſide, and reeved through an iron-bound block, hooked to the upper eye-bolt on the aftſide of the main-maſt-head, then leads down and reeves through a block at the after-end of the boom. The ſtanding-part clinches round the maſt-head, or hooks to an eye-bolt near the block; the leading-part comes down and has a double block ſpliced or turned in, that connects by its fall to a ſingle block that hooks to an eye-bolt in the after-part of the channel. Sometimes it has the addition of a runner.

Main-ſheet reeves through a double block, ſtrapped round the boom within the taffarel, and through another double block, ſtrapped round the horſe inſide the taffarel, and belays to a large cleat, or the pin in the ſheet-block of ſmall veſſels. Large veſſels ſometimes have a treble block on the horſe.

Tack-tackle has the double block faſtened to the tack of the ſail, and connects with its fall to a ſingle block hooked to an eye-bolt in the deck.

Guy-pendants have a hook and thimble, that hook in a thimble of a ſtrap on the boom, juſt without the main-ſheet-block. In the inner end of the pendant, is a thimble or long-eye ſpliced, to which is hooked a luff-tackle, which is hooked to an eye-bolt in the ſide before the maſt, and the fall leads in-board.

Gaff-topping-lift rigs ſimilar to the boom above, only it has a ſpan upon the gaff, and the block at the maſt-head hooks to the eye-bolt, next below the boom-topping-lift; and the

Haliard connects it to an eye-bolt in the deck or ſide, the ſame as the boom.

Inner tye is ſimilar to the above, and hooks to an eye-bolt in the jaws of the gaff, then reeves through an iron-bound block, that hooks to an eye-bolt in the maſt-head below the above. It has a double block ſpliced or turned in to the lower end, and ſets up by the haliards, the lower block hooking to an eye-bolt on the oppoſite ſide to the tye above.

Peek-downhauler reeves through a ſmall block, ſtrapped with a thimble to the eye-bolt at the outer end of the gaff, and belays round a cleat under the boom.

Throat-downhauler reeves through a block at the nock of the ſail, and leads down the aftſide of the maſt.

Main-sail bends at the head to the gaff with lacing and earings, and is ſeized to the hoops round the maſt, through the holes in the fore-leech.

Throat-downhauler.—The double block hooks to an eye-bolt under the throat of the gaff, that connects by its fall to a ſingle block hooked to the thimble, ſeized in the bight of a ſtrap round the maſt under the boom ſaddle.

Sheet-rope ſplices in the clue of the ſail, and reeves through a ſheave-hole in the boom; and a thimble is turned in to the inner end, to which hooks the ſheet or luff-tackle, and the inner block to a ſtrap round the boom near the jaws. When the ſail is hove out, it is laſhed with an earing through the clue, and an eye-bolt in the boom-end.

Tricing-line reeves through a ſmall block made faſt to an eye-bolt in the throat of the gaff; one end ſplices to the tack of the ſail, the other end leads down upon deck, and belays to a cleat on the maſt.

Rigging of Cutters or Veſſels with one Maſt.

The different articles before the maſt rig ſimilar to ſhips, and the ſhrouds, boom, &c. as the brigs.

Gaff-topsail laces to a ſmall gaff at the head.

Haliards reeve through a ſheave-hole at the top-gallant-maſt-head, and bend to the inner quarter of the gaff; the leading-part comes down upon deck.

Topping-lift reeves through a ſheave-hole, or ſmall block, ſeized to the top-gallant-head, then through a thimble or ſmall block ſeized at the outer end of the gaff; the ſtanding-part clinches round the top-gallant-maſt-head above the ſheave-hole, and the leading-part comes down upon deck.

Sheet reeves through a thimble ſeized at the peek of the main-ſail, and bends to the clue of the ſail, and leads down upon deck.

Tack makes faſt to the tack of the ſail, a little above the rigging.

Saveall-topſail.—The clues laſh near the lift-block of the croſs-jack-yard.

Haliards bend to the earings of the ſail, and reeve through a block on each quarter of the topſail-yard, and lead down upon deck.

Ringtail-sail bends to a ſmall yard on the head, and is hoiſted by the peek-downhauler, abaft the main-ſail. The foot is expanded on a ſmall boom, or ſpar, laſhed to the outer end of the main-boom.

Water-sail bends on the head to a ſmall yard.

Haliards reeve through a ſmall block laſhed under the outer end of the main-boom, and make faſt to the middle of the yard, and the leading-part belays round a cleat on the taffarel.

Sheets make faſt to the clues of the ſail, and lead in over the quarters.

Mizen is ſet on a ſmall maſt over the ſtern. If a ſquare-ſail, it bends to a yard at the head, and is hoiſted by a *haliard* reeved through a ſheave-hole at its maſt-head, and is ſpread by *ſheets* at the foot. If a ſpritſail, its fore-leech bends to the maſt with grommets, and is ſpread or peeked with a ſprit, and the foot hauls aft by the ſheet to a ſmall boom.

Rigging, *Serving the.* See Rigging.

RIGHT, Rectum, in *Logic* and *Ethics*.

In this ſenſe the word ſtands oppoſed to *wrong*, *erroneous*, *falſe*, &c.

Right, in *Geometry*, ſomething that lies evenly, without inclining or bending one way or another.

Thus, a *right line* is that whoſe ſeveral points all tend the ſame way, or which lies evenly between its extremes.

In this sense, *right* signifies as much as *straight*, and stands opposed to *curved* or *crooked*.

Right *Angle*. See Angle.

In this sense, the word *right* stands opposed to *oblique*.

Right-*Angled* is understood of a figure, when its sides are at right angles, or stand perpendicularly one upon another.

This sometimes holds in all the angles of the figure, as in squares and rectangles; sometimes only in part, as in right-angled triangles.

Right *Cone*. See Cone.

Right-*Lined Angle*. See Angle.

Right *Sine*. See Sine. The word here stands contradistinguished to *versed*.

Right *Ascension*, in *Astronomy*. See Ascension.

Right *Ascension, Angle of*. See Angle.

Right *Ascension, Parallax of*. See Parallax.

Right *Descension*. See Descension.

Right *Descension, Parallax of*. See Parallax.

Right *Sphere* is that where the equator cuts the horizon at right angles: or, that in which the poles are in the horizon, and the equator is in the zenith.

Such is the position of the sphere with regard to those who live directly under the equator. The consequences of which position are, that they have no latitude, nor elevation of the pole. They can see nearly both poles of the world; all the stars rise, culminate, and set, with them; and the sun always rises and descends at right angles to their horizon, and makes their days and nights equal.

In a right sphere the horizon is a meridian; and, if the sphere be supposed to revolve, all the meridians successively become horizons, one after another.

Right *Circle*, in the *Stereographical Projection of the Sphere*, is a circle at right angles to the plane of projection, or that which passes through the eye. See Projection.

Right *Sailing* is when a voyage is performed on some one of the four cardinal points.

If a ship sail under the meridian, that is, on the north or south points, she varies not in longitude at all, but only changes the latitude, and that just so much as the number of degrees she has run.

If a ship sail under the equinoctial upon the very east or west points, she alters not her latitude at all, but only changes the longitude, and that just so much as the number of degrees she hath run.

If she sail directly east or west, under any parallel, she there also altereth not her latitude, but only the longitude; yet that not according to the number of degrees of the great circle she hath sailed in, as under the equinoctial, but more according as the parallel is remoter from the equinoctial towards the pole. For the less any parallel is, the greater is the difference of longitude.

Right, *Jus*, in *Law*, signifies not only a property, for which a writ of right lies, but also any title or claim, either by virtue of a condition, mortgage, or the like, for which no action is given by law, but only an entry.

Such are *jus proprietatis*, a right of property; *jus possessionis*, a right of possession; and *jus proprietatis et possessionis*, a right both of property and possession.

This last was formerly called *jus duplicatum*. As if a man be disseised of an acre of land, the disseisee has *jus proprietatis*; the disseisor hath *jus possessionis*; and, if the disseisee release to the disseisor, he hath *jus proprietatis et possessionis*. See Jus.

Right, *Hereditary*. See Hereditary.

Right, *Petition of*. See Petition.

Right, *Pretensed*. See Pretensed.

Right *of Reformation*. See Reformation.

Right, *Writ of*. See Writ and Recto.

Right *in Court*. See Rectus *in Curia*.

Right *Distillation*. See Distillation.

RIGHTING, in *Sea Language*, denotes the act of restoring a ship to her upright position, after she has been laid on a careen. This is generally the natural effect of casting loose the careening pullies, by which she had been drawn down. But it is sometimes necessary to apply mechanical powers to right the ship in such a situation; and the principal of these are the relieving tackles.

A ship is said also to right at sea, when she rises with her masts erected, after having been prest down on one side by the effort of her sails, or a heavy squall of wind. Falconer.

Righting, when expressed of the *helm*, implies the replacing it amidships, after it has been put over to the side in tacking or otherwise.

RIGHTS, *Bill of*, in *Law*, is a declaration, delivered by the lords and commons to the prince and princess of Orange, February, 13 1688; and afterwards enacted in parliament, when they became king and queen. This declaration sets forth, that king James II. did, by the assistance of divers evil counsellors, endeavour to subvert the laws and liberties of this kingdom, by exercising a power of dispensing with and suspending of laws; by levying money for the use of the crown, by pretence of prerogative, without consent of parliament; by prosecuting those who petitioned the king, and discouraging petitions; by raising and keeping a standing army, in time of peace; by violating the freedom of election of members to serve in parliament; by violent prosecutions in the court of king's bench; and causing partial and corrupt jurors to be returned on trials, excessive bail to be taken, excessive fines to be imposed, and cruel punishments inflicted; all which were declared to be illegal. And the declaration concludes in these remarkable words, "And they do claim, demand, and insist upon, all and singular the premises, as their undoubted rights and liberties." And the act of parliament itself (1 W. & M. stat. 2. cap. 2.) recognizes "all and singular the rights and liberties asserted and claimed in the said declaration to be the true, ancient, and indubitable rights of the people of this kingdom."

RIGIACUM, in *Ancient Geography*, a town of Belgic Gaul, and capital of the Attrebatii. Ptolemy.

RIGID Marble. See Marble.

RIGIDITY, among *Philosophers*, a brittle hardness; or that kind of hardness supposed to arise from the mutual indentation of the component particles within one another.

Rigidity is opposed to ductility, malleability, &c.

RIGLAND, in *Geography*, a town of Germany, in the margraviate of Anspach; 7 miles N. of Anspach.

RIGLET. See Reglet.

RIGNAC, in *Geography*, a town of France, in the department of the Aveyron, and chief place of a canton, in the district of Rodes; 12 miles W.N.W. of Rodes. The place contains 851, and the canton 7182 inhabitants, on a territory of $202\frac{1}{2}$ kiliometres, in 16 communes.

RIGNEY, a town of France, in the department of the Doubs; 10 miles N.E. of Besançon.

Rigney *le Seron*, a town of France, in the department of the Aube; 6 miles N.W. of Ervy. N. lat. 48° 12'. E. long. 3° 43'.

RIGNY, a town of France, in the department of the Indre and Loire; 6 miles N.N.E. of Chinon.

RIGO, a small island in the West Indies, near the N.W. coast of Porto Rico.

RIGODUNUM, in *Ancient Geography*, a town of Britain,

tain, in the country of the Brigantes, placed by Camden and Baxter at Ribchefter in Lancafhire; but Horfley prefers Manchefter or Warrington. See RIBCHESTER.

RIGOLL, or REGALS, a kind of mufical inftrument, confifting of feveral fticks bound together, only feparated by beads. It makes a tolerable harmony, being well ftruck with a ball at the end of a ftick.

Such is the account which Graffineau gives of this inftrument.

Skinner, upon the authority of an old Englifh dictionary, reprefents it as a clavichord, or clarichord; poffibly founding his opinion on the nature of the office of the tuner of the regals, who ftill fubfifts in the eftablifhment of the king's chapel at St. James's, and whofe bufinefs is to keep the organ of the chapel royal in tune; and not knowing that fuch wind inftruments as the organ need frequent tuning, as well as the clavichord and other ftringed inftruments.

Sir Henry Spelman derives the word *rigol* from the Italian *rigabello*, a mufical inftrument, anciently ufed in churches inftead of the organ.

Walther, in his defcription of the regal, makes it to be a reed-work in an organ, with metal and alfo wooden pipes, and bellows, adapted to it. And he adds, that the name of it is fuppofed to be owing to its having been prefented by the inventor to fome king.

From an account of the regal, ufed in Germany, and other parts of Europe, it appears to confift of pipes and keys on one fide, and the bellows and wind-cheft on the other.

We may add, that lord Bacon (Nat. Hift. cent. ii. § 102.) diftinguifhes between the regal and organ, in a manner which fhews them to be inftruments of the fame clafs. Upon the whole there is reafon to conclude, that the *regal*, or *rigol*, was a pneumatic, and not a ftringed inftrument.

Merfennus relates that the Flemings invented an inftrument, *les regales de bois*, confifting of feventeen cylindrical pieces of wood, decreafing gradually in length, fo as to produce a fucceffion of tones and femitones in the diatonic feries, which had keys, and was played on as a fpinnet; the hint of which, he fays, was taken from an inftrument in ufe among the Turks, confifting of twelve wooden cylinders, of different lengths, ftrung together, which, being fufpended, and ftruck with a ftick, having a ball at the end, produced mufic. Hawkins's Hift. Muf. vol. ii. p. 449. See REGAL.

RIGOMAGUS, in *Geography*, a town of Italy, in Liguria, at a fmall diftance N. of Afta.

RIGOR, in *Medicine*, a *fhivering*, or the flight convulfive *tremors*, attended by a fenfation of cold, which occur either from actual expofure to cold, or from that condition of the body which ufually precedes a paroxyfm of fever, or which, it fhould rather be faid, conftitutes one of the firft fymptoms of a febrile paroxyfm. (See FEVER.) There is often no abfolute diminution of the heat in the body, when this fenfation of cold, and even actual fhivering, with a difpofition to fit near a fire, or to be loaded with blankets, occur. It arifes, therefore, from fome peculiar affection of the brain and nervous fyftem, and not from actual deficiency of heat. This is farther proved by the circumftance, that a fimilar tremor, or *rigor*, is capable of being temporarily excited by certain impreffions upon the fenforium; as by certain fights, or even thoughts, that excite horror: whence, indeed, the word *horror* is applied by medical writers in nearly the fame fenfe with *rigor*.

Rigor, or chillinefs, precedes or commences the attack of almoft all febrile and inflammatory difeafes; whence the vulgar, miftaking the firft fymptom for the caufe, afcribe all thefe difeafes to the agency of *cold*, the operation of which they conceive to have been accomplifhed at the time when the *rigor* occurred. It takes place at the beginning of quinfey, pleurify, peripneumony, and all the organic inflammations; at the commencement of almoft all fevers; and at each fuch fucceffive paroxyfm or even exacerbation of intermittent, remittent, and hectic fevers: it conftitutes the moft ftriking feature, indeed, of the intermittent fever, which is hence called the *ague* by the common people, in contradiftinction from the *fever*, or hot fit, which enfues. The tremor and clattering of the teeth are often fo great, indeed, in the cold fit of an ague, as to fhake the bed and its furniture about the patient. It made even Cæfar tremble.

> " He had a fever when he was in Spain,
> And, when the fit was on him, I did mark
> How he did fhake: 'tis true, this god did fhake."
> Shakfpeare.

The rigor is a fymptom ftill more notorious in pathology, as having been the foundation of Dr. Cullen's whole theory of fever. That phyfician maintained, that the rigor, or *cold fit*, having been produced by the fedative influence of the common caufes of fever on the brain, became itfelf the caufe of the fucceeding *hot* and *fweating* ftages, by roufing the heart and arteries to greater actions, in order to throw back the load of blood into the extreme veffels, which had been driven to the centre by the conftriction of the latter, while the *rigor* lafted. The reader will find this doctrine ftated, and refuted, under the article FEVER, and the head *Cullenian Theory*. It is not difficult to fhew, refpecting this, as well as the vulgar opinion, that the *rigor*, like the heat, and the fweating, is one in the chain of *effects*, and not a *caufe* of the phenomena which enfue. But it would be equally difficult to explain the immediate caufe of any of them.

RIGOSA, in *Geography*, a town of Italy, in the department of the Serio; 3 miles N.N.W. of Bergamo.

RIGOURISTS, in *Ecclefiaftical Hiftory*. See JANSENISM.

RIGUSA, in *Ancient Geography*, a town of Spain, in the Tarragonenfis, belonging to the Carpetani. Ptolemy.

RIK, in *Geography*, a town of Perfia, in the province of Irak; 12 miles N. of Ifpahan.

RIKEBACH, a town of Germany, in the county of Bregentz; 7 miles S.S.E. of Bregentz.

RIKIKES, a town of Thibet; 35 miles S. of Deuprag.

RIL, a town of Africa, in Darfur; 60 miles S.S.E. of Cobbé.

RILANDA, a town of Sweden, in the province of Upland; 28 miles N.E. of Stockholm.

RILEY, JOHN, in *Biography*, a portrait painter, and the beft which England had produced prior to fir Jofhua Reynolds. He was born in London in 1646. After the death of Lely he obtained very confiderable efteem and employment. He painted the portraits of king Charles II., James II. and his queen, and was appointed by James ftate-painter. His ftyle is compofed from Vandyke and Lely, and his execution is free and mafterly, and bears an air of originality. He died in 1691, at the age of 45.

RILL, or RIVULET. See RIVER.

RILL, in *Agriculture*, a fmall runlet of water, moftly rifing on the fides of fmall hills or declivities. In many fituations they may be converted to ufeful purpofes in hufbandry, fuch as the irrigation of pafture or meadow lands that lie below their levels; the fupplying of grafs grounds with water, for the purpofes of live-ftock; and the affording it to towns and villages, in dry or other ſituations where it is ſcarce. See IRRIGATION, WATERING *of Land*, and the following article.

RILLS, *Artificial*, ſuch as have been formed or made by means of art. It has been remarked, that the practice of conſtructing rivulets of this ſort for ſupplying water is peculiar to a few diſtricts of this country, as Yorkſhire and weſt Devonſhire, in the latter of which they have been made uſe of time immemorial in bringing what, in the ſimple language of the diſtrict, is termed "pot-water" to the farm-houſes, and the hamlets of cottages in upland ſituations; an excellent expedient, which is ſuppoſed applicable in many other parts of the iſland, but which, except in the caſe of Yorkſhire, has hitherto been confined to that extreme part of the country.

And in forming theſe ſorts of rills in their original diſtrict, it is obſerved by Mr. Marſhall, that one which ſupplies the houſe with water, alſo a drinking-pool near the yard, and in the natural courſe of it conveying it through a ſtraw yard, a trough is placed acroſs it for the uſe of the yard cattle; and which has, likewiſe, been for a vaſt length of time led over ſome graſs land, which lies below the yards, on the principle of the float and drain. But that although this rill is ſeldom, if ever, dried up, leading it along the ſides of the valley, through upland incloſures, which are deſtitute of water for ſtock, and their value of courſe thereby much depreciated, does not appear to have been thought of. In the courſe of the ſummer of 1792, being deſirous to know if this rill could be carried through an intended ſuite of yards on the ſide of the valley, he took the level, and found not only that object to be attainable, but alſo that it might be led with eaſe into two waterleſs fields which lie above theſe yards; and, through them, into four or five more (equally in want of water for ſtock) ſituated beyond them. It is added that, in aſcertaining theſe facts, he made uſe of a maſon's long level inverted, a plummet-hole being previouſly cut in the head of the ſtandard; the crown of which being ſet upon the ground, the arms of the level were ſteadied by rods in the horizontal poſition; and a carpenter's rule held acroſs another rod, ſet up, at as great a diſtance as a clear ſight would admit of, and at a height upon the ſtaff equal to the height of the level. Finding this a moſt ſimple and perfect inſtrument, but difficult to adjuſt, by reaſon of its inſtability, he has ſince had a *frame-level* made on the ſame principle; namely, with a ſtraight edge, or top rail, anſwering to the baſe-board of the long level, with a broad piece falling down from the middle of it, anſwering to the ſtandard; and with two end-pieces or legs, to ſuperſede the uſe of the rods, together with a bottom rail, eight or nine inches from the ground, and with diagonal braces to keep the whole firm, and prevent the middle or plumb-line from getting out of the ſquare with the ſtraight edge of the top rail; which is ſeven or eight feet long, and the height about four feet. He thinks that half a rod long, and a quarter of a rod high, are eligible dimenſions when great accuracy is required. But a ſhorter length, as one-third of a rod, is more handy. And, as an improvement of the rule and rod, he has contrived a *croſs-ſtaff*; namely, a ſlip of thin deal, about five feet and a half long, with a croſs-piece about two feet long and three inches wide, fixed in the edge of it, at the exact height of the level; the top of the ſtaff riſing twelve or eighteen inches above the upper edge of the croſs-piece, that the hand of the perſon who holds it up may not interfere with the view. This croſs-piece ſhould be of white wood, as deal, or be painted white, that it may be more diſtinctly ſeen at a diſtance. With this implement the flowing level may be well aſcertained.

And it is obſerved that, in order to aſcertain the proper fall of a rill of this intention, he previouſly took the running level of the ancient floating *leat* of the meadow, and finding its fall irregular, he took it in two places where the variations were greateſt. In the firſt, the fall was twenty-ſeven inches in one hundred and ten feet; which is nearly one inch, or one foot of fall to fifty inches, or fifty feet, in length. In this part the current is in a degree rapid; the fall much too great for the general intention. The fall in one hundred and ten feet of the other part is barely ſix inches; which is only one meaſure of perpendicular height to two hundred and twenty of horizontal length. But in this part the motion is too ſluggiſh; the ſurface of the water is nearly ſmooth; barely dimpling; no ripple or agitation appears. The fall is evidently too little for a water courſe, in which there is not a conſtant ſtream. He has therefore fixed upon one meaſure in a hundred, as the proper fall of a water-courſe, into which water is occaſionally thrown for the purpoſes of watering lands, filling drinking-pools, ciſterns, and other ſimilar purpoſes. And in order to adjuſt the level to this deſcent, he meaſured one hundred feet in length, and having nicely aſcertained the *dead level*, he depreſſed the range of the top bar one foot below the upper edge of the croſs-piece of the ſtaff, and, while in that poſition, he marked the ſituation of the plumb-line on the face of the level, the plummet-hole being made wide for this purpoſe; thus fixing the flowing level. And with this deſcent, he has traced a line from an intended reſervoir, and from point to point, through the fields of one ſide of the farm, and finds that it reaches, even with this deſcent, within every field; and that three-fourths, or a larger proportion, of the ſurface are capable of being floated from this intended pool. With the view of ſeeing the actual motion of water falling one in a hundred, he has had fifty yards of the upper end of the line opened, and finds the current fully ſufficient; a lively rippling ſtream, more active, perhaps, than is neceſſary. But the leakage being the leſs the quicker the water moves, it may, he thinks, be ſafely concluded that one foot of fall in a hundred feet length is nearly the proper degree that is required.

And in the ſame caſe he has, by the ſame means, alſo found that, from a ſimilar reſervoir formed near the ſource of the rill, water might be conveyed to every field, and almoſt every acre of the oppoſite ſide of the farm, which is a matter of great conſequence. It is ſuggeſted, that the uſes of theſe reſervoirs will be thoſe of having in readineſs, during the ſummer months, when the rill is weak, a body of water to throw into drinking-pools, ciſterns, &c.; a weak current turned into a dry trench is abſorbed by its perforations and fiſſures, for ſome time, at leaſt, after it is turned in; whereas a body of water, ruſhing quickly along it, not only in part eſcapes abſorption, but tends to fill up the leaks; and, in winter, theſe reſervoirs will be uſeful in ſcouring the trenches, and in hoarding up bodies of water for the purpoſe of irrigation, or other ſimilar uſes. In the ſetting out of theſe rills, he has laid the head or upper end of each, from two to three feet below the intended ſurfaces of their reſpective reſervoirs, when full. Hence, by the means of a portcullis flood-gate, a body of water two or three feet deep, and the whole extent of the ſurfaces of the baſons, may be poured into the rills, faſter or ſlower, as may be requiſite. And in a ſubſequent minute it is ſtated, that difficulties were met with in conducting a rill through an open grove of trees, but which were overcome in the following manner; having, by means of the frame level and croſs, aſcertained the general deſcent, or flowing level, through the whole extent of the grove; and having, in this

operation,

operation, gained a general idea of the requiſite direction of the rill, by means of ſtakes placed at the ſeveral ſtations of the croſs-ſtaff, wherever clear views could be caught through the openings between the trees, the intermediate ſpaces between the ſtakes were traced by the eye, ſo as to endeavour to follow the natural level of the ground, without forming abrupt bends in the channel: parrying between the two. And that the ſuppoſed line being thus ſet out, the ſurface of the ground was cleared two or three feet wide on either ſide of it, from leaves and other incumbrances, and the top ſoil removed for manure; thus making a hollow pathway through the grove, four or five feet wide. The next operation was to level this pathway, which was likewiſe done by the eye, from ſtake to ſtake; paring off the protuberances, and caſting or wheeling them into the hollows to fill them up. Then in order to come at the true line, and to render the flowing level perfectly uniform, a narrow pathlet, the width of the ſpade, was formed on the upper ſide of the broad pathway. This pathlet was formed with the frame level in hand, ſinking trenches in the ſtill protuberating parts, and raiſing banklets in the hollows; thus fixing the exact flowing level at each level's length, and, at the ſame time, forming the face or lower ſide of it, in ſuch manner as to eaſe the bends, and give a ſmooth flowing line to the rill or runlet of the water. And further, in order to bring the buſineſs of forming the bed of the rill to a certainty, and thereby to render any further ſuperintendance unneceſſary, yet to prevent error in the execution, he formed a *gauge* for the labourers to work by; which conſiſted of a board, forming the ſegment of a circle; the chord or greateſt length being three feet, the greateſt depth twelve inches. This gives the dimenſions of the bed of the rill. To keep the bottom of it exactly true to the flowing level, ſo that the current ſtream may be perfectly uniform, it is fixed under a maſon's ſhort level; the end of one of the arms projecting three or four inches beyond one end of the gauge. And the trench being ſunk to nearly its proper depth, by the eye kept on the adjuſted margin, the projecting end of the level is placed on the ſame marginal guide, and the plummet-line being brought to the perpendicular, (and the baſe of the level of courſe rendered horizontal,) the bottom of the trench is finiſhed with certainty.

Upon having the water turned into the upper part of the trench thus formed, by two common labourers, who never before, perhaps, took a level in their hands, the current was found not only deſirable as to deſcent, but perfectly uniform, without alteration. And hence the practicability and certainty of this method of forming the channels of rills, as well as the eligibility of one meaſure in a hundred, for the deſcent or fall, are fully aſcertained. It is obſerved that the above dimenſions are the moſt proper for the part paſſing under trees, as being liable to fill up, by leaves and ſmall twigs; but in open land, liable to be trodden by cattle, four feet in width, and eight inches deep is better, the lower ſide being made broad and flatly convex to prevent treading in, being turfed over with the ſods removed.

But in reſpect to the Yorkſhire rills, the ſame writer remarks that the heights of the northern margin have neither ſprings nor rivulets (ſome very few inſtances excepted), nor any other natural waters than the brooks which wind at the bottom of the deep vallies that divide them, and the rivulets which generally run at the feet of the precipices that terminate them. That formerly theſe brooks and rivulets were the only reſources which the villages that are ſcattered on theſe heights had for water, both for the uſe of cattle and for domeſtic purpoſes. But that in proceſs of time wells were ſunk, but they are of ſuch a depth as to make the labour of raiſing the water little leſs than that of fetching it from a moderate diſtance. Of courſe that this kind of natural neceſſity has led to an expedient which, though not new in principle, is perhaps entirely ſo in ſimplicity of execution, and might be practiſed with great advantage in many ſimilar ſituations. For as the moorland mountains riſe with generally an eaſy aſcent, from the beds of the rivulets laſt-mentioned, to a height much exceeding that of the hills to be watered, frequently abounding with ſprings almoſt to their higheſt ſwells, theſe ſprings are collected and conducted by a narrow channel down the ſlope of the mountain ſides, and along the face of the precipice, until the ſummit be gained; the waters being thence conveyed to the place or places deſired. It is ſtated that, in planning an artificial rill, a level, and ſome little knowledge of the country, are, as has been ſeen, the requiſite guides. The ſurveyor begins at the place to which the water is required to be brought, and aſcertains the loweſt part of the brink of the precipice from which water can be conducted. The face of the precipice is traced in like manner; and, if neceſſary, the aſcent of the moorland hills, until ſprings, or their natural rills, can be commanded. And that if his level bring him to the bottom of the ſteep ſoon enough to catch the rivulet which runs at its foot, the work is readily completed. If not, he goes above its higheſt bend, generally to the head or higheſt part of the valley (between the heights and the moorlands), and winds along the ſide of the oppoſite ſwell to ſome more elevated ſource. And if, when he arrives on the moorland hills (or, by an obſervation from the top of the precipice,) he finds that nature does not furniſh the requiſite quantity of water high enough to give the neceſſary fall, the work is, of courſe, impracticable.

But in regard to the manner of executing an artificial rill in this part, an opening ſhallow channel, of a width proportioned to the quantity of water to be conducted, is the main operation. In making ſtagnant pools, it has been found that much art is neceſſary to make them retentive, but in forming the bed of a rill no ſuch art is requiſite. It is the nature of running waters to render the ſurface on which they run firm and retentive. Sand is, he believes, the chief material uſed in forming the channels of theſe rills; and this only in places where an open rock or other porous ſtratum is croſſed. But much depends on the quantity of fall and the quantity of water. If the fall be but little, and the quantity of water at the ſource be ſuch as not to admit of much waſte, great care is requiſite in forming the bed of the rill. The fall is therefore regulated in a great degree by the quality of the ground. On good ground the channel is nearly level. Over faulty ground the water runs with a current for the double purpoſe of getting quickly over it, and rendering its channel more retentive. The circumſtances from which injuries are produced in theſe rills are leaves in autumn and ſnows in winter. To remove the obſtructions which theſe not unfrequently cauſe, and to repair ſuch breaches as time will always make in the work of art, a ſuperintendant is neceſſary to every artificial rill.

And it is obſerved that the rill of Kirby moorſide is, he believes, the largeſt, and was the firſt which was brought upon theſe heights. This rill was brought to the villages of Gillimore and Fadmore near forty years ago; and has been extended to Kirby about thirty years, by Joſeph Ford, a ſelf-taught engineer of great ingenuity and ſome judgment; a man to whom the country owes much. Since the introduction of this, ſeveral others have been raiſed; and ſome few unſucceſsful attempts have been made; the channel was, in one inſtance, (that of Newton,) extended a conſiderable way before the impracticability of completing it

was

was difcovered; a piece of mifconduct which nothing but a want of accuracy in the ufe of the level can lead to. The mifcarriage, in this cafe, was not owing to a want of elevation in the fource, but to a depreffion of the channel at the foot of the fteep; the head of the valley (if fuch it may be called) being lower than the top of the precipice at the given point. This fhews the neceffity of tracing the entire channel with fufficient accuracy before any other expence is incurred. The mode of doing which has been fhewn above.

It is likewife further ftated, that in the cafe of Kirby the channel is raifed fomewhat by a bridge-like mound of earth thrown acrofs the crown of the valley. And that the fame mound ferves the purpofe of conducting another rill acrofs the fame difficult pafs; from whence the Kirby rill takes an eaftward, the rill of Welburn (applied principally to the watering of pafture grounds) a weftward direction.

Alfo in regard to the expence, it is ftated that the firft coft of the Kirby rill was not altogether one hundred pounds. The diftance about ten miles, watering (befides the town of Kirby) two villages and a line of cultivated waterlefs upland country about four miles in length. Befides the firft coft, which was raifed by fubfcription, a fuperintendant had ten pounds a-year for keeping it in repair and free from obftructions; which yearly falary is paid by the contributions of the perfons benefited; each being rated agreeably to the eftimated benefit received.

It may be noticed, that from the vaft advantages that have been derived from the conftruction of thefe forts of rivulets, in thefe few cafes of upland dry fituations, the attention of the land proprietor and farmer in other diftricts where there is a prevalent fcarcity of water, either for domeftic purpofes, or the ufe of cattle ftock, fhould be directed to the execution of them, on fuch cheap and beneficial plans as may be the moft convenient in the particular fituations. See Pond.

Thefe kinds of rills fhould, in all cafes where they are capable of it, be turned to the purpofe of watering land, as well as the ufes noticed above.

RILLE, in *Geography*, a town of France, in the department of the Maine and Loire; 9 miles E. of Baugé. —Alfo, a river of France, which runs into the Seine, fix miles below Quilbœuf.

RILLY, a town of France, in the department of the Marne; 6 miles S. of Reims.

RILSK, a town of Ruffia, in the government of Kurfk, on the Sem; 52 miles W.S.W. of Kurfk. N. lat. 51° 30′. E. long. 34° 54′.

RIM, in a watch or clock, the circumference or circular part of a wheel.

Rims, in *Ship Building*, compafs-pieces of timber, which form the quarter-galleries between the ftools.

Rims, a fkirting of elm-board round the upper fide of fhips' tops.

Rim, a caft-iron frame, in which the dropping-palls of the capftan traverfes, and palls, or counteracts the efforts of the capftan.

RIMA literally denotes a fiffure or chink. See Fissure, and Rhagades.

Hence, it is applied to feveral parts of the body, that bear a refemblance thereto; as *rima pudendi*, fiffura magna, the fame with vulva: and *rima laryngis*, the aperture of the larynx, called the *glottis*.

Rima is alfo ufed for a narrow aperture of a fmall cavity under the fornix, opening into the infundibulum; called alfo the third ventricle of the brain.

Rima, in *Geography*, a river of Hungary, which runs into the Theyffe, near Bolgar.

RIMAC, a river of Peru, which paffes by Lima, in a valley to which it gives name, on which Lima is built, and runs into the Pacific ocean, S. lat. 12°.

RIMAGIONE, a town of Genoa; 5 miles S.S.W. of Spezza.

RIMASZOMBAT, a town of Hungary; 14 miles E.S.E. of Altfol.

RIMBA, a province of Benguela, in Africa, on the banks of the Morano.

RIMBACH, a town of the duchy of Wurzburg; 3 miles S. of Volckach.

RIMBU, a town of Thibet; 71 miles W. of Laffa. N. lat. 30° 35′. E. long. 89° 50′.

RIME, in *Poetry*. See Rhyme.

Rime, in *Rural Economy*, a fort of hoary or white frofty appearance, fometimes on the ground in the autumnal winter and early fpring mornings.

RIMENANT, in *Geography*, a town of France, in the department of the Two Nethes; two miles E. of Malines.

RIMERS are moveable bars to fupport the fluices and over-falls in opening-weirs.

RIMFORSA, in *Geography*, a town of Sweden, in Weft Gothland; 17 miles S. of Linkoping.

RIMINI, a fea-port town of Italy, capital of the department of the Rubicon, late in the Romagna; formerly fituated on the fea, but the fea has for fome centuries receded to a diftance. The harbour on the river Marechia, on which the city is built, is now fo choaked up with fand, as fcarcely to admit of fmall barks. This city was once very flourifhing, but befides other calamities which have befallen it, it fuffered extremely from an earthquake in 1671. It is the fee of a bifhop, fuffragan of Ravenna. This is the ancient Ariminum, the firft town of which Cæfar took poffeffion, after paffing the Rubicon. In the market-place there is a kind of ftone pedeftal, with an infcription, declaring, that upon it Cæfar had ftood and harangued his army; but the authenticity of this is not afcertained to the fatisfaction of antiquaries. Befides this fuggeftum of doubtful antiquity, here is a triumphal arch, erected to the emperor Auguftus, and the remains of an amphitheatre. This city is faid to have been built 500 years earlier than Rome itfelf, and to have been made a colony in the year of Rome 483. It derived its name from the river Arminus, which wafhed its walls, and feparated the Via Flaminia from the Via Æmilia. Two councils were held here, one of orthodox bifhops, in the year 358, and another in the following year, of Arian prelates. Vitalien, governor of the city for the emperor Juftinian, defended it againft Vitiges, king of the Goths, with fuch vigour, as to oblige the Goths to raife the fiege. Some time after it became fubject to the Lombards; but when their laft king, Didier, was conquered and taken prifoner by Charles the Great, Rimini returned to the allegiance of the weftern emperors. The liberality of Otho III. conferred the dominion of it on the Malatefta family: at laft the Venetians gained poffeffion of it, and by a treaty with pope Julius II. gave it to the holy fee. The harbour at Rimini was formerly famous, being covered with marble, and of fuch extent, as to contain a confiderable fleet; but its mouth being filled up with fand, Sigifmond Pandolfo Malatefta deftroyed it, and with the marble ftones, raifed out of its ruins, built the Francifcan church, which is the fineft in Rimini; 57 miles S.E. of Bologna. N. lat. 44° 4′. E. long. 12° 38′.

RIMIS, a ſmall iſland in the Baltic, near the coaſt of Pomerania, N. lat. 54° 11′. E. long. 13° 26′.

RIMNIK. See RIBNIK.

RIMONT, a town of France, in the department of the Arriege; 8 miles W.N.W. of Taraſcon.

RIN, in *Rural Economy*, a provincial word uſed to ſignify brine.

RINÆUS, in *Anatomy*. See NASALIS.

RINALDI, ODERIC, in *Biography*, a learned Italian eccleſiaſtical hiſtorian in the 17th century, was a native of Treviſo, and entered the eſtabliſhment belonging to the prieſts of the congregation of the Oratory at Rome, of which Baronius had been a member. After the death of that cardinal, Rinaldi undertook the laborious taſk of continuing his "Eccleſiaſtical Annals," from the year 1198, with which the work of Baronius terminated, to the year 1564, when the council of Trent had been diſſolved. It abounds with many curious and valuable documents, taken from the archives at the Vatican, and other collections. It conſiſts of ten large volumes in folio, which made their appearance in Rome at different periods, from 1646 to 1677. Rinaldi publiſhed a ſufficiently copious abridgment, in Italian, of the whole annals, compiled both by Baronius and himſelf.

RINALDO DI CAPUA, an eminent Neapolitan compoſer, who flouriſhed in the middle of the laſt century, and whoſe ſtory is ſomewhat ſingular.

He was the natural ſon of a perſon of very high rank in that country, and at firſt only learned muſic as an accompliſhment; but being left by his father with only a ſmall fortune, which was ſoon diſſipated, he was forced to make it his profeſſion. He was but ſeventeen when he compoſed his firſt opera at Vienna.

In the courſe of a long life, Rinaldo experienced various viciſſitudes of fortune, ſometimes in vogue, ſometimes neglected. However, finding old age coming on, he collected together his principal works, ſuch as had been produced in the zenith of his fortune and fancy, thinking theſe would be a reſource in diſtreſsful times; thoſe times arrived; various misfortunes had happened to him and his family; when, behold! this reſource, this *ſole* reſource, the accumulated produce of his pen, had by a graceleſs ſon been ſold for waſte paper!

This compoſer, whoſe productions were, during many years, the delight of all Europe, in 1770 was reduced at Rome to the utmoſt indigence. Diogenes the Cynic was never more meanly clad through choice, than Rinaldo through neceſſity: a patched coat, and ſtockings that wanted to be patched or darned! We, having often received great pleaſure from his works, courted his acquaintance and converſation, which was very lively and intelligent; but though a good-natured man, his opinions were very ſingular and ſevere on his brother compoſers.

He thought they, at that time, "had nothing left within the reach of their invention to entitle them to reputation for novelty, but the refuſe of thouſands, which had been often tried and rejected, either as impracticable or diſpleaſing. The only chance which a compoſer has for introducing new modulation in ſongs, was in a ſhort ſecond part, (every ſerious ſong then ended with a *da capo*,) in order to *fright* the hearer back to the firſt, to which it ſerves as a foil, by making it comparatively beautiful." He included himſelf in the cenſure, and frankly confeſſed, that though he had written full as much as his neighbours, yet out of all his works, perhaps not above *one* new melody could be found, which had not been wire-drawn in different keys, and different meaſures, a thouſand and a thouſand times.

We ſubſcribed to theſe opinions at the time, till we heard Haydn's quartets and ſymphonies, Paeſiello's vocal compoſitions, and Mozart's latter works, vocal and inſtrumental.

Rinaldo cenſured, with great ſeverity, the noiſe and tumult of inſtruments in modern ſongs;—what would he ſay now to our double-drums and tromboni?

Rinaldo had the reputation at Rome of being the inventor of accompanied recitatives; but in ſearching for old compoſitions in the archives of San Girolamo della Carita, at Rome, we found an oratorio of Aleſſandro Scarlatti, which was compoſed at the latter end of the 17th century, before Rinaldo di Capua was born, and in which there are *accompanied recitatives*. But he did not, himſelf, pretend to the invention; all that he claimed was the being among the firſt who introduced ritornels, or interſtitial ſymphonies, in recitatives of ſtrong paſſion and diſtreſs, which expreſs or imitate what it would be ridiculous for the voice to attempt. There have been ſince many fine ſcenes of this kind in the works of Jomelli, Perez, Galuppi, Sarti, Piccini, Sacchini, and Paeſiello.

Rinaldo ſeems to have been a ſucceſsful compoſer from 1737 to 1758. His firſt ſerious opera at Rome was "Il Ciro Riconoſciuto," in 1737; and "Adriano in Siria," the laſt, in 1758.

A very fine air from "Vologeſo" was ſung by Monticelli in England, and printed by Walſh among the favourite ſongs in the opera of Gianguir,—"Nell' orror di notte oſcura,"—to which we refer as a ſpecimen of his ſerious ſtyle. Indeed the whole ſcene in that opera, beginning by the accompanied recitative, "Berenice, ove ſei?" and terminated by the air, "Ombra che pallida," is admirable, and a proof to what perfection dramatic muſic was brought in Italy fifty or ſixty years ago; and the curious will do well to procure a copy of this ſcene whenever they have an opportunity.

It has been ſaid, perhaps with ſome truth, that the ſcience of this compoſer was not equal to his genius; for being educated as a dilettante, he probably did not ſubmit to all the drudgery of dry ſtudy, which one intended for the profeſſion of muſic is obliged to undergo.

RINAR, a word uſed by the chemiſts, to expreſs filings of any thing.

RINAUR, in *Geography*, a town of Hindooſtan, in Myſore; 25 miles E. of Chinna Balabarum.

RINCADROLEAN POINT, a cape on the W. coaſt of Ireland, in the county of Kerry. N. lat. 52° 44′. W. long. 10° 13′.

RIND, a ſkin of any fruit that may be cut off, or pared. The outer coat of the cheſnut, ſet with prickles, is particularly called the *urchin-like rind*.

RIND is alſo uſed for the inner bark of trees; or that ſoft, whitiſh, juicy ſubſtance, adhering immediately to the wood.

Through this it is that the ſap has been ſuppoſed to return from the extremities of the branches to the root: the veſſels hereof are by ſome alſo ſuppoſed to do the office of arteries; whence Mr. Bradley calls them *arterial* veſſels. See PLANTS.

RIND, *Grafting in the*. See ENGRAFTING.

RIND-*Gall*, a damage a tree receives when young, ſo that the bark or rind grows in the inner ſubſtance of the tree.

RINDE, in *Geography*, a river of Hindooſtan, which runs into the Jumna, 15 miles S.E. of Corah.

RINDERA, in *Botany*. See Cynoglossum *lævigatum*, n. 14.

RINDGE, or Ringe, in *Geography*, a town of America, in the county of Chefhire, New Hampfhire, fituated on the Maffachufett's line, about 80 miles W. of Portfmouth, and 70 N.W. of Bolton. This town was incorporated in 1768, and contains 1226 inhabitants. This townfhip has 13 ponds of water of different fizes, in which are perch, trout, eels, &c. It has alfo, towards the northern part, a mine of ochre of a Spanifh brown. One half of the water of this town runs to the Merrimack, and the other to the Connecticut river.

RINDOMS, a town of Spain, in Catalonia; 11 miles N.W. of Tarragona.

RINDSAKER, a town of Norway; 60 miles N.N.E. of Chriftiania.

RINEKENBERG, a town of the duchy of Carinthia; 6 miles E. of Wolkenmarck.

RINEUS Marinus, a name given by fome botanical writers to the crithmum, or famphire, a fea-plant, ufed as a pickle.

RING, Annulus, a little moveable, put on the finger, either by way of ceremony, or of ornament.

The bifhop's ring makes a part of the pontifical apparatus; and is efteemed a pledge of the fpiritual marriage between the bifhop and his church.

The epifcopal ring is of a very ancient ftanding. The fourth council of Toledo, held in 633, appoints that a bifhop condemned by one council, and found afterwards innocent by a fecond, fhall be reftored, by giving him the ring, ftaff, &c.

From bifhops, the cuftom of the ring has paffed to cardinals, who are to pay a very great fum, *pro jure annuli cardinalitii.*

Rings, *Origin of.* Pliny (lib. xxxvii. cap. 1.) obferves, that we are in the dark as to the perfon who firft invented, or wore the ring; becaufe what is faid of Prometheus, as alfo of Midas's ring, are fables. The firft people among whom we find the ring in ufe, are the Hebrews, (Gen. xxxviii.) where Judah, Jacob's fon, gives Tamar his ring, or fignet, as a pledge of his promife; but the ring appears to have been in ufe at the fame time among the Egyptians, from Gen. xli. where Pharaoh puts his ring upon Jofeph's hand, as a mark of the power he gave him. And in the firft book of Kings, chap. xxi. Jezebel feals the warrant fhe fent for the killing of Naboth, with the king's ring.

The ancient Chaldeans, Babylonians, Perfians, and Greeks, had likewife the ufe of the ring; as appears from feveral paffages in Scripture, and from Quintus Curtius, who tells us, that Alexander fealed the letters he wrote into Europe with his own feal; and thofe in Afia with Darius's ring.

The Perfians will have Guiamfchild, the fourth king of the firft race, to have firft introduced the ring, for fealing his letters and other acts. The Greeks, Pliny thinks, knew nothing of the ring in the time of the Trojan war; the reafon he gives is, that we find no mention of it in Homer, but that when letters, &c. were to be fent away, they were tied up, and the ftrings knotted.

The Sabines had rings in Romulus's time; and it is to them, probably, the practice firft came from the Greeks; and from them that it paffed to the Romans; though it was fome time before it got footing there. Pliny cannot learn which of the kings of Rome firft adopted it; but there are no figns of it in any of their ftatutes, before thofe of Numa and Servius Tullius. He adds, that it was alfo in ufe among the ancient Gauls and Britons.

Rings, *Matter of Ancient.* There were fome of one fingle metal, and others of a mixture, or two. For the iron and filver were frequently gilt; or at leaft the gold part was fixed within the iron, as appears from Artemidorus, lib. ii. cap. 5. The Romans were contented with iron rings a long time; and Pliny affures us, that Marius firft wore a gold one in his third confulate, which was in the year of Rome 650. Sometimes the ring was iron, and the feal gold; fometimes it was hollow, and fometimes folid; fometimes the ftone was engraven, and fometimes plain; and the graving fometimes was in relievo, and fometimes in creux: the laft were called *gemmæ ectypæ;* the former *gemmæ fculptura prominente.*

Ring, *the manner of wearing the,* has been various. From Jeremiah, chap. xxii. it appears, that the Hebrews wore it on their right hand. Among the Romans, before they came to be adorned with ftones, and while the graving was yet on the metal itfelf, every one wore them at pleafure, on what hand and finger he pleafed. When ftones came to be added, they wore them altogether on the left hand; and it would have been held an exceffive foppery to have put them on the right.

Pliny fays, they were at firft worn on the fourth finger; then on the fecond or index; then on the little finger; and at laft on all the fingers, excepting the middle one.

The Greeks wore them altogether on the fourth finger of the left hand, as we are informed by Aul. Gellius, lib. x. and the reafon he gives for it is, that having found from anatomy, that this finger had a little nerve that went ftraight to the heart, they efteemed it the moft honourable, by reafon of this communication with that noble part. Pliny fays, the Gauls and ancient Britons wore the ring on the middle finger.

At firft they only wore a fingle ring, then one on each finger, and at length feveral on each finger. (Martial, lib. xi. epig. 60.) At laft one on each joint of each finger. (Ariftoph. in Nub. &c.) Their foppery at length arofe to that pitch, that they had their weekly rings.

Juvenal, Sat. vii. fpeaks of *annuli femeftres;* as alfo of winter and fummer rings. But of all others, Lampridius, cap. 32. obferves, that Heliogabalus carried the point fartheft, who never wore the fame ring, or the fame fhoe, twice.

Rings have been alfo worn in the nofe, and as pendants in the ears. Bartholin has an exprefs treatife, "De Annulis Narium," *Of Rings of the Noftrils.* St. Auguftine affures us, it was in his time the fafhion of the Moors; and Pietro della Valle obferves the fame of the modern orientals.

In effect, there is no part of the body where rings have not been worn. Several Eaft India travellers affirm, that the natives now commonly wear them on their nofe, lips, cheeks and chin. Ramufio tells us, that the ladies of Narfinguay, in the Levant, and Diodorus Siculus, lib. iii. that thofe of Ethiopia ufed to adorn their lips with iron rings.

As to the ears, the cuftom ftill obtains of wearing rings in them, both of men and women, almoft all over the world. See Pendant.

The Indians, particularly the Guzzarats, have worn rings on their feet. And when Peter Alvarez had his firft audience of the king of Calicut, he found him all covered with ftones fet in rings, having bracelets and rings both on the hands and fingers, and even on the feet and toes.

Louis Bartome reprefents a king of Pegu as ftill more extravagant, having rings fet with precious ftones on every toe.

Rings, *Ufe of.*—The ancients had three different kinds; the

the firſt ſerved to diſtinguiſh conditions or quality. Pliny aſſures us, that the ſenators at firſt were not allowed to wear the gold ring, unleſs they had been ambaſſadors at ſome foreign court. Nor was it even allowed them to wear the gold ring which was given them in public, except on public occaſions; at other times they wore an iron one. And thoſe who had a triumph obſerved the ſame rules.

At length the ſenators and knights were allowed the common uſe of the gold ring; but Acron on Horace, lib. ii. ſat. vii. obſerves, they could not do it unleſs it were given them by the prætor.

In after days the gold ring became the badge of the knights, the people wearing ſilver rings, and the ſlaves iron ones; though the gold ring was ſometimes alſo allowed the people, and Severus granted it to his common ſoldiers. Auguſtus allowed it to the liberti or freedmen; and though Nero made a regulation to the contrary, yet it was ſoon ſet aſide.

A ſecond kind of rings comprehended the *annuli ſponſalitii*, wedding-rings. Some carry the origin of this cuſtom as far back as the Hebrews, on the authority of a text in Exodus, xxxv. 22. Leo of Modena, however, maintains, that the ancient Hebrews did not uſe any nuptial ring. Selden, in his Uxor. Ebraica, lib. ii. chap. xiv. owns, that they gave a ring in the marriage, but that it was only in lieu of a piece of money of the ſame value which had uſed to have been given before. The Greeks and Romans did the ſame, and from them the Chriſtians took it up very early, as appears from Tertullian, and in ſome ancient liturgies, where we find the form of bleſſing the nuptial ring.

The third kind of rings included thoſe uſed as ſeals, called *cerographi* or *cirographi*; an account of which, ſee under the article SEAL.

Richard, biſhop of Saliſbury, in his Conſtitutions, anno 1217, forbids the putting of ruſh rings, or any the like matter, on women's fingers, in order to the debauching them more readily; and he inſinuates the reaſon of his prohibition, that there were ſome people weak enough to believe, that what was thus done in jeſt was a real marriage.

De Breveil, in his Antiquities of Paris, ſays, it was an ancient cuſtom to uſe a ruſh-ring in the nuptials of ſuch as had had an affair together before their marriage.

RING, in *Angling*, an inſtrument intended to free the hook when accidentally entangled among weeds. See ANGLING.

RING, in *Aſtronomy*. The ring of Saturn is a thin, broad, opaque, circular arch, encompaſſing the body of that planet, like the horizon of an artificial globe, without touching it, and appearing double, when ſeen through a good teleſcope.

The diſcovery of it is owing to M. Huygens, who, after frequent obſervation of Saturn, with teleſcopes which magnified two or three times more than any that had been before made, perceived two lucid points, or anſæ, ariſing out from the body in a right line.

Hence, as in ſubſequent obſervations, he always found the ſame appearance, he concluded that Saturn was encompaſſed with a permanent ring; and accordingly produced his new ſyſtem of Saturn in 1659.

However, Galileo firſt diſcovered that the figure of Saturn was not round. It appeared to him like a large globe between two ſmall ones; and he announced this diſcovery in the year 1610. Proſecuting his obſervations till the year 1612, he was then ſurpriſed to find only the middle globe; but in proceſs of time he again diſcovered the globes on each ſide, which appeared to change their form; ſometimes appearing round, ſometimes like an acorn, ſometimes ſemicircular, then with horns towards the globe in the middle, and growing by degrees ſo long and wide as to encompaſs it, as it were, with an oval ring. Huygens, who, as we have ſaid, completed the diſcovery, makes the ſpace between the globe of Saturn and the ring equal to, or rather bigger than, the breadth of the ring; and the greateſt diameter of the ring, in proportion to that of the globe, as 9 to 4. But Mr. Pound, with an excellent micrometer, applied to the Huygenian teleſcope of 123 feet in length, determined this proportion to be as 7 to 3.

Mr. Whiſton, in his "Memoirs of the Life of Dr. Clarke," informs us, that the doctor's father once ſaw a fixed ſtar between the ring and the body of Saturn. M. Caſſini, in 1675, obſerved upon the ring a dark elliptical line, dividing it, as it were, into two rings; the inner of which appeared brighter than the other. He alſo perceived a dark belt upon the planet, parallel to the greater axis of the ring. Mr. Hadley obſerved, that the outer part of the ring ſeemed narrower than the inner part, and that the dark line was fainter towards its upper edge; he alſo ſaw two belts, and obſerved the ſhadow of the ring upon Saturn. In October, 1714, when the plane of the ring very nearly paſſed through the earth, and was approaching it, M. Maraldi obſerved, that while the arms were decreaſing, both in length and breadth, the eaſtern arm appeared a little larger than the other for three or four nights, and yet it vaniſhed firſt; for after an interruption for two nights by clouds, he ſaw the weſtern arm alone. This inequality of the ring made him ſuſpect that it was not bounded by exactly parallel planes, and that it turned about its axis. In the ſequel of this article we ſhall give the ſubſtance of Dr. Herſchel's obſervations, which, on account of his accuracy as an obſerver, and the ſuperior excellence of his teleſcopes, are much more important than any others, as he has diſcovered many circumſtances which had eſcaped all other obſervers.

This ring, ſeen from Saturn, appears like a large luminous arc in the heavens, as if it did not belong to the planet. When we ſee the ring moſt open, its ſhadow upon the planet is broadeſt; and from that time the ſhadow grows narrower, as the ring appears to do to us; until, by Saturn's annual motion, the ſun comes to the plane of the ring, or even with its edge; which, being then directed towards us, becomes inviſible, on account of its thinneſs.

The principal phenomena of Saturn's ring are familiarly illuſtrated by a view of *Plate* XIX. *Aſtronomy*, *fig.* 14. Let S be the ſun, A B C D E F G H Saturn's orbit, and I K L M N O the earth's orbit. Both Saturn and the earth move according to the order of the letters; and when Saturn is at A, his ring is turned edgewiſe to the ſun S, and he is then ſeen from the earth as if he had loſt his ring, let the earth be in any part of the orbit whatever, except betwnen N and O; for whilſt it deſcribes that ſpace, Saturn is apparently ſo near the ſun as to be hid in his beams. As Saturn goes from A to C, his ring appears more and more open to the earth; at C the ring appears moſt open of all; and ſeems to grow narrower and narrower as Saturn goes from C to E; and when he comes to E, the ring is again turned edgewiſe both to the ſun and earth: and as neither of its ſides is illuminated, it is inviſible to us, becauſe its edge is too thin to be perceptible; and Saturn appears again as if he had loſt his ring. But as he goes from E to G, his ring opens more and more to our view on the under ſide; and ſeems juſt as open at G as it was at C; and may be ſeen in the night-time from the earth in any part of its orbit, except about M, when the ſun hides the planet from our view. As

Saturn

Saturn goes from G to A, his ring turns more and more edgewise to us, and therefore it seems to grow narrower and narrower; and at A it disappears as before. Hence, while Saturn goes from A to E, the sun shines on the upper side of his ring, and the under side is dark; and whilst he goes from E to A, the sun shines on the under side of his ring, and the upper side is dark. The ring disappears twice in every annual revolution of Saturn, *viz.* when he is in 19th degree of Pisces and of Virgo, and when Saturn is in the middle between these points, or in the 19th degree either of Gemini or of Sagittarius, his ring appears most open to us; and then its longest diameter is to its shortest, as 9 to 4. Ferguson's Astr. sect. 204.

Dr. Herschel (Phil. Trans. for 1790, vol. lxxx. pt. 1.) observes, that the black disc, or belt, upon the ring of Saturn, which we have already mentioned, is not in the middle of its breadth; and that the ring is not subdivided by many such lines, as some astronomers have represented; but there is one single, dark, considerably broad line, belt, or zone, which he has constantly found on the north side of the ring. (See *Plate* XIX. *Astronomy*, *fig.* 15.) "Since the year 1774, to the present time," as Dr. Herschel says (Phil. Trans. for 1792, vol. lxxxii. pt. 1.) "I can find only four observations where any other black division of the ring is mentioned, than the one which I have constantly observed: these were all in June, 1780." As this dark belt is subject to no change, it is probably owing, as the doctor remarks, to some permanent construction of the surface of the ring. This belt cannot be the shadow of a chain of mountains, since it is visible all round on the ring; for at the ends of the ansæ there could be no shade visible on account of the direction of the sun's illumination, which would be in the line of the chain; and the same argument will hold against any caverns or concavities. It is, moreover, fully evident, that this dark zone is contained between two concentric circles, as all the phenomena answer to the projection of such a zone. Thus in *fig.* 16, we may see that the zone is continued all round the ring, with a gradual decrease of breadth towards the middle, answering to the appearance of a narrow circular plane, projected into an ellipsis. The matter of the ring is undoubtedly no less solid than the planet itself; and it is observed to cast a strong shadow upon the planet. The light of the ring is also generally brighter than that of the planet; for the ring appears sufficiently bright when the telescope affords scarcely light enough for Saturn. From many repeated observations, which we cannot here detail, Dr. Herschel establishes the fact of the extreme thinness of the ring. He farther observes, that there may be a refraction through a very rare atmosphere on the two planes of the ring, by which the satellite may be elevated and depressed, so as to become visible on both sides of the ring, even though the ring should be equal in thickness to the diameter of the smallest satellite, which may amount to 1000 miles. From a series of observations upon luminous points of this ring, (Phil. Trans. vol. lxxx. pt. 2.) he has discovered that it has a rotation about its axis, in $10^h\ 32'\ 15''.4$.

The ring is invisible when its plane passes through the sun, or the earth, or between them: in the first case, the sun shines only upon its edge, which is too thin to reflect sufficient light to render it visible; in the second case, the edge only being opposed to us, it is not visible, for the same reason; in the third case, the dark side of the ring is exposed to us, and therefore the edge being the only luminous part which is towards the earth, it is invisible, for the same reason as before. Observers have differed ten or twelve days as to the time of its becoming invisible, owing to the difference of the telescopes, and of the state of the atmosphere. The disappearance of the ring seems to occur only with the telescopes in common use among astronomers; for Dr. Herschel, with his large telescopes, has been able to see it in every situation. He thinks the edge of the ring is not flat, but spherical, or spheridical. He observes, that the ring was seen in his telescope, when we were turned towards the unenlightened side; so that he either saw the light reflected from the edge, or else the reflection of the light of Saturn upon the dark side of the ring, as we sometimes see the dark part of the moon. He cannot, however, say which of the two might be the case; especially as there are very strong reasons for thinking, that the edge of the ring is of such a nature as not to reflect much light. M. de la Lande thinks, that the ring is just visible, with the best telescopes in common use, when the sun is elevated $3'$ above its plane, or three days before its plane passes through the sun; and when the earth is elevated $2'\ 20''$ above the plane, or one day from the earth's passing it. In the Phil. Trans. for 1790, Dr. Herschel ventured to suggest a suspicion that the ring was divided; this conjecture was strengthened by subsequent observations, after he had an opportunity of seeing both sides of the ring. His reasons are these; 1st, the black division upon the northern side of the ring, is in the same place, of the same breadth, and at the same distance from the outer edge, that it always appeared upon the northern side; 2dly, with his seven-feet reflector and an excellent speculum, he saw the division in the ring, and the open space between the ring and the body, equally dark, and of the same colour with the heavens about the planet; 3dly, the black division is equally broad on each of the rings. From these observations, Dr. Herschel thinks himself authorised to say, that Saturn has two concentric rings, situated in one plane, which is probably not much inclined to the equator of the planet. The dimensions of the ring are in the following proportions, as nearly as they could be ascertained.

	Parts.
Inside diameter of the smaller ring - -	5900
Outside diameter - - - - - -	7510
Inside diameter of the largest ring - -	7740
Outside diameter - - - - - -	8300
Breadth of the inner ring - - - -	805
Breadth of the outer ring - - -	280
Breadth of the space between the rings -	115

M. de la Place, in the "Mem. de l'Acad. at Paris," supposes that the ring may have many divisions; but Dr. Herschel remarks, that no observations will justify this supposition.

From the mean of a great many measures of the diameter of the larger ring, Dr. Herschel makes it $46''.677$, at the mean distance of Saturn. Hence, its diameter : the diameter of the earth :: 25.8914 : 1. From the above proportions, therefore, the diameter of the ring must be upwards of 204,883 miles; and the distance of the two rings 2839 miles.

The ring being a circle, appears elliptical from its oblique position; and it appears most open, when Saturn is 90° from the nodes of the ring, upon the orbit of Saturn; or when Saturn's longitude is about $2^s\ 17°$, and $8^s\ 17°$. In such a situation, the lesser axis is very nearly equal to half the greater, when the observations are reduced to the sun; consequently the plane of the ring makes an angle of about 30° with the orbit of Saturn.

The breadth of the ring (as stated by Dr. Herschel, Phil. Trans. vol. xcvi. pt. 2. p. 467.) is to the space between the ring and the body of Saturn as about 5 to 4.

Kepler,

Kepler, in his Epitom. Aſtron. Copern., and after him Dr. Halley, in his Inquiry into the Cauſes of the Variation of the Needle, Phil. Tranſ. N° 195, ſuppoſe our earth may be compoſed of ſeveral cruſts or ſhells, one within another, and concentric to each other. If this be the caſe, it is poſſible the ring of Saturn may be the fragment or remaining ruin of his former exterior ſhell, the reſt of which is broken or fallen down upon the body of the planet.

Ring is alſo the name of an inſtrument uſed in navigation, for taking the altitudes of the ſun, &c.

It is uſually of braſs, about nine inches diameter, ſuſpended by a little ſwivel, 45° from the point of which is a perforation, which is the centre of a quadrant of 90°, divided in the inner concave ſurface.

To uſe it, they hold it up by the ſwivel, and turn it to the ſun, till the ſun-beams, falling through the hole, make a ſpot among the degrees, which marks the altitude required.

This inſtrument is preferred to the aſtrolabe, becauſe the diviſions are here larger than on the aſtrolable. See Astrolabe.

Ring is alſo uſed for the ſound or tone of a *bell;* which ſee.

The ringing of bells, though now a recreation chiefly of the lower claſs of people, is a very curious exerciſe. As for the tolling of a bell, this is nothing more than the producing of a ſound by the ſtroke of the clapper againſt the ſide of a bell; the bell itſelf being in a pendant poſition, and at reſt. In ringing, the bell, by means of a wheel and rope, is elevated to a perpendicular: in its motion to this ſituation, the clapper ſtrikes forcibly on one ſide, and, in its return downwards, on the other ſide of the bell, producing at each ſtroke a ſound. The muſic of bells is altogether melody; but the pleaſure ariſing from it conſiſts in the variety of interchanges, and the various ſucceſſion and general predominance of the conſonances in the ſounds produced.

The practice of ringing bells in change is ſaid to be peculiar to this country, which for this reaſon is called the ringing iſland; but the antiquity of it is not eaſily aſcertained. There are in London ſeveral ſocieties of ringers, particularly one known by the name of the College Youths. Merſennus has ſaid nothing of the ringing of bells in changes; and Kircher has only calculated the poſſible combinations ariſing from a given number. See Alternations.

In England, the practice of ringing is reduced to a ſcience; and peals have been compoſed, which bear the names of the inventors. Some of the moſt celebrated peals now known were compoſed about fifty years ago, by Mr. Patrick, ſo well known as the maker of barometers.

For the method of ringing in the Low Countries, ſee Carillons.

Ring, or *Annulus*, in *Geometry*. See Annulus.

The area of the ring included between the circumferences, A B P A, D E Q D, of two concentric circles, (*Plate* XII. *Geometry*, *fig.* 12.) is obtained by the rule given under Annulus: *viz.* Multiply the ſum of the diameters by their difference, and the product by .7854, and the ultimate product will be the area required: for the ring being equal to the difference of the two circles, if the diameters be called D, *d*, and .785398, &c. $= a$, we ſhall have the ring $= aD^2 - ad^2 = a \times \overline{D + d} \times \overline{D - d}$. Hence if D W be a perpendicular to the radius C D A, DW^2 will be equal to $AD \times \overline{AC + CD} = \overline{D - d} \times \overline{D + d}$, and aDW^2, or the area of a circle whoſe radius is D W, will be $= aD^2 - ad^2 =$ the area of the ring. Hence alſo it appears, that the ring is equal to an ellipſe whoſe axes are $D + d$ and $D - d$. See Ellipse.

The area of the ring may alſo be had, by multiplying half the ſum of the circumferences by half the difference of the diameters, the product being the area. For the circumferences are equal to $4aD$, $4ad$: therefore $a \times \overline{D + d} = \frac{1}{4}C + \frac{1}{4}c$; which, by ſubſtitution in the laſt rule, will give $a \times \overline{D + d} \times \overline{D - d} = \overline{\frac{1}{4}C + \frac{1}{4}c} \times \overline{D - d} = \overline{\frac{1}{2}C + \frac{1}{2}c} \times \overline{\frac{1}{2}D - \frac{1}{2}d}$, as in the rule. The ſame rule will ſerve alſo for a part of the ring, A B E D A, included between the parts, A D, B E, of two radii, uſing for C and *c* the lengths of the intercepted arcs.

Another rule for finding the area of the ring is as follows: Multiply the perpendicular breadth of the ring, that is, the difference of the radii, by the circumference R S T, (or part R S for the part A B E D A,) having the ſame centre with, and equally diſtant from, the bounding arcs. For this circumference, being equally diſtant from the other two, will be equal to half their ſum. Hence the whole ring, or any part of it A B E D A, included between two radii, is equal to a parallelogram on the ſame baſe A D, and whoſe altitude is equal to R S, the middle circumference.

Ring, *Solid*, is a ſolid returning into itſelf; of which every ſection perpendicular to the axis, or line paſſing through the middle, of the ſolid, is every where the ſame figure, and of the ſame magnitude.

To find the Surface of a ſolid Ring.—Multiply the axis by the perimeter of a ſection perpendicular to it, and the product will be the ſurface. *E. gr.* a workman having made for a jeweller a circular ring, or a ring whoſe axis forms the circumference of a circle; it is required to find the expence of the gilding, at a penny the ſquare inch; the thickneſs of the ring, or the diameter of a ſection of it, being 2 inches; and the inner diameter, acroſs from ſide to ſide, 18 inches. Here $18 + 2 = 20 =$ the diameter of the circle formed by the axis; and conſequently $20 \times 3.14159 =$ the length of the axis. But $2 \times 3.14159 =$ the circumference of a ſection of it; therefore $20 \times 3.14159 \times 2 \times 3.14159 = 40 \times 3.14159^2 = 394.785$ ſquare inches, nearly, $= 394.785$ pence $=$ 1*l.* 12*s.* 10¼*d.* nearly, the expence required.

To find the Solidity of a Ring.—Multiply the axis by a ſection perpendicular to it, and the product will be the ſolidity. *E. gr.* required the price of a ring of iron, whoſe dimenſions are the ſame with thoſe in the laſt example, at four-pence a pound; a cubic inch of iron weighing 4.423 ounces avoirdupois. Here the area of a ſection being $2^2 \times .785398 = 3.14159$, which expreſſes half the circumference, and the axis being the ſame as before, the ſolidity will evidently be expreſſed by half the ſurface in the laſt example; *i. e.* the ſolidity $= 197.3925$ cubic inches, which multiplied by 4.423, gives 873.065 ounces $= 54.56657$ pounds; which, at 4*d.* each, will amount to 18*s.* 2¼*d.*, the price required.

It is needleſs to multiply examples, as the mode of operation is the ſame in all forms, with thoſe for priſms, both with regard to the ſurfaces and ſolidities: for it is evident that any ring is equal to a priſm, whoſe altitude and end are reſpectively equal to the axis and ſection of the ring, both as to ſurface and ſolidity, and, therefore, the rules for them both muſt be the ſame; and, on this account, any demonſtration of the rules for rings is unneceſſary. Hutton's Menſuration.

Rings *of Colours*, in *Optics*, a phenomenon firſt obſerved in thin plates of various fubftances, by Mr. Boyle, and Dr. Hooke, but afterwards more fully explained by fir Ifaac Newton. Mr. Boyle having exhibited a variety of colours in colourlefs liquors, by fhaking them till they rofe in bubbles, as well as in bubbles of foap and water, and alfo in turpentine, procured glafs blown fo thin as to exhibit fimilar colours; and he obferves, that a feather of a proper fhape and fize, and alfo a black ribband held at a proper diftance between his eye and the fun, fhewed a variety of little rainbows, as he calls them, with very vivid colours. Boyle's Works by Shaw, vol. ii. p. 70.

Dr. Hooke, about nine years after the publication of Mr. Boyle's Treatife on Colours, exhibited the coloured bubble of foap and water, and obferved, that though at firft it apppeared white and clear, yet as the film of water became thinner, there appeared upon it all the colours of the rainbow. He alfo defcribed the beautiful colours that appear in thin plates of Mufcovy glafs; which appeared, through the microfcope, to be ranged in rings furrounding the white fpecks or flaws in them, and with the fame order of colours as thofe of the rainbow, and which were often repeated ten times. He alfo took two thin pieces of glafs, ground plain and polifhed, and putting them one upon another, preffed them till there began to appear a red coloured fpot in the middle; and preffing them clofer, he obferved feveral rings of colours encompaffing the firft place, till, at laft, all the colours difappeared out of the middle of the circles, and the central fpot appeared white. The firft colour that appeared was red, then yellow, then green, then blue, then purple, then red again; yellow, green, blue, and purple; and again in the fame order, fo that he fometimes counted nine or ten of thefe circles, the red immediately next to the purple; and the laft colour that appeared before the white was blue; fo that it began with red, and ended with purple. Thefe rings, he fays, would change their places, by changing the pofition of the eye, fo that, the glaffes remaining the fame, that part which was red in one pofition of the eye, was blue in a fecond, green in the third, &c. Birch's Hift. of the Royal Society, vol. iii. p. 54.

Sir Ifaac Newton, having demonftrated that every different colour confifts of rays which have a different and fpecific degree of refrangibility, and that natural bodies appear of this or that colour, according to their difpofition to reflect this or that fpecies of rays (fee COLOUR), purfued the hint fuggefted by the experiments of Dr. Hooke, already recited, and cafually noticed by himfelf, with regard to thin tranfparent fubftances. Upon compreffing two prifms hard together, in order to make their fides touch one another, he obferved, that in the place of contact they were perfectly tranfparent, which appeared like a dark fpot; and when it was looked through, it feemed like a hole in that air, which was formed into a thin plate, by being impreffed between the glaffes. When this plate of air, by turning the prifms about their common axis, became fo little inclined to the incident rays, that fome of them began to be tranfmitted, there arofe in it many flender arcs of colours, which increafed, as the motion of the prifms was continued, and bended more and more about the tranfparent fpot, till they were completed into circles, or rings, furrounding it; and afterwards they became continually more and more contracted.

By another experiment with two object-glaffes, he was enabled to obferve diftinctly the order and quality of the colours from the central fpot, to a very confiderable diftance. Next to the pellucid central fpot, made by the contact of the glaffes, fucceeded blue, white, yellow, and red. The next circuit immediately furrounding thefe confifted of violet, blue, green, yellow, and red. The third circle of colours was purple, blue, green, yellow, and red. The fourth circle confifted of green and red. All the fucceeding colours became more and more imperfect and dilute, till, after three or four revolutions, they ended in perfect whitenefs.

In order to determine the thicknefs of the plate of air, by which he fuppofed the colours were produced, he meafured the diameters of the firft fix circles, at their moft lucid parts, and found their fquares to be in the arithmetical progreffion of the odd numbers 1, 3, 5, 7, 9, 11; and hence he concluded, that the intervals of the glaffes at thefe circles muft be in the fame progreffion. He alfo meafured the diameters of the dark or faint rings between the more lucid colours, and found their fquares to be in the arithmetical progreffion of the even numbers 2, 4, 6, 8, 10, 12; and he concluded, after an accurate menfuration, the thicknefs of the air at the darkeft part of the firft dark ring, made by perpendicular rays, to be in the neareft round numbers $\frac{1}{89000}$th part of an inch, half of which, multiplied by the progreffion 1, 3, 5, 7, 9, 11, &c. gives the thicknefs of the air at the moft luminous parts of all the brighteft rings, their arithmetical means being its thicknefs at the darkeft parts of all the dark ones. In examining the under fide of the thin plate, in order to obferve what light was tranfmitted, he found that the central fpot was white, and the order of the colours was yellowifh-red; black, violet, blue, white, yellow, red; violet, blue, green, yellow, red, &c.; but thefe colours were very faint and dilute, except when the light was tranfmitted very obliquely through the glaffes. When he put water between the glaffes, and meafured the rings again, he found the proportion of their diameters to the diameters of the like circles made by air, to be about 7 to 8; fo that the intervals of the glaffes, at fimilar circles, caufed by water and air, were about 3 to 4.

When thefe rings were examined in a darkened room, by the coloured light of a prifm caft on a fheet of white paper, they became more diftinct, and vifible to a far greater number than in the open air. He fometimes faw more than twenty of them, whereas in the open air he could not difcern above eight or nine.

From other curious obfervations on thefe rings, made by different kinds of light thrown upon them, he inferred, that the thickneffes of the air between the glaffes, where the rings are fucceffively made, by the limits of the feven colours, red, orange, yellow, green, blue, indigo, and violet, in order, are one to another as the cube roots of the fquares of the eight lengths of a chord, which found the notes in an octave, *fol, la, fa, fol, la, mi, fa, fol*; that is, as the cube roots of the fquares of the numbers 1, $\frac{8}{9}$, $\frac{5}{6}$, $\frac{3}{4}$, $\frac{2}{3}$, $\frac{3}{5}$, $\frac{9}{16}$, $\frac{1}{2}$. Thefe rings appeared of that prifmatic colour with which they were illuminated; and by projecting the prifmatic colours immediately upon the glaffes, he found that the light, which fell on the dark places between the coloured rings, was tranfmitted through the glaffes without any change of colour. From this circumftance he thought that the origin of thefe rings is manifeft; becaufe the air between the glaffes is difpofed, according to its various thicknefs, in fome places to reflect, and in others to tranfmit the light of any particular colour, and in the fame place to reflect that of one colour, where it tranfmits that of another.

In examining the phenomena of colours made by a denfer medium furrounded by a rarer, fuch as thofe which appear in plates of Mufcovy glafs, bubbles of foap and water, &c. the colours were found to be much more vivid than the others, which were made with a rarer medium furrounded by by a denser. From the preceding phenomena it is an obvious deduction, that the transparent parts of bodies, according to their several sizes, reflect rays of one colour, and transmit those of another; on the same account that thin plates, or bubbles, reflect or transmit those rays; and this Newton supposed to be the reason of all their colours. Hence also he has inferred, that the size of those component parts of natural bodies that affect the light, may be conjectured by their colours. See Colour and Reflection.

Sir Isaac Newton, pursuing his discoveries concerning the colours of thin substances, found that the same were also produced by plates of a considerable thickness, divisible into lesser thicknesses. The rings formed in both cases have the same origin, with this difference, that those of the thin plates are made by the alternate reflections and transmissions of the rays at the second surface of the plate, after one passage through it; but that, in the case of a glass speculum, concave on one side, and convex on the other, and quick-silvered over on the convex side, the rays go through the plate, and return before they are alternately reflected and transmitted. Newton's Optics, p. 169, &c. or Newton's Opera, Horsley's edit. vol. iv. p. 121, &c. p. 184, &c.

The abbé Mazeas, in his experiments on the rings of colours that appear in thin plates, has discovered several important circumstances attending them, which were overlooked by the sagacious Newton, and which tend to invalidate his theory for explaining them. In rubbing the flat side of an object-glass against another piece of flat and smooth glass, he found that they adhered very firmly together after this friction, and that the same colours were exhibited between these plane glasses, which Newton had observed between the convex object-glass of a telescope, and another that was plane; and that the colours were in proportion to their adhesion. When the surfaces of pieces of glass, that are transparent and well polished, are equally pressed, a resistance will be perceived; and wherever this is felt, two or three very fine curve lines will be discovered, some of a pale red, and others of a faint green. If the friction be continued, the red and green lines increase in number at the place of contact; the colours being sometimes mixed without any order, and sometimes disposed in a regular manner; in which case the coloured lines are generally concentric circles, or ovals, more or less elongated, as the surfaces are more or less united. When the colours are formed, the glasses adhere with considerable force; but if the glasses be separated suddenly, the colours will appear immediately upon their being put together, without the least friction. Beginning with the slightest touch, and increasing the pressure by insensible degrees, there first appears an oval plate of a faint red, and in the centre of it a spot of light green, which enlarges by the pressure, and becomes a green oval, with a red spot in the centre; and this enlarging, in its turn, discovers a green spot in its centre. Thus the red and green succeed one another in turns, assuming different shades, and having other colours mixed with them. The greatest difference between these colours exhibited between plane surfaces, and those by curve ones, is, that, in the former case, pressure alone will not produce them, except in the case above-mentioned. In rubbing together two prisms, with very small refracting angles, which were joined so as to form a parallelepiped, the colours appeared with a surprising lustre at the places of contact, and differently coloured ovals appeared. In the centre there was a black spot, bordered by a deep purple; next to this appeared violet, blue, orange, red tinged with purple, light green, and faint purple. The other rings appeared to the naked eye to consist of nothing but faint reds and greens. When these coloured glasses were suspended over the flame of a candle, the colours disappeared suddenly, though they still adhered; but being suffered to cool, the colours returned to their former places, in the same order as before. At first the abbé Mazeas had no doubt but that these colours were owing to a thin plate of air between the glasses, to which Newton has ascribed them; but the remarkable differences in the circumstances attending those produced by the flat plates, and those produced by the object-glasses of Newton, convinced him that the air was not the cause of this appearance. The colours of the flat plates vanished at the approach of flame, but those of the object-glasses did not. Nor was this difference owing to the plane glasses being less compressed than the convex ones; for though the former were compressed ever so much by a pair of forceps, it did not in the least hinder the effect of the flame. Afterwards he put both the plane glasses and the convex ones into the receiver of an air-pump, suspending the former by a thread, and keeping the latter compressed by two strings; but he observed no change in the colours of either of them, in the most perfect vacuum that he could make. Suspecting still that the air adhered to the surface of the glasses, so as not to be separated from them by the force of the pump, he had recourse to other experiments, which rendered it still more improbable that the air should be the cause of these colours. Having laid the coloured plates, after warming them gradually, on burning coals; and thus, when they were nearly red, rubbing them together, he observed the same coloured circles and ovals as before. When he ceased to press upon them, the colours seemed to vanish; but they returned, as he renewed the friction. In order to determine whether the colours were owing to the thickness of some matter interposed between the glasses, he rubbed them together with suet and other soft substances between them; yet his endeavours to produce the colours had no effect. However, by continuing the friction with some degrees of violence, he observed, that a candle appeared through them encompassed with two or three concentric greens, and with a lively red inclining to yellow, and a green like that of an emerald; and at length the rings assumed the colours of blue, yellow, and violet. The abbé was confirmed in his opinion that there must be some error in Newton's hypothesis, by considering that, according to his measures, the colours of the plates varied with the difference of a millionth part of an inch; whereas he was satisfied that there must have been much greater differences in the distance between his glasses, when the colours remained unchanged. From other experiments he concluded, that the plate of water introduced between the glasses was not the cause of their colours, as Newton apprehended; and that the coloured rings could not be owing to the compression of the glasses. After all he adds, that the theory of light, thus reflected from thin plates, is too delicate a subject to be completely ascertained by a small number of observations. Berlin Mem. for 1752, or Memoirs Presentes, vol. ii. p. 28—43.

For M. du Tour's experiments and observations, see Mem. Pref. vol. iv. p. 288.

M. Muschenbroeck is also of opinion, that the colours of thin plates do not depend upon the air; but as to the cause he is not satisfied. Introd. ad Phil. Nat. vol. ii. p. 738. See on this subject Priestley's Hist. of Light, &c. per. 6. sect. 5. p. 498, &c.

Sir Isaac Newton's explanation of the appearance of the above-mentioned coloured concentric rings, who accounts for the production of them by ascribing to the rays of light certain fits of easy reflection and easy transmission alternately returning and taking place with each ray at certain

certain stated intervals, not being satisfactory to Dr. Herschel, he instituted a series of experiments with a view of investigating the cause of these phenomena. Newton's hypothesis appears to him not easily reconcileable with the minuteness and extreme velocity of the particles of which these rays, according to the Newtonian theory, are composed. The detail of this celebrated astronomer's experiments would far exceed our limits; we must therefore content ourselves with referring for an account of them to the Phil. Trans. for 1807, vol. xcvii. pt. 2. and with merely stating the consequences which he has deduced from them.

It is evident, says our author, that the phenomena of concentric rings must have an adequate cause, either in the very nature or motion of the rays of light, or in the modifications that are given to them by the two essential surfaces that act upon them at the time of the formation of the rings. Hence he infers, that the true cause may be reduced to an alternative that may be determined; for if it can be shewn, that a disposition of the rays of light to be alternately reflected and transmitted cannot account for the phenomena which this hypothesis is to explain, a proposal of accounting for them by modifications that may be proved, even on the principles of sir Isaac Newton, to have an existence, will be readily admitted. Accordingly Dr. Herschel offers some arguments for removing an obstacle to the investigation of the real cause of the formation of the concentric rings; for after the very plausible supposition of the alternate fits, which agrees so wonderfully well with a number of facts that have been related, it will hardly be attempted, if these should be set aside, to ascribe some other inherent property to the rays of light, by which we might account for them: and thus we shall be at liberty to turn our thoughts to a cause, that may be found in the modifications arising from the action of the surfaces, which have been proved to be the only essential ones in the formation of rings. Our author proceeds to observe, that concentric rings cannot be formed by an alternate reflection and transmission of the rays of light; for if we adopt one of the most simple methods of obtaining a set of concentric rings, which is that of laying a convex lens upon a plain metalline mirror, we can in this case have no transmission of rays, nor consequently any alternate reflection and transmission of them. He further observes, that alternate fits of easy reflection and easy transmission, if they exist, do not exert themselves according to the various thicknesses of thin plates of air. In the following experiment, he placed a plain well-polished piece of glass 5.6 inches long, and 2.3 thick, upon a plain metalline mirror of the same length with the glass, and in order to keep the mirror and glass at a distance from each other, he laid between them, at one end, a narrow strip of such paper as is commonly put between prints. The thickness of that which was used in this case was the 640th part of an inch. Upon the glass was put a 39-inch double convex lens; and having exposed this combination to a proper light, two complete sets of coloured rings were visible in this arrangement. The rays which convey the secondary set of rings to the eye must pass through a thin wedge of air, and if these rays are endowed with permanent fits of easy reflection and easy transmission, or absorption, their exertion, according to sir I. Newton, should be repeated at every different thickness of the plate of air, which amounts to the $\frac{1}{89952}$d part of an inch, of which he says, "hæc est crassitudo aeris in primo annulo obscuro radiis ad perpendiculum incidentibus exhibito, qua parte is annulus obscurissimus est." The length of the thin wedge of air, reckoned from the line of contact, to the beginning of the interposed strip of paper, is 5.2 inches, from which, by calculation, it will have the above-mentioned thickness at $\frac{1}{53}$th of an inch from the contact; and therefore at $\frac{1}{53}$, $\frac{3}{53}$, $\frac{5}{53}$, $\frac{7}{53}$, $\frac{9}{53}$, $\frac{11}{53}$, &c. we shall have the thickness of air between the mirror and glass equal to $\frac{1}{178000}$, $\frac{3}{178000}$, $\frac{5}{178000}$, $\frac{7}{178000}$, &c. of which the same author says that they give "crassitudines aeris in omnibus annulis lucidis, qua parte illi lucidissimi sunt." Hence it follows that, according to the above hypothesis, the rings of the secondary set, which extended over a space of .14 of an inch, should suffer more than seven interruptions of shape and colour in the direction of the wedge of air.

In order to ascertain whether such an effect had any existence, Dr. Herschel viewed the secondary set of rings upon every part of the glass-plate, by moving the convex lens from one end of it gradually to the other; and his attention being particularly directed to the third, fourth, and fifth rings, which were extremely distinct, he saw them retain their shape and colour all the time without the smallest alteration.

The same experiment was repeated with a piece of plate-glass instead of the metalline mirror, in order to give room for the fits of easy transmission, if they existed, to exert themselves, but the result was still the same; and the constancy of the brightness and colours of the rings of the secondary set plainly proved, that the rays of light were not affected by the thickness of the plate of air through which they passed.

Our author next proceeds to shew, that alternate fits of easy reflection and easy transmission, if they exist, do not exert themselves according to the various thicknesses of thin plates of glass. In proof of this he selected a well-polished plate of coach-glass 17 inches long, and about 9 broad. Its thickness at one end was $\frac{33}{200}$ths, and at the other $\frac{31}{200}$ths of an inch; so that in its whole length it differed $\frac{1}{100}$th of an inch in thickness; and it was regularly tapering from one end to the other. This plate, with a double convex lens of 55 inches laid upon it, being placed upon a small metalline mirror, and properly exposed to the light, exhibited the usual two sets of rings. In the secondary set, which was the object of attention, 12 rings were counted, and the central space between them was estimated to be about $1\frac{1}{2}$ times as broad as the space occupied by the 12 rings on either side; so that the whole space taken up might be reckoned equal to the breadth of 40 rings of a mean size; for the 12 rings, as usual, were gradually contracted in breadth as they receded from the centre, and by a measure of the whole space thus occupied, it was found that the breadth of a ring of a mean size was about the 308th part of an inch.

According to sir I. Newton's calculation of the action of the fits of easy reflection and easy transmission in thick glass-plates, an alternation from a reflecting to a transmitting fit requires a difference of $\frac{1}{137545}$th part of an inch in thickness (Newton's Optics, p. 277.); and by calculation this difference took place in the glass-plate, that was used at every 80th part of an inch of its whole length. The 12 rings, as well as the central colour of the secondary set, should consequently have been broken by the exertion of the fits at every 80th part of an inch; and from the space over which these rings extended, which was about .13 inch, it was found, that there must have been more than 10 such interruptions or breaks in a set of which the 308th part was plainly to be distinguished. But when the glass-

plate

plate was drawn gently over the ſmall mirror, keeping the ſecondary ſet of rings in view, their ſhape and colour were found to be always completely formed.

This experiment was alſo repeated with a ſmall plain glaſs, inſtead of the metalline mirror put under the large plate. In this manner it ſtill gave the ſame reſult, with no other difference but that only ſix rings could be diſtinctly ſeen in the ſecondary ſet, on account of the inferior reflection of the ſubjacent glaſs.

Our author next ſhews, that coloured rings may be completely formed without the aſſiſtance of any thin or thick plates, either of glaſs or of air. Sir I. Newton placed a concave glaſs mirror at double its focal length from a chart, and obſerved, that the reflection of a beam of light admitted into a dark room, when thrown upon this mirror, gave "four or five concentric iriſes or rings of colours like rainbows" (Optics, p. 265.); and he accounts for them by alternate fits of eaſy reflection and eaſy tranſmiſſion, exerted in their paſſage through the glaſs-plate of the concave mirror. Ibid. p. 277.

The duke de Chaulnes concluded from his own experiments of the ſame phenomena, that theſe coloured rings depended upon "the firſt ſurface of the mirror, and that the ſecond ſurface, or that which reflects them after they had paſſed the firſt, only ſerved to collect them, and throw them upon the paſteboard, in a quantity ſufficient to make them viſible." (Prieſtley's Hiſt. &c. p. 515.) Mr. Brougham, after having conſidered what the two laſt-mentioned authors had done, ſays, "that upon the whole there appears reaſon to believe, that the rings are formed by the firſt ſurface out of the light, which, after reflection from the ſecond ſurface, is ſcattered, and paſſes on to the chart." Phil. Tranſ. for 1796, p. 216.

Dr. Herſchel's experiment is as follows. He placed a highly poliſhed ſeven-feet mirror, but of metal inſtead of glaſs, that he might not have two ſurfaces, at the diſtance of fourteen feet from a white ſcreen, and through a hole in the middle of it, one-tenth of an inch in diameter, he admitted a beam of the ſun into his dark room, ſo directed as to fall perpendicularly on the mirror. In this arrangement the whole ſcreen remained perfectly free from light, becauſe the focus of all the rays, which came to the mirror, was by reflection thrown back into the hole through which they entered. After this preparation, an aſſiſtant ſtrewed ſome hair-powder with a puff into the beam of light, while he kept his attention fixed upon the ſcreen. As ſoon as the hair-powder reached the beam of light the ſcreen was ſuddenly covered with the moſt beautiful arrangement of concentric circles, diſplaying all the brilliant colours of the rainbow. A great variety in the ſize of the rings was obtained by making the aſſiſtant ſtrew the powder into the beam at a greater diſtance from the mirror; for the rings contract by an increaſe of the diſtance, and dilate on a nearer approach of the powder. This experiment, ſays our author, is ſo ſimple, and points out the general cauſes of the rings which are here produced in ſo plain a manner, that we may confidently ſay, they ariſe from the flection of the rays of light on the particles of the floating powder, modified by the curvature of the reflecting ſurface of the mirror. From this experiment our author concludes, that the principle of thin or thick plates, either of air or glaſs, on which the rays might alternately exert their fits of eaſy reflection and eaſy tranſmiſſion, muſt be given up: and that the fits themſelves of courſe cannot be ſhewn to have any exiſtence. It will hardly be neceſſary to add further, that the whole theory relating to the ſize of the parts of natural bodies and their interſtices, which ſir I. Newton has founded upon the exiſtence of fits of eaſy reflection and eaſy tranſmiſſion, exerted differently, according to the different thickneſs of the thin plates of which he ſuppoſes the parts of natural bodies to conſiſt, will remain unſupported; for if theſe fits have no exiſtence, the whole foundation on which the theory of the ſize of ſuch parts is placed, will be taken away, and it will be neceſſary to explore another baſis for a ſimilar edifice. This baſis, our author conceives, is to be found in the modifying power, which the two ſurfaces that have been proved to be eſſential to the formation of rings, exert upon the rays of light.

Our author having pointed out a variety of methods that ſerve to produce coloured concentric rings between two glaſſes of a proper figure applied to each other, and having proved that only two ſurfaces, namely, thoſe that are in contact with each other, are eſſential to their formation, proceeds in the inveſtigation of the ſubject to ſhew, that priſmatic phenomena aſſume the ſhape of rings, in conſequence of the ſole uſe of ſpherical curves in producing them. Our author found, by an appropriate experiment, that, as ſpherical curves gave circular rings, cylindrical forms produce ſtreaks; that cylindrical and ſpherical ſurfaces combined produce coloured elliptical rings; and that irregular curves produce irregular figures. Hence he infers, that the curvature of ſurfaces is the cauſe of the appearance, as well as of the ſhape of the coloured phenomena which are produced. If we can invariably predict, from the nature of the curves that are employed in an experiment, what will be the appearance and form of the colours that will be ſeen, it certainly muſt prove the efficacy of theſe curvatures in the production of ſuch phenomena. This concluſion is further confirmed by the conſideration, that coloured appearances cannot be produced between the plain ſurfaces of two parallel pieces of glaſs applied to one another.

Having proved that no more than two ſurfaces are eſſential to the formation of Newton's coloured rings, and that the configuration of the coloured phenomena ariſes from the curvature of one or both of the two eſſential ſurfaces, Dr. Herſchel infers from theſe principles, that we are to diſtinguiſh between the production of the colours and that of their configuration when produced. The cauſe of the configuration has been already explained; and our author next proceeds to inveſtigate the production and arrangement of the colours. The order of the colours is priſmatic; that is, red, orange, yellow, green, blue, indigo, and violet. Dr. Herſchel's experiments for aſcertaining this arrangement are too numerous and various to be here recited. We ſhall therefore ſtate the general propoſition, and ſpecify the reſults of the experiments by which it is eſtabliſhed. The general propoſition is, that the critical ſeparation of the colours, which takes place at certain angles of incidence, is the primary cauſe of the Newtonian coloured rings between optic glaſſes. The reſults of the experiments are as follow: theſe expeririments (for which we refer to Phil. Tranſ. for 1809, vol. xcix. pt. 2.) explain in what manner a critical ſeparation of the colours, which takes place at certain angles of incidence, is the cauſe of the appearance of the blue and red bows; ſince the different reflexibility of the rays of light, by which Newton has accounted for the blue bow, brings on a critical ſeparation of the blue colours, and ſince alſo the different intromiſſibility by which the author has explained the red bow, occaſions an equally critical ſeparation of the red ones. Dr. Herſchel has not only proved that all the various appearances, which were produced by convex glaſſes, may be equally

equally well obtained by the use of a prism, but he has also shewn, that the great simplicity of this valuable optical instrument has cleared up great difficulties, by pointing out to us that the colours which are modified into such various shapes, are in all prismatic experiments exclusively produced by the critical separation of the rays of light. As this fact must be admitted, it certainly will not be philosophical to look for a different cause of the same or similar effects, when convex glasses, which have all the required prismatic properties, are used to produce them. In order to shew the great similarity, or rather the identity of these effects, it will be sufficient to take the most simple case of each, namely, the coloured rings that are produced when a plano-convex lens is laid with its convex side upon a plain reflecting surface: and the coloured streaks which are produced when the base of a right-angled prism is in the same manner placed upon such a surface. The results of the experiments, with the reasonings annexed to them, are contained in the following propositions. The form of rings arises from the spherical figure of the lens: the right-lined appearance of the streaks is owing to the straight figure of the plain surface of the prism. The colour of the rings may suddenly be changed; the colours of the blue bow-streak may as instantly be converted into those of the red bow. The cause of the sudden change of the rings has been shewn to be that the sets of one colour are seen by reflection, and those of the other by transmission; it has also been shewn, that the blue bow-streaks are seen by reflection, and those of the red bow by transmission. In a lens we may, at the same time, see, in half the set, the colours of the reflected, and in the other half, the colours of the transmitted rings; and in a prism held before an open window, when the eye is close to it, and when half the bow falls on the side of the room, we may see blue streaks by reflection from half the blue bow, and green streaks by transmission from half the red bow. When deep convex, or concave, glasses are laid upon the first surface of a lens, the rings are not affected by it; and when the same glasses are laid upon the first surface of a prism the streaks remain unaltered. When the convexity of the lens, which is placed on the reflecting surface, is changed, the size of the rings is also changed; and when the angle of the prism is increased or diminished, the distance of the streaks undergoes a proportional alteration. When the lens is pressed upon the plain glass, the rings increase in diameter; and by a pressure of the plain glass against the prism the distance of the streaks grows larger. To form rings by a lens, scattered rays only are required: and the same light is best for the production of streaks by a prism. Many other instances of similarity might be adduced, but it is needless. Now, as it has been clearly proved, that the critical separation of the colours, which takes place at certain angles of incidence, occasions all the phenomena of the blue and red bows, and of the streaks, rings, and other regular or irregular appearances, that may be seen in a prism, it cannot be doubted that the Newtonian rings observed between object-glasses are owing to the same cause.

Dr. Herschel concludes an elaborate paper on this subject with the following remarks on the Newtonian alternate fits of easy reflection and easy transmission.

"In attempting to rescue the science of optics from what has been so long considered as unsatisfactory for explaining the great question about the cause of the coloured rings, I have made use of a principle, the effects of which have so near a resemblance to those of the supposititious fits of easy reflection and easy transmission, that the author of them might easily be misled by appearances. But although the principle of a critical separation of the colours, substituted for these fits, admits the reflection of some rays at the same angles of incidence at which others are transmitted, yet since the Newtonian different refrangibility of light will account for these critical reflections within glass, and equally critical intromissions from without, we can have no longer any reason to ascribe original fits to the rays of light, which in the first part of this paper they have already been proved not to possess, and which now, in all prismatic experiments, I have shewn are not necessary for explaining appearances that may be accounted for without them."

In the Philos. Transactions for 1810, vol. c. pt. 2, we have a third paper, as a supplement to the other two papers, containing additional observations on the cause of coloured concentric rings between object-glasses, and other appearances of a similar nature, in which Dr. Herschel further explains what some may have thought obscure, and obviates certain objections against his theory. His fundamental principle for explaining the colour of the rings, which he has illustrated both by reasoning and experiment, is this: that the colours in all prismatic phenomena are produced either by the interior critical separation arising from the different reflexibility of the rays which cause the blue bow, or by the exterior critical separation arising from the different intromissibility of the rays which cause the red bow. In this paper he subjoins some additional arguments to those before given, in order to prove, that there are two primary prismatic bows, a blue one and a red one; and he maintains, that the red bow is a phenomenon of equal originality with the Newtonian blue bow, and that as one of these bows cannot be the converse of the other, we have two critical separations essentially different, *viz.* the reflective and intromissive. But we must refer to the author's own account, *ubi supra*.

For an account of the rings of colours produced by electrical explosions, see COLOURS *of Natural Bodies*, CIRCULAR *Spots*, and FAIRY *Circles*.

RINGS *of Flies*, in *Natural History*, the several rounds or circular portions, of which the bodies of these and other insects are composed.

In the fly kind these are crustaceous or cartilaginous, and consequently of a matter little capable of extension; many actions of these insects require, however, that their bodies, or a part at least of their bodies, should be able to inflate or distend, and contract their size occasionally. Were every ring of the body one entire scale, or shelly substance, these changes could not be easily effected; nature has therefore so provided, that the tender bodies of these little creatures are sufficiently defended, and yet all the necessary motions may be performed.

RING, in *Agriculture*, a sort of hoop made of iron, which is used for various purposes, as fastening horses and cattle by in the stalls. In these cases they should be made large and strong.

RING, in *Commerce*, a term used in reckoning at Hamburgh, and is equivalent to 240 of things that are sold by number. Staves are sold in rings of 4 schoaks (a schoak being 60) and 8 pieces: 3 rings of hogshead staves, or 6 rings of barrel staves, are reckoned equal to 2 rings of pipe staves.

RING, a stout circle of iron in the upper part of the shank of an anchor, to which the cable is bent.

RINGS are also circles of iron or other metal, let over the points of bolts, whereon they are clenched, to prevent their drawing. Hatch-rings, or ring and starts, are those which are fixed in the hatches or scuttles to open or shut them with.

RINGS *in Timber*, in *Rural Economy*, the concentric layers by which the wood is formed. These rings are, according to Dr. Darwin, annually produced from the alburnum, and are

are ſuppoſed to be thicker on that ſide of the trunk of the tree which has a ſouthern aſpect than on the contrary, and thicker in thoſe ſummers moſt favourable to vegetation than in others. It is added, that theſe rings, as they loſe their vegetable life, and at the ſame time a part of their moiſture, by evaporation or abſorption, gradually become harder and of a darker colour, inſomuch, that by counting their number, it is ſaid, that not only the age of the tree, but the mildneſs or moiſture of each ſummer, during the time of its growth, may be eſtimated by the reſpective thickneſs of the rings of timber.

RING, *Baſe*. See BASE.

RING-*Bolt*, in a *Ship*, is an iron bolt with an eye at one end, in which is fitted a circular ring, and uſed for various purpoſes; particularly for hooking the tackles, by which the cannon of a ſhip is managed and ſecured. They are driven by the ſides of the gun-ports in ſhips for ſecuring the guns; and in the deck for ſtopping the cable, and are therefore called ſtopper-bolts. The rings are ſometimes made angular, to receive many turns of laſhing; ſuch are the ring-bolts driven through the ſhip's ſide along the waiſt for laſhing the booms and ſpare anchors.

RING-*Bone*, among *Farriers*, &c. a hard callous ſubſtance, growing in the hollow circle of the little paſtern of a horſe, above the coronet.

It ſometimes goes quite round, like a ring, whence its name; ſometimes it is hereditary, derived from the ſtallion or mare; but it oftener comes by accident, as from a ſtrain, a blow of a horſe, &c.

RING, *Corniche*. See CORNICHE.

RING-*Dial*. See DIAL.

RING-*Dove*. See DOVE, and COLUMBA *Palumbus*.

RING, *Fairy*. See FAIRY.

RING-*Head*, an engine uſed in ſtretching of cloth.

RING, *Natal*. See NATAL.

RING *Ouzel* or *Amſel*. See OUZEL, and TURDUS *torquatus*.

RING, *Reinforce*. See REINFORCE.

RING-*Ropes*, in a *Ship*, ſhort pieces of rope, tied occaſionally to the ring-bolts of the deck, to faſten the cable more ſecurely, when the ſhip rides in a tempeſt, or turbulent ſea, or rapid current. They are uſed more particularly in veering away the cable gradually in thoſe circumſtances, in order to freſhen the hauſe.

RING-*Scalpel*. We have a deſcription and a figure of a ring-ſcalpel, for aſſiſting the delivery of women in childbirth, by Dr. Thomas Simſon, in the Medical Eſſays of Edinburgh, vol. v. art. 39.

RING-*Tail*, in *Ornithology*, the Engliſh name for the *ſubbuteo*, or *pygargus accipiter*; which has been generally ſuppoſed to be the female of the hen-harrier; but males have lately been found of this ſpecies. See FALCO *Pygargus*.

The ring-tail is a moderately large bird. It has a ſort of ring, or chain of feathers, round the back part of its head, reaching to its chin on each ſide, which ſtand erect, and are brown in the middle, and of a reddiſh-white at the edges, and make a ſort of crown, which ſurrounds the head; on the top of the head and cheeks the feathers are duſky, bordered with ruſt-colour; under each eye is a white ſpot; the back is duſky, the rump white, with oblong yellowiſh ſpots on each ſhaft; the tail is long, and its tip white; the breaſt and belly are of a yellowiſh-brown, marked with oblong duſky ſpots; its legs are yellow, and the inſide of its mouth is black; it feeds on ſmall birds, and its eggs are of a reddiſh hue, with very little clear white appearing in them. Theſe birds fly higher than the hen-harrier, and ſometimes perch on trees.

RING-*Tail Eagle*. See *White-tailed* EAGLE, and FALCO *Albicilla*.

RING-*Tail*, in a *Ship*, is a quadrilateral ſail, occaſionally hoiſted abaft the after-leech of the boom-mainſails, to which the fore-leech is made to correſpond. The head is bent to a ſmall yard at the outer end of the gaff, and the foot is ſpread on the boom, which is prolonged by a piece laſhed to the outer end. A triangular ſail of this ſort is uſed in light favourable winds, extended on a ſmall maſt, occaſionally erected for that purpoſe on the taffarel of ſmall veſſels.

RING, *Trunnion*. See TRUNNION.

RING-*Walk*, among *Hunters*, a round walk. See HUNTING.

RING-*Worm*, in *Medicine*. See RINGWORM.

RING *Iſland*, in *Geography*, a ſmall iſland off the coaſt of Maſſachuſetts, oppoſite to Newbury port, to the eaſtward.

RINGAN, a town of Germany, in the principality of Culmbach; 14 miles S. of Culmbach.

RINGANDEE, a town of Bengal; 30 miles W. of Rogonatpour.

RINGELBERGIUS, JOACHIM-FORTIUS, in *Biography*, vernacularly Sterck, an eminent Flemiſh philoſopher and mathematician, who flouriſhed in the 16th century, was born at Antwerp. He was patronized by the emperor Maximilian I., in whoſe palace he had an apartment, and he there received his firſt inſtructions in the rudiments of learning. When he was ſeventeen years of age, he was ſent to the univerſity of Louvain, where he ſtudied the learned languages, philoſophy, and the mathematical ſciences. He became a public profeſſor in that univerſity, and taught rhetoric, coſmography, the mathematics, and the Greek language, with very high reputation. So numerous were the claſſes which attended his lectures, that they frequently occupied his attention twelve hours every day, for a month together. In the year 1528 he went into Germany, and taught the mathematical ſciences and the Greek tongue in various ſeminaries of that country. From Germany he went to France, where he filled the profeſſor's chair at Paris, Orleans, Bourdeaux, and other places. He died about the year 1536. He wrote a number of eſteemed works, which were publiſhed at Baſil, Antwerp, and other places, and reflected honour on his learning and judgment. The titles of ſome of them are, "De Ratione Studii;" "De Uſu et Differentiis vocum quarundam apud Latinos;" "De Uſu Vocum quæ non flectuntur;" "Grammaticæ Græcæ Elementa;" "Dialectica, et Tabulæ Dialecticæ;" "De conſcribendis Epiſtolis Lib.;" "Rhetoricæ, et quæ ad eam ſpectant;" "Sententiæ;" "De Formis dicendi, Lib.;" "De Periodis;" "Synonyma;" "Sphæra, ſive Inſtitutionum Aſtronomicarum, Lib. iii.;" "Coſmographia;" "Optica;" "Chaos Mathematicum;" "Arithmetica." The whole of his works were collected and publiſhed at Leyden, in 1531.

RINGELSLOFF, in *Geography*, a town of Auſtria; 4 miles E.N.E. of Ziſterſdorff.

RINGEN, a town of Ruſſia, in the government of Riga; the birth-place of the empreſs Catharine I., near Dorpat.

RINGENDORF, a town of France, in the department of the Lower Rhine; 7 miles W. of Haguenau.

RINGENT COROLLA, in *Botany* and *Vegetable Phyſiology*, named from its reſemblance to the mouth and ſnout of ſome animal; ſee COROLLA. Certain Engliſh authors, literally tranſlating the original word (*ringens*), uſe the ludicrous term of *a grinning corolla*.

RIN-

RINGENTHAL, in *Geography*, a town of Saxony, in the circle of Erzgebirg; 1 mile N. of Mitweyda.

RINGERIKE, a town of Norway; 24 miles N.N.E. of Chriftiania.

RINGES, in *Rural Economy*, a provincial term, fignifying rows of hay, mown corn, quicks, &c.

RINGKIOBING, in *Geography*, a town of Denmark, on the coaft of a large gulf of the North fea, to which it gives name. The inhabitants are almoft wholly employed in trading to Holland and Norway. The bay affords plenty of good fifh, particularly oyfters. It is of a good depth, and fecure, except at the entrance, which is rendered dangerous by fand-banks; 48 miles N.W. of Ripen. N. lat. 56° 2′. W. long. 8° 18′.

RINGLEBEN, a town of Saxony, in the principality of Eifenach; 6 miles N. of Erfurt. N. lat. 51° 6′. E. long. 11° 2′.

RINGO's Town, a town of America, in Hunterden county, New Jerfey; 15 miles N.W. of Princeton.

RINGSTED, a town of Denmark, in the ifland of Zealand, anciently a large city, but reduced by fires into a fmall town: but it is ftill famous for its court of judicature, to which lies an appeal from almoft all the courts of Zealand, whereas no appeal lies from this but to the fupreme court at Copenhagen; 29 miles S.W. of Copenhagen. N. lat. 55° 28′. E. long. 11° 48′.

RINGWOOD, a town of America, in Hunterden county; 25 miles N. of Morriftown, containing 2605 inhabitants.

Ringwood, a market-town and parifh in the hundred of Ringwood, New Foreft, weft divifion, county of Southampton, England, is fituated on the eaftern bank of the river Avon, at the diftance of 14 miles W. by S. from Southampton, and 90 miles S.W. by W. from London. This town is of great antiquity, and is fuppofed by Camden to have been the Regnum of the Romans, which others, however, have fixed, with greater probability, at Chichefter, in Suffex. But whatever it may have been during the Roman government, it unqueftionably attained confiderable importance in the time of the Saxons; and in Domefday book, it is eftimated at a higher value than Thuinam, or Chriftchurch.

Ringwood is noted for its breweries of ftrong beer and ale. A market is held here on Wednefday, weekly; and there are fairs on the 10th of July, and 11th of December. The petty feffions for New Foreft, weft divifion, are holden in this town. The unfortunate duke of Monmouth is very generally ftated to have been taken in a field near Ringwood, after his defeat at Sedgemoor; but this ftatement is erroneous, that prince having been actually feized in the woodlands in Dorfetfhire. According to the parliamentary returns of 1811, the town and parifh contained 658 houfes, and a population of 3269 perfons.

North from Ringwood is the village of Ellingham, where formerly was a religious houfe, founded by William de Salariis, in the reign of Henry II., and appropriated as a cell to the abbey of St. Saviour le Vicompte, in Normandy. When the alien priories in this country were diffolved, Henry VI. granted Ellingham and its poffeffions to the college at Eton. Some remains of the buildings of this eftablifhment are fuppofed to form the nave of the prefent church, and the opinion is certainly not improbable, as it is more ancient than the reft of the fabric. The altar-piece here is a painting of the Day of Judgment, prefented to the parifh by the late lord Windfor, whofe anceftor, brigadier Windfor, brought it from Port St. Mary, in the bay of Cadiz, among the trophies of an expedition againft that city in the year 1702. In the church-yard is a plain ftone, to the memory of dame Alicia Lifle, whom the blood-thirfty Jeffreys condemned to be executed in her old age, on a charge of harbouring known rebels in her manfion at Moyles-Court. This manfion is ftill ftanding, furrounded by a very pleafant, but fmall, park. Its former poffeffors, the Lifles, were originally fettled in the Ifle of Wight, where they had large eftates, and whence they derived their name. Colonel John Lifle, hufband to the above-mentioned Alicia, was one of the judges who paffed fentence on king Charles I. and alfo one of the lords commiffioners of the great feal during the protectorate of Cromwell. On the eve of the reftoration he fled to the continent, was profcribed by the parliament of Charles II., and affaffinated at Laufanne, in Switzerland, by three villains, hired for that purpofe by fome of the royal family, or their friends. Beauties of England and Wales, vol. vi. by John Britton, F.S.A. and E. W. Brayley, Lond. 1805.

RINGWORM, in *Medicine*, a popular appellation, applied to various fuperficial affections of the fkin, which affume fomewhat of a circular form. But the fact is, that almoft all the partial cutaneous difeafes have more or lefs a tendency to the annular figure, and rife in fomewhat irregular patches, approximating to the oval or the circle, which is fometimes perfect, and fometimes broken. It is only by referring to an intelligible nomenclature, fuch as that propofed by the late Dr. Willan, that any difcrimination can be clearly made in the varieties of thefe eruptions. If we examine thefe ringworms according to this fyftem, we fhall find, that there are feveral difeafes, to which the term is applicable, and daily applied, and confequently the fame remedies recommended for their cure, which are, neverthelefs, very different in their nature, and therefore require very different modes of treatment. Thus there is a circular eruption, which confifts of patches of *pimples*, the lichen circumfcriptus of Dr. Willan; even the *fcaly* lepra occurs in circles of various fizes, and is fometimes called ringworm: the *puftular* difeafe, called impetigo figurata, or moift tetter, and the *veficular* eruption termed herpes circinatus, (fee Dr. Bateman's Pract. Synopf. of Cutan. Difeafes,) are alfo diftinguifhed by their circular form, and it is to thefe two laft that the term *ringworm* is moft popularly applied. And above all, the contagious difeafe of the fcalp, the porrigo fcutulata, is fo diftinctly circular in its form, as to be diftinguifhed from the other fpecies of the fame diforder, by the appellation of *ringworm*, or by fome the *ringworm of the fcalp*. See the fame Synopfis, ord. v. gen. 2. See alfo Porrigo, Lichen, Herpes, &c. above.

The general treatment recommended for ringworms by the vulgar, is the application of common *ink*; and this, by its aftringency, which is flight, may be partially ufeful in the decline of the *herpetic* ringworm, above-mentioned, or in the mildeft forms of that of the fcalp: but it will be certainly injurious if applied to the moift *tetter*, or to the *lichen* in its early ftage; and the fame effect can be produced by fimilar aftringents, in a more manageable and lefs dirty form; as by folutions of the fulphate of iron or zinc in rofe-water or other diftilled water. But in fact, the ringworm of the fcalp requires much more active remedies, on the one hand; and on the other, the herpetic ringworm difappears in a fhort time fpontaneoufly; fo that the remedy may be deemed in both cafes ufelefs. It is obvious, then, that difeafes, which are puftular, fcaly, veficular, and papular refpectively; fome of which are inflamed, and others not; fome contagious, and others not; fome difappearing fpontaneoufly, and others refifting the moft active applications; fome connected with diforder of the conftitution, and others merely local, cannot be treated with advantage, or even with impunity, by the ſame ſet of medicines, and ought not to be confounded under the ſame appellation; but popularly, the *name* of a diſeaſe is alone inquired for, and the remedy is appropriated to the name. By diſcarding the term ringworm, or uniting with it the epithets puſtular, veſicular, or herpetic, porriginous, &c. this practical error may be avoided.

RINLING, or AINLING, in *Geography*, a town of Bavaria; 8 miles N.N.W. of Aicha.

RINNE, a river of Thuringia, which runs into the Saale, two miles below Rudelſtadt.

RINOREA, in *Botany*, a name of uncertain derivation, but probably beſtowed on this genus by Aublet, from its native appellation in Guiana.—Aubl. Guian. 235. Juſſ. 287. Lamarck Dict. v. 6. 211. Illuſtr. t. 134.—Claſs and order, *Pentandria Monogynia.* Nat. Ord. *Berberides*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, villous, cloven into five, oblong, acute ſegments. *Cor.* Petals ten, concave, ovate, oblong; the five inner ones ſmaller; all inſerted below the germen. *Stam.* Filaments five, ſhort, inſerted at the baſe of the outer petals; anthers oblong, two-celled, with two valves burſting from the baſe to the top. *Piſt.* Germen ſuperior, roundiſh, villous; ſtyle oblong, villous; ſtigma obtuſe. *Peric.* unknown.

Obſ. Juſſieu deſcribes *Rinorea* as having five longer petals, each furniſhed with an inner one at its claw or baſe.

Eſſ. Ch. Calyx five-cleft. Petals ten, the five inner ones ſmaller. Style one Stigma one.

1. R. *guianenſis.* Aubl. Guian. t. 93.—Native of cultivated ground in Guiana, where it flowered in January.—A *tree* ſix or ſeven feet high, whoſe *trunk* is branched very thickly, to the very ſummit, in a ſtraight alternate manner. *Leaves* alternate, ſtalked, ovate-oblong, acute, toothed. *Stipulas* ſhort, deciduous. *Flowers* white, in axillary, terminal cluſters, each placed on a ſhort ſtalk, which is furniſhed with two ſcales at its baſe.

RINTELN, in *Geography*, a town of Germany, in the county of Schauenburg, ſituated on the S. ſide of the Weſer. The univerſity of Stadthagen was removed to this town in the year 1621; its profeſſors of divinity are Lutheran, but thoſe of the other faculties are Calviniſts. The town church belongs to the Lutherans; the Calviniſts and garriſons uſe the univerſity church for their ſervice. The ramparts, ditches, and bulwarks, that environ the town, were begun in 1665, and finiſhed in 1668. The inhabitants are chiefly employed in agriculture, breeding of cattle, and brewing; 9 miles S.S.E. of Minden. N. lat. 52° 11′. E. long. 9° 8′.

RINUCCINI, OTTAVIO, in *Biography*, an Italian poet of Florence, who went into France in the ſuite of Mary of Medicis, queen to Henry IV. He was the inventor of the muſical drama or opera, that is, of the manner of writing or repreſenting comedies or tragedies in muſic, to which the firſt recitative was applied. (See RECITATIVE.) Others give this invention to a Roman gentleman of the name of Emilio del Cavaliere, who was more properly the inventor of the ſacred drama or oratorio, in a ſimilar ſpecies of muſic or recitative, ſo nearly at the ſame time, that it is difficult to determine which was firſt: both had their beginning in 1600. See CAVALIERE, and ORATORIO.

It is certain that Rinuccini was author of three lyric pieces, "Daphne," "Euridice," and "Ariadne," which all Italy applauded. Euridice, written for the nuptials of Mary of Medicis, was firſt performed with great ſplendour and magnificence at Florence, at the court and expence of the grand duke.

The poetry of Rinuccini is truly lyrical, ſmooth, poliſhed, and mellifluous. He died in 1621, at Florence; and his works were publiſhed in 1622, in the ſame city, in 4to. by his ſon, Pietro Franceſco Rinuccini. The family is noble, and was ſubſiſting in 1770.

RINVEEL POINT, in *Geography*, a cape of Ireland, in the county of Galway, N. of Ballinakiel bay. N. lat. 53° 41′. E. long. 9° 58′.

RINUM, a town of Perſia, in the province of Segeſtan or Seiſtan; 60 miles E.N.E. of Zareng.

RIO *de los Anzuelos*, a river of Mexico, which runs into the Spaniſh Main, N. lat. 11° 10′.—R. *dos Apoſtolos*, a river of North America, which runs into the northern part of the gulf of California.—R. *de Bogota*, a river of New Granada, which collects all the waters of the valley of Bogota, the bottom of which valley, according to Humboldt, is no leſs than 7460 feet above the level of the ſea, and finds its way through the mountains to the S.W. of the town of Santa Fé. (See BOGOTA.) The perfect level of the plain, its geological ſtructure, and the form of the rocks, which reſemble ſmall iſlands in the middle of the Savannahs, appeared to M. Humboldt to indicate the exiſtence of an ancient lake. If the ſingle outlet of the river were to be ſtopped, the valley would again be converted into a lake. The river, where it leaves the valley, is about 144 feet wide, half the breadth nearly of the Seine at Paris, between the Louvre and the Palace of the Arts. It then enters into a narrow rocky channel, not more than 40 feet wide, which appears, ſays the ſame intelligent and inſtructive traveller, to have been formed by an earthquake. After running for a little way in this crevice, the river precipitates itſelf, at two bounds, to the depth of 574 feet. After this tremendous fall, it purſues its way to the Magdalena, about 50 miles, ſtill deſcending with great rapidity, and at the rate of 150 feet to a mile. Although this is not the greateſt fall in the globe, there is not probably any which, from ſo great a height, precipitates ſo large a body of water. Bouguer makes the height between 1500 and 2000 feet; but he ſpeaks only from the information of others who had ſeen the fall, and pointed out to him ſuch heights as they thought might be nearly equal to it. The accompaniments of this waterfall, upon which the effect ſo much depends, are an aſſemblage of every thing that is ſublime, beautiful, and pictureſque. Independent, ſays M. Humboldt, of the height and the ſize of the column of water, the figure of the landſcape, and the aſpect of the rocks; the peculiar character ſtamped on theſe great ſcenes of nature is owing to the luxuriant form of the trees and herbaceous plants, their diſtribution into groups, or into ſcattered thickets, the extent of the craggy precipice, and the freſhneſs of vegetation. Another feature in the character of this extraordinary cataract is probably quite peculiar to it:—the water deſcends from a cold region to a warm one. The plain of Bogota, eſpecially near the fall, is extremely fertile, and is ſuppoſed to owe ſome of its fruitfulneſs to the irrigation occaſioned by the great quantity of water from the fall, which is diſſolved in the air, and afterwards precipitated. The fine crops of wheat, the oak, the elm, and other plants, recall to mind the vegetation of Europe. Looking down from this terrace, one ſees, with ſurpriſe, at the bottom, a country producing the palm, the banana, and the ſugar-cane. This cannot ariſe from the difference of height; as it is known, that no very great change of temperature can be produced by a difference of level of 570 feet. M. Humboldt ſuggeſts, that it is probably owing to the ſhelter which

which the high country affords to the low. It is one of the circumftances that has added much to the marvellous height of the cataract; as the height is naturally fuppofed to be great, that carries one at once from the temperature of Europe, and one where the thermometer is fometimes at the freezing point, to that of the torrid zone. Although the river lofes a great part of its water in falling, which is reduced into vapour, the rapidity of the lower current forces the obferver to keep at the diftance of 150 yards from the bafin dug out by the fall. The folitude of the place, the richnefs of the vegetation, and the dreadful roar that ftrikes the ear, contribute to render the foot of the cataract of Tequendama one of the wildeft fcenes that can be found in the Cordilleras. (Humboldt's Refearches, &c. tranflated by Helm M'Williams, Lond. 1814.)—R. *Bueno*, a river of the ifland of Jamaica, which runs into the fea on the north coaft, N. lat. 18° 30′. W. long. 77° 19′.—R. *de Cedros*, a river of South America, which runs into the Pacific ocean, N. lat. 2° 30′.—R. *Cobre*, a river of Jamaica, which paffes by Spanifh Town, and runs into the fea, 4 miles N.W. of Kingfton.—R. *del Conches*, or *de Salinas*, a river of Mexico, which joins the Brava at its mouth.—R. *Dolce*, or *Frefh-water river*, a river of Brazil, which runs into the Atlantic, S. lat. 19° 20′.—R. *Dolce*, or *Dulce*, a river of South America, in the province of Tucuman, formed by the confluence of feveral rivers. After paffing by St. Yago del Eftero, &c. and purfuing a courfe of about 300 miles, it lofes itfelf in a falt lake, S. lat. 30° 40′.—R. *de los Draces*, a river of Mexico, which runs into the Spanifh Main, N. lat. 9° 45′.—R. *dos Efmeraldas*, a river of America, on the ifthmus of Darien, which runs into the Pacific ocean, N. lat. 2° 42′.—R. *dos Efmeraldos*, a river of Peru, which runs into the Pacific ocean, N. lat. 0° 57′.—R. *Frifco*, a river of Africa, which runs from the Ivory coaft into the Atlantic, N. lat. 5° 8′. W. long. 5° 55′.—R. *dos Galinas*. See Magualbari.—R. *Grande*, a river of South America, which runs into the Spanifh Main, between Carthagena and St. Martha.—Alfo, a river of the ifland of Jamaica, which runs into the fea, on the N. coaft, N. lat. 18° 15′. W. long. 76° 14′.—R. *Grande*, or *Civdad Nova*, a town of Brafil, in the jurifdiction of Fernambuco, formerly the feat of a jurifdiction. S. lat. 5° 44′.—R. *Grande*, a river of Brafil, fcarcely deferving the name, the mouth of which is fituated in S. lat. 3° 2′.—Alfo, a river of Africa, which paffes the coaft of Zanguebar, and runs into the Indian fea, forming the iflands of Patta and Lamo at its mouth. S. lat. 2° 5′. E. long. 41° 30′.—Alfo, a river of Africa, navigable for boats near 400 miles from the mouth, which lies on the Atlantic, N. lat. 11°. W. long. 14° 36′.—Alfo, a river of America, which rifes in the ifthmus of Darien, and runs into the Pacific ocean, three miles W. of Panama. See alfo Vermejo, Patixa, and Hacha.—R. *Hondo*, a river of Yucatan, which runs into the bay of Honduras.

Rio *de Janeiro*, a jurifdiction or independent government of Brafil, fo called by the Portuguefe when they became mafters of the country, from the river Janeiro, which runs through the middle of it; and the river probably derived its name from its having been difcovered on the day of the feaft of St. Januarius, or on the 1ft day of January, in 1516, by Solis. The province and the river are called by the natives "Genabara." At the mouth of the river, on the eaft fide, is the fort of Santa Cruz, and on the weft, that of St. Jago, together with the capital. The rivers in this government are few, and none of them large, except the Janeiro, which is rather a falt bay or gulf than a river, and two rivers that difcharge themfelves into this bay. At the mouth of it are feveral fmall iflands, that render its entrance fomewhat difficult and dangerous. Although the foil of this province is for the greateft part rich and fertile, the inhabitants manifeft little induftry either in the cultivation of the foil or the improvement of the country. It confifts chiefly, at leaft near the capital, in raifing garden vegetables for the whites, and rice and manioc for the blacks. Wheat is found to grow in other parts of the Brafils, with an increafe beyond what is known in Europe. A corn-mill, diftinguifhed by the fimplicity of its ftructure, attracted the notice of fir George Staunton; and he has thought it worthy of being defcribed. A wheel, a few feet only in diameter, was placed horizontally, much below the current of a ftream, as it fell from a fteep bank, and was received in hollows, 10 or 12 in number, fo obliquely fcolloped into the upper rim of the wheel, as to impel it to a quick rotatory motion, while its upright fhaft, paffing through an opening in the centre of an immoveable mill-ftone above the wheel, but of a narrower diameter, was fixed to a fmaller mill-ftone, which, forced round with the motion of the wheel and dependent fhaft, crufhed between it and the larger ftone beneath, the grain infinuated between them from a hopper. Thus that effect was produced by one wheel only, which is generally the refult of a much more expenfive and complicated machinery. A fimilar mill, it is faid, is in ufe in the Crimea. A foreft, not far from the capital, was found, by fir George and his affociates, to abound in palms and maftic wood; alfo mango and gouyava trees are found growing to the fize of trees, befides many other vegetables, never obferved before by thofe who were then travelling through it. The ipecacuanha plant is faid to grow at St. Catharine's within the government of Rio. The fize and vivid hue of many of the flowers throughout the foreft, and the gaudy plumage of the birds, which came occafionally in fight, were very ftriking. The woods, it is faid, abound in fnakes, fome of which are extremely large and formidable. But their hiffing noife puts thofe who hear it on their guard, and they feldom, without provocation, advance to an attack. The foreft now mentioned led to the cultivated valley of "Tijouca," fituated, as it were, in the bottom of a funnel, being furrounded on all fides by mountains, excepting to the fouthward, where a fmall opening admitted an arm of the fea. The valley was watered by a clear ftream, which, upon firft entering it, was precipitated down a fteep and broad rock of granite, forming a magnificent cafcade. Very little labour appeared neceffary in the plantations of Tijouca. Indigo, manioc, coffee, cacao, and chocolate-trees, fugar-canes, plantains, and orange and lime-trees, were commonly feen all growing promifcuoufly, and fome fpontaneoufly, in the fpace of 20 fquare yards. Coffee and indigo were the principal objects of attention. The temperature of the valley was exceffively hot, on account of its confined fituation, and the reflection of the fun's rays from the fides of the mountains, which in many places were very rocky. Fahrenheit's thermometer, about four in the afternoon, ftood, in the fhade, at 88°. Several diftricts of the government of Rio produced cotton, fugar, coffee, and cacao or chocolate, rice, pepper, and tobacco, in great abundance. That of Rio Grandé yielded plenty of excellent wheat. The vine grew in great perfection; but the grape is not fuffered to be preffed for wine, as fuch a procefs might interfere with the fale of the fame article from Portugal. But probably lefs caution may be exercifed in this refpect fince the removal of the Portuguefe government to the Brafils. Moft of the land, as far as Cook and his companions had an opportunity of obferving it, was laid down in grafs, upon which cattle were paftured in great plenty; but they were fo lean, that an Englifhman would fcarcely eat their flefh: the herbage of thefe paftures confifts chiefly of creffes, and confequently is fo fhort, that though it may afford a bite for horfes and fheep, it can hardly be grazed by horned cattle in a fufficient quantity for keeping them alive. For other particulars relating to the climate, productions, commerce, and inhabitants of this province, fee BRASIL, and the next article.

RIO *de Janeiro*, a city of Brafil, and capital of the abovementioned government, and alfo of the whole country, and the Portuguefe dominions in America, fituated on a river, or rather an arm of the fea, of the fame name. Formerly Bahia dos Todos, or Santos, was the principal feat of government, and chief mart for commerce in the Brafils; but the difcovery and improvement of the gold and diamond mines, within about 100 leagues of Rio de Janeiro, and communicating immediately with it, gave a decided preponderancy to the latter. The city ftands on a plain, clofe to the fhore, on the W. fide of the bay, at the foot of feveral high mountains which rife behind it. It is neither ill-defigned nor ill-built; the houfes in general are of ftone, and two ftories high; every houfe having, after the manner of the Portuguefe, a little balcony before its windows, and a lattice of wood before the balcony. Its circuit was computed by lieutenant, afterwards captain, Cook, to be about three miles, and it appeared to be equal in fize to the largeft country towns of England, Briftol and Liverpool not excepted; the ftreets are ftraight, and conveniently broad, interfecting each other at right angles; moft of them, however, lie in a line with the citadel, called St. Sebaftian, which ftands on the top of a hill, that commands the town. The harbour is fafe and capacious, and very convenient for commerce. Captain Mackintofh, from experience, recommends to fhips bound for this harbour, after getting in with cape Frio, inftead of fteering along fhore, to fhape their courfe between S.W. and S.W. by W. for 12 or 14 leagues. To this diftance the land wind extends. The forenoons in general are calm, but almoft every afternoon a frefh fea-breeze fets in from the S.W. It is proper to fteer, in a direct courfe, from hence to the fmall iflands lying under the great inclining Sugar-loaf on the weftern fide of the entrance into Rio harbour. From thefe fmall iflands the wind will carry the fhip to the oppofite fide of the harbour's mouth, where the fort of Santa Cruz is fituated, and which may be approached within 50 yards, and from thence, fafely and quickly, into harbour. The entrance of the harbour, as fir Erafmus Gower obferves, will fhew itfelf by difcovering the caftle or fort of Santa Cruz, and a fmall fortified ifland, called Fort Lucia, nearly abreaft of it. Between thefe is the channel into the harbour, near a mile wide; both fhores are fteep; that of Santa Cruz is perpendicular, there being fix fathoms in the wafh of the fea. The narrownefs of the channel caufes ftrong tides; but as the fea-breeze blows frefh, they do not impede entering into the harbour. In going in it is beft to keep mid channel, or even nearer to Santa Cruz. About four miles outfide the harbour's mouth, the depth of water is 18 and 19 fathoms, which will decreafe gradually to 8 or 7; and this, being the fhalloweft part, may be called the bar, which is about two miles outfide the fort. The water again deepens, on approaching to Santa Cruz, to 17 and 18 fathoms, nor will lefs be found in the fair way of the great road. Large fhips may moor in fhoaler water, but that depth, or thereabouts, is more advifeable, as fuch a fituation affords the full advantage of the fea-breeze, as well as that of avoiding the infects, which are very troublefome when nearer to the fhore. In the inner harbour, formed by an ifland called "Ilheo dos Cobras," or Serpent ifland, are proper wharfs for heaving fhips down by; but the mode of doing it alongfide hulks is now preferred. In the fame harbour will fhips anchor, which are loading or unloading goods, or want repairing; but the outer is the more healthy fituation. Rio is fituated in S. lat. 22° 54′, and W. long. 42° 44′. The variation of the compafs is 4° 55′ W. of the pole. The tide flows $7\frac{1}{2}$ hours, and rifes about $5\frac{1}{2}$ feet perpendicular. Fahrenheit's thermometer, during fir G. Staunton's ftay, was between 77° and 82°.

The entrance into the harbour, from the fea, is bounded, on one fide, by the leaning cone already mentioned, meafuring 700 feet in height, and by the huge mafs of granite, fupporting the caftle of Santa Cruz, on the other; and is interrupted, near the middle, by the little ifland on which Fort Lucia is erected. On entering into the harbour it was found to enlarge to a width of three or four miles, and to penetrate, in feveral branches, farther than the eye could reach. It is interrupted with many iflands, fome entirely green, and fome covered with batteries or habitations. The fhores of the harbour were diverfified and embellifhed with villages, farms, and plantations, feparated by rivulets, ridges of the rocks, indentures of little fandy bays, or the fkirtings of a foreft; the whole terminated, in diftant profpect, by an amphitheatre or fcreen of mountains, rifing in a vaft variety of rude and fantaftic forms, but covered with trees to their very fummits.

Within four miles of the harbour's mouth is fituated, on the W., the city of St. Sebaftian, ufually called Rio, built on a projecting tongue of land; but all the ground behind it is broken into hills and rocks, with woods, houfes, convents, and churches on their tops. A convent of Benedictines, and alfo a fort commanding the town, are fituated upon the extreme point jetting into the harbour; oppofite to this point is Serpent ifland, between which and the town is a narrow channel, fufficiently deep, however, for the paffage of the largeft fhips. Upon the ifland are, a dock-yard, magazines, and naval ftore-houfes; and round its fhores are the ufual anchoring places for the fhipping which frequent this port. Beyond the town the harbour begins to widen confiderably, and refembles a large lake with many iflands upon its furface. In the late improved ftate of the town, the ftreets are paved, with the addition of foot-paths, and though fome of them are narrow, they are convenient in a hot climate by the fhade which they afford. In the fquares are refrefhing fountains, which fupply the water conveyed to them by an aqueduct of confiderable length; a circumftance of moment, as Rio has no river clofe to it of any note. This aqueduct is carried over vallies by a double row of arches, one placed above another; and thus prefents a ftructure that adds great ornament to the town. A guard conftantly attends at the fountains throughout Rio, to regulate the diftribution of the water, which is, probably, fcanty, as there are people who wait a long time with buckets for their fhare. A fufficient proportion of the water from the fountain upon the quay oppofite to the palace, is allotted for the ufe of the fhipping, and is conveyed to the cafks, remaining in the boat, by means of a woollen or canvas tube, called a hofe, ftretching from the fountain to the cafk. Capt. Cook complained that the water was not good; but this circumftance fir Erafmus Gower afcribes to fome accidental impurities that muft have remained in the cafks which he filled with it.

The fhops of Rio, fays Staunton, were full of Manchefter manufactures, and other Britifh goods, even to Englifh prints, both ferious and caricature. A Portuguefe merchant adverting to thefe fupplies of goods, and the advantages gained by the country that furnifhed them, obferved that the profperity both of Portugal and its dependencies redounded

redounded chiefly to the benefit of England. The benefit has probably been reciprocal; and, it is hoped, will thus continue. The exterior appearance of the inhabitants indicated eafe and comfort; their dwellings were generally in good condition, many of them large, and well adapted to the climate; the magazines and markets well ftored with merchandize; new buildings, private and public, erected; tradefmen bufily employed; and befides the aqueduct and fountains, which adorned the city, it had fome public walks, and a fpacious quay of granite, of which material, found upon the fpot, many of the chief edifices were conftructed. The place, however, is faid to be unhealthy; and inftances of longevity are rare. This infalubrity may be owing, perhaps, to local and temporary circumftances, more than to the neceffary influence of the climate. The fituation of the town upon a plain, almoft wholly furrounded by hills thickly covered with foreft trees, deprives it of a free circulation of air, and expofes it to the morning and evening damps of humid nights, preceded by fcorching days, and of courfe putrid and intermitting fevers muft often be the confequence. Water is alfo fuffered to ftagnate in marfhes near the town; and to thefe difadvantages we may add the tormenting influence of infinite fwarms of mufquitoes, or large gnats, which attack ftrangers for fome time after their arrival. But none of thefe real, or any imaginary, evils reftrain the propenfity of all claffes of fociety towards gaiety and pleafures. See Brasil.

The inhabitants of Rio are very numerous, and confift of Portuguefe, Negroes, and Indians, the original natives of the country. This townfhip, which is but a fmall part of the capitanea, or province, is faid, according to Cook, to contain 37,000 white perfons, and 629,000 blacks, many of whom are free, amounting together to 666,000, in the proportion of 17 to 1. The Indians, who are employed to do the king's work in this neigbourhood, can fcarcely be confidered as inhabitants; their refidence is at a diftance, from whence they come by turns to their tafk, which they are obliged to perform for a fmall pay. The guard-boat was conftantly rowed by thefe people, who are of a light copper colour, and have long black hair. See Brasil.

When walking abroad, men of the lower claffes generally wear cloaks; and thofe of the middling and higher ranks never appear without fwords. The ladies wear their hair hanging down in treffes, tied with ribbands, and adorned with flowers; their heads being uncovered. In their vifits to the churches, both at matins and vefpers, they are regular; at other times they are generally feated at their windows or balconies. Many of them have fine dark eyes, with animated countenances. In the evenings they amufe themfelves by playing on fome kind of mufical inftrument, chiefly the harpfichord or guitar. At this time the doors and windows are thrown open for the admiffion of cool air. If a ftranger fhould happen to ftop to hear the mufic, it often happens that the father, hufband, or brother of the lady that is playing, fteps out and politely invites him into the houfe; and the ladies, not unfrequently, having bunches of flowers in their hands, exchange them with gentlemen as they pafs by. This practice may perhaps be an imitation of that of the ladies of Lifbon, who on particular days, called "days of intrufion," throw nofegays from their balconies upon perfons walking under them. Captain Cook charges the fame indelicate want of referve on the ladies of Rio; but we truft the accufation which fome perfons have brought againft them, that there is not one modeft woman among them, is not only too general, but founded on a mifreprefentation of what they may conceive to be an allowable practice, founded in cuftom and courtefy. Some of the men, however, have been accufed of much worfe practices, in yielding to depraved and unnatural appetites.

Among the more innocent pleafures of both fexes are operas, plays, and mafquerades. Company often affembles at a garden, fituated near the fea, at one extremity of the town, and laid out in grafs plats, fhrubberies, and parterres, ornamented in various ways. In thefe receffes the gay fociety of Rio, after taking the exercife of walking in the evening, and after hearing fongs and mufic, fit down to partake of banquets, occafionally accompanied by mufic and fire-works. On the fide of this garden next the fea is a terrace, and at the extremities of the terrace there are two neat fquare buildings, like Englifh fummer-houfes. In one the walls are decorated with paintings, reprefenting views of the harbour, and particularly of the whale-fifhery, which was formerly carried on in it; until the large black whale, which formerly frequented it, was difturbed and driven away, in confequence of the increafed concourfe of fhipping. The cieling of this and the other fummer-houfe are covered with various appropriate devices, in fhell or feather work; and the walls of the latter are decorated with eight large paintings, defcriptive of the principal productions to which the country is indebted for its opulence, including views of the diamond and gold mines, with the operations performed in them; of the cultivation of the fugar-cane, and the proceffes by which its juice is extracted and granulated into fugar; of the manner of collecting the fmall animals which produce the cochineal, and preparing the rich dye from them; of the culture of the manioc, with the procefs of making caffada and tapioca; and of the culture and preparation of coffee, rice, and indigo. Near the town is another garden, originally intended for promoting the progrefs of botany, but now chiefly curious for a fmall manufacture of cochineal; but the garden at Rio does not produce annually above 30 pounds of this commodity. The preparation of cochineal, however, is now encouraged by the trade being laid open, which was formerly a monopoly to the crown. Another fpecies of manufacture is carried on in the vicinity of Rio; an exclufive privilege having been given to a company, upon paying one-fifth of its profits to the crown. To this harbour was brought, for the purpofe of converting it into oil, the blubber or firm fat of the black whales. The whalebone or cartilages of the jaw were alfo properly feparated and cleanfed here, before they were fent to Europe. In another part of the harbour of Rio, called Val Lengo, are warehoufes for the reception and fale of flaves. See Brasil.

The eftablifhment for the defence of Rio confifts of two fquadrons of cavalry, two regiments of artillery, fix regiments of infantry, two battalions of difciplined militia, befide above 200 difciplined free Negroes; making, in the whole, a body of at leaft 10,000 men, exclufively of a very numerous regiftered but undifciplined militia, of whom a confiderable proportion is in the city and its neighbourhood. The entrance of the harbour, which is fcarcely a mile from point to point, is croffed in every direction by heavy batteries. The fort of Santa Cruz is a work of fome ftrength, and the principal defence of the harbour. But the defence of the city of Rio is fuppofed to depend chiefly on the works erected on the Serpent ifland, which is about 300 yards long: it mounts 46 guns, 20 facing the fouth and fouth-eaft, and the remainder looking to the oppofite points. The parapet, along the front of the town, recently conftructed, will afford a good line for mufquetry and light guns.

The high conical rocks at the entrance of the harbour of Rio, and the furrounding hills, are all of granite, in which the only remarkable circumſtance is the large proportion of feld-ſpath contained in it. About two miles within the harbour, on the ſouth-weſt ſide, is one high rock, entirely compoſed of columnar maſſes, bearing the reſemblance of baſaltes: it reſts upon clay. In all the quarries of granite it is found incumbent upon clay and ſand. Here are three ſpecies of granite: the firſt, red-coloured, ſoft, and ſhining; the ſecond, deep blue coloured, harder, and of a cloſer texture; and the third of a whitiſh ſhining colour, containing much mica, and little feld-ſpath; its texture ſoft, and incapable of a good poliſh.

The government of Rio is, as to its form, mixed; and yet, in fact, very deſpotic. It conſiſts (we are now ſpeaking of its ſtate before the removal of the Portugueſe government thither) of the viceroy, the governor of the town, and a council. To reſtrain the people from travelling into the country, and penetrating into any diſtrict where gold or diamonds may be found, certain bounds are preſcribed to them, at the diſcretion of the viceroy, ſometimes at a few, and ſometimes at many, miles diſtance from the city. On the verge of theſe limits a guard conſtantly patroles, and any perſon that goes beyond it is ſeized and thrown into priſon.

The riches of this place conſiſt chiefly in the mines, that lie at a conſiderable diſtance in the country, from which much gold is brought, at the expence of many lives. Precious ſtones are alſo found here in ſuch plenty, that a certain quantity only is allowed to be collected in a year: they are diamonds, topazes of ſeveral kinds, and amethyſts. The mines called "general" are the neareſt to the city, at the diſtance, according to the ſtatement of M. Bougainville, in his account of his voyage round the world, of about 75 leagues. They yield to the king every year, for his right of fifths, at leaſt 112 arrobas of gold: in 1762 they yielded 119. Under the captaincy, the MINAES *Geraes* (which ſee) are comprehended thoſe of Rio de Morte, of Sabara, and of Serro-frio. The laſt, beſides gold, produces all the diamonds that come from Braſil. They are found at the bottom of a river, of which they turn the courſe, in order to ſeparate from the pebbles in its bed the diamonds, topazes, chryſolites, and other ſtones of inferior quality. Of all theſe ſtones, the diamonds alone are contraband: they belong to the undertakers, who are obliged to give an exact account of the diamonds found, and to place them in the hands of the intendant appointed by the king for this purpoſe, who depoſits them immediately in a caſket encircled with iron, and ſhut with three locks. He has one of the keys, the viceroy another, and the aſſayer of the royal treaſury the third. This caſket is encloſed in a ſecond, ſealed by the three perſons above-mentioned, and which contains the three keys of the firſt. The viceroy has not the power of viſiting its contents: he only conſigns the whole to a third ſtrong coffer, which he ſends to Liſbon, after having ſet his ſeal on the lock. They are opened in the preſence of the king, who chooſes what diamonds he pleaſes, and pays the price to the undertakers at the rate fixed by their agreement. The undertakers pay to his moſt faithful majeſty the value of a piaſtre Spaniſh money, for every ſlave employed in ſearching for diamonds; and the number of theſe ſlaves may amount to 800. Of all kinds of contraband trade, that of diamonds is the moſt ſeverely puniſhed.

The gold drawn from the mines cannot be carried to Rio de Janeiro, without being firſt brought to the ſmelting houſes eſtabliſhed in each diſtrict, where the right of the crown is received. What reſults to private perſons is remitted in bars, with their weight, number, and the royal arms. Thoſe bars belonging to individuals are regiſtered in the factory of La Prayburia, 30 leagues from Rio de Janeiro. In this ſtation are a captain, lieutenant, and 50 men; here is paid the right of fifths; and, beſides, a toll of a real and a half *per* head on men, cattle, and beaſts of burthen. Half of the product of this duty belongs to the king, and the other half is divided between the detachment according to rank. As it is impoſſible to return from the mines without paſſing by this office, all perſons are there ſtopped, and ſearched with the greateſt ſeverity. Individuals are afterwards obliged to carry all the gold in bars, which belongs to them, to the mint of Rio de Janeiro, where the value is given in coin, commonly in half doubloons, each worth eight Spaniſh dollars. Upon each of theſe half doubloons the king gains a dollar, by the alloy and the right of coinage. The mint of Rio Janeiro is one of the moſt beautiful which exiſt; it is furniſhed with every convenience to work with the greateſt celerity. As the gold arrives from the mines at the ſame time that the fleets arrive from Portugal, it is neceſſary to accelerate the work of the mint, and the coinage proceeds with ſurpriſing quickneſs. The arrival of theſe fleets renders the commerce of Rio Janeiro very flouriſhing, but chiefly that of the Liſbon fleet. The mines of St. Paolo and Parnaqua yield to the king four arrobas for the fifths every year. The moſt diſtant mines, as thoſe of Pracaton and Quiaba (Cuyaba), depend on the captaincy of Matogroſo. The fifth of the above mines is not received at Rio Janeiro, but that of the mines of Goyas is deducted. This captaincy alſo poſſeſſes diamond mines, the working of which is prohibited.

The whole of the expence of the king of Portugal at Rio Janeiro, for the payment of the troops and civil officers, and for the charges of the mines, the maintenance of the public buildings, the careening of veſſels, amounts to about 600,000 dollars. The expences of building ſhips of the line and frigates there ſtationed are not included.

Recapitulation, and Amount of the Average of different Objects of royal Revenue.

	Dollars.
150 arrobas of gold, the average produced by the royal fifths, are in Spaniſh money	1,125,000
The duty on diamonds	240,000
The duty on coinage	400,000
Ten *per cent.* from the cuſtom-houſe	350,000
Two and a half *per cent.* of free gift	87,000
Right of toll, ſale of employments, officers, and generally all the profits of the mines	225,000
Duty on ſlaves	110,000
Duty on fiſh-oil, ſalt, ſoap, and the tenth on the proviſions of the country	130,000
Total	2,667,000

From which, deducting the above expences, it will appear that the king of Portugal draws from Rio Janeiro a revenue exceeding 10,000,000 of French livres, or 416,666*l.*

The coin that is current here, is either that of Portugal, conſiſting chiefly of 36*s.* pieces, or pieces both of gold and ſilver, which are ſtruck at this place: the pieces of ſilver, which are very much debaſed, are called patacks, and are of different value, being eaſily diſtinguiſhed by the number of rees marked on the outſide. Here is alſo a copper coin, like that in Portugal, of five and ten ree pieces. See REE.

Upon the whole, Rio de Janeiro is a very good place for ſhips to put in at that want refreſhment: the harbour is ſafe and commodious; and proviſions, except wheaten bread and flour, may be eaſily procured: as a ſuccedaneum for bread, here

here are yams and caſſada in plenty: beef, both freſh and jerked, may be bought, ſays Cook in 1768, at about $2\frac{1}{4}d.$ a pound, but it is very lean. The people here jerk their beef by taking out the bones, cutting it into large but thin ſlices, then curing it with ſalt, and drying it in the ſhade: it eats very well, and if kept dry, will remain good a long time at ſea. Mutton is ſcarcely to be procured, and hogs, and poultry, are dear. Of garden-ſtuff and fruit there is abundance; but none can be kept at ſea except the pumpkin: rum, ſugar, and molaſſes, all excellent in their kind, may be had at a reaſonable price; tobacco is alſo cheap, but not good. Cook's Voyages by Hawkeſworth, vol. ii. Staunton's Embaſſy, vol. i.

Rio *Infanta*. See *Great* Fish *river*.

Rio *de Limones*, a river of the iſland of Cuba, which runs into the Spaniſh Main, N. lat. 20° 21′. W. long. 78°.—R. *Mino*, a river of Jamaica, which runs into the ſea, on the W. ſide of Carliſle bay.

Rio *das Mortes*, a town of Braſil, in the juriſdiction of Minaes Geraes, ſituated on a river of the ſame name, which runs into the Parana.

Rio *Negro*, a conſiderable river of South America, which runs from the river Oronoko, in the kingdom of Granada, and enters the river of the Amazons, near Fort Rio Negro. S. lat. 3° 15′. W. long. 61° 31′.—R. *Nuevo Bay*, a bay on the N. coaſt of Jamaica. N. lat. 18° 26′. W. long. 76° 46′.—R. *de Oro*, a river of the iſland of Chiloe, which runs into the Pacific ocean, S. lat. 42° 45′.—R. *de Ouro*, a river of Africa, which runs into the Atlantic, N. lat. 23° 52′. W. long. 16°.—R. *de las Palmas*. See Palmas.—R. *das Palmas*. See Scherbro.—R. *de la Plata*. See Plata.—R. *dos Patos*, a river of Braſil, which runs into the Atlantic, S. lat. 28° 30′.—R. *dos Pedras*, a river of Africa, which runs into the Atlantic, N. lat. 9° 10′.—R. *de Pinos*, a river of the Iſthmus of Darien, which runs into the Spaniſh Main, N. lat. 9° 12′. W. long. 80° 25′.—R. *de Puercos*, a harbour on the N. coaſt of Cuba, S.W. of Bahia Honda.—R. *de los Rabados*, a river of Chili, which runs into the Pacific ocean, S. lat. 45° 10′.—R. *dos Ramos*, a river of Africa, which runs into the Atlantic, S. lat. 14° 37′.—R. *Real*, a river of Braſil, which divides the captainſhip of Sergippe from that of All-Saints. This river, if it were not for the bar at the entrance, on which there is but ten feet of water, would be an inlet to the moſt fertile and pleaſant part of the Braſils. Over the bar there is room enough, and depth of water ſufficient, for the whole navy of England to ride in ſafety. About four leagues above the mouth, this river divides itſelf into four large branches, one running N.N.W. called Rio Fundo, another N.W. navigable for any veſſel that can get near the bar, as far as the towns of St. Lucia and St. Euſtatia, from the latter of which it takes its name, a third, called Rio de Pao Grand, or Great Timber river, which runs W.N.W. The main branch, which runs W.S.W. is alſo navigable as far as the town of Bahia, about 20 leagues from its mouth. On the banks of theſe branches there are many fine plantations, and ſmall villages, which ſend great quantities of ſugar, tobacco, and mandioc to Bahia or Fernambuco, as the wind permits. This river runs into the ſea through four channels, formed by three ſmall ſandy iſlands, lying in the mouth of it. About 12 leagues to the S. of Rio Real is a ſmall harbour, called Torre Garcia de Avilla, defended by four pieces of cannon; the town lies about a mile above the port, on the higheſt land on this coaſt; and it is the beſt for a ſhip to make, that is bound to Bahia, while the N.E. wind blows.—R. *del Rey*, or *River Real*, a river of Africa, which runs into the Atlantic, N. lat. 4° 30′. E. long. 8° 5′. This river may be diſtinguiſhed by the extreme high lands of Amboyes, between it and the river Camarones, ſituated S.E. from the mouth. It appears like a deep large bay running N., 21 or 24 miles wide at the entrance, where the ground is oozy; the channel being exactly in the middle, free from ſhoals and ſands, except near the E. ſide, which is foul; the ſhore on both ſides is low and marſhy. The river which comes far from the N., is wide for a long interval into the country, and receives ſeveral conſiderable rivers in its courſe: the adjacent lands are populous and full of villages. The principal trade conſiſts in ſlaves and large elephants' teeth, and akkori or blue coral. The inhabitants are called *Calbongas* (which ſee).—R. *dos Reyes Magos*, a river of Braſil, which runs into the Atlantic, S. lat. 19° 20′.—R. *St. Balardo*, a river of New Albion, which runs into the Pacific ocean, N. lat. 34° 44′.—R. *St. Andre*, a river of Chili, which runs into the Pacific ocean, S. lat. 35° 40′.—R. *St. Maria*, a river of Chili, which runs into the Pacific ocean, S. lat. 51° 36′.—R. *de Sal*, a river of Mexico, which riſes in the province of Culiacan, on the borders of New Biſcay, and runs into the Pacific ocean, N. lat. 23° 40′.—R. *Salado*, a river of South America, in the province of Tucuman, which riſes about 60 miles W. of Salta, and firſt bears the name of "Rio del Paſſage," but being joined by ſeveral ſmaller ſtreams, it changes its name to Salado, and runs into the Parana at Santa Fé, in the province of Buenos Ayres; its whole courſe being about 500 miles.—R. *Salado*, or R. *des Apaches*, a river of North America, one of the branches of the river Bravo, which joins the main ſtream, about N. lat. 30° 40′. W. long. 86°.—R. *Salado*, a river of South America, which in the latter part of its courſe, divides Chili from Peru, and runs into the Pacific ocean, S. lat. 26° 15′.—R. *de los Sauces*, a river of South America, which riſes in Patagonia, and runs into the Atlantic by two ſtreams, forming between them a conſiderable iſland and the ſouthern mouth of the bay of Anegada, S. lat. 39° 45′.

Rio *Seco*, a town of Portugal, in the province of Beira, on the borders of Spain; 7 miles S.S.E. of Almeida.—R. *Seco*, a river of Peru, which runs into the Pacific ocean, S. lat. 7° 6′.

Rio *Secundo*, a town of South America, in the province of Cordova, on the river Secundo; 30 miles S. of Cordova.—R. *Selbola*. See Scherbro.—R. *Sin Fondo*, a river of Chili, which runs into the Pacific ocean, S. lat. 43° 50′.—R. *del Spiritu Santo*. See Manica.—R. *das Trombetas*, a river of Braſil, which runs into the river of the Amazons at Pauxi.—R. *de Vacas*, a river of Mexico, which runs into the Pacific ocean, N. lat. 14°.—R. *Verde*, a river of Peru, which runs into the Pacific ocean, N. lat. 1°.

Rio *Verde*, a town of Mexico, in the province of Guaſteca; 90 miles N.W. of St. Yago de los Valles.

RIOBAMBA, a juriſdiction of South America, in the viceroyalty of New Granada and audience of Quito; ſituated to the ſouth of the aſſiento of Latacunga. This juriſdiction is divided into two departments; the corregidor, who reſides at Riobamba, appointing a deputy, who lives at the aſſiento of Hambato, ſituated between the capital and Latacunga. The firſt department contains 18 principal villages. The productions and manufactures of the province of Riobamba excel all the reſt of the provinces of Peru. In various parts it has rich mines of gold and ſilver. The juriſdictions of Riobamba, Alauſi, and Cuença, by means of the warehouſes at Yaguache and Noranjel, carry on a conſiderable trade with Guayaquil. This trade, in the manufactures of the country, which conſiſt only of three ſorts,

cloth,

cloth, bags, and linen, is attended with confiderable profit to the dealers, and advantage to the country, as all the poor people, who are remarkably numerous, and perfons of fubftance, except thofe of the capital, wear the goods manufactured in the country. Part of the wheat produced in the jurifdiction of Riobamba and Chimbo is fent to Guayaquil. This jurifdiction is (by miftake) defcribed under *Hambato* (which fee). We fhall here fubjoin an account of Hambato. This affiento ftands in a wide plain at the bottom of a mountain, N. of Riobamba. On its N. fide runs a large river, which has a bridge; the river having never been fordable on account of its depth and extreme rapidity. It is finely fituated, and in extent of populoufnefs nearly equal to Latacunga; the number of its inhabitants amounting to eight or nine thoufand. The houfes are built of unburnt bricks, well planned, and make a good appearance. They are of low elevation, for the purpofe of avoiding the deftructive effects of earthquakes. Here are a parifh church, two chapels of eafe, and a convent of Francifcans. The earthquake which made fuch terrible havock in the affiento of Latacunga proved alfo fatal to this, the horrors of which were augmented by the terrible eruptions from mount Carguarifo, in confequence of which a muddy torrent, formed of afhes, cinders, and fnow melted by the flames of the aperture, precipitated down the fides of the mountain, overflowing the fields, fweeping away the cattle, and every thing elfe in the way by its violence. The inhabitants, in their manners and cuftoms, refemble thofe of Quero; but it has fewer families of diftinction than Riobamba. The bread made at this affiento is famous all over the province, and accordingly it is fent to Quito and other parts, without being deteriorated by length of time. It has fix villages. The Indian inhabitants of the village of Quero make all forts of cabinet work; that of Petate is equally famous for abundance of fugar-canes and the excellent quality of its fugar; and that of Santa Rofa de Pilaguin, which, with its fields, lies on the fide of Carguarifo, is famous for the goodnefs of its barley, as the diftrict bordering on the affiento is for its exquifite fruits; and to this diftrict Quito owes moft of the European kinds fold in that city. See Quito and Granada.

Riobamba, the capital of the jurifdiction above-mentioned, and defcribed under Hambato. This elegant town, by the devaftation occafioned by the terrible earthquake on the 4th of February 1797, became a heap of ruins, and foon totally difappeared; for the peak of Sicalpa falling on the town, and ftopping the two rivers which pafs by it, formed a lake, fo that even the ruins were not vifible. Of 9000 inhabitants, only about 400 efcaped. Although Quito fuftained little damage, Latacunga, and all the hamlets in its corregiamento, were utterly deftroyed. Many perfons perifhed, and the furvivors were infected by the putridity of the dead bodies. Near Hambato many mountains fplit, and by their fudden fall occafioned ftill more awful deftruction among the human race. Quero, mentioned in the preceding article, with all its people were buried, in an inftant, under a cliff which fell on the town. Pelileo was overwhelmed by a ftream of water and mud; the circumjacent lands were all tranfpofed; and a deadly filence indicated the general ruin. Alaufi and Guaranda alfo fuffered greatly. The fate of Cuença, Loja, Jaen, and Guayaquil, was, at that time, unknown; but the fhocks do not feem to have extended fo far. The caufe of this defolation feems to have proceeded from the volcano Tangarunga or Tangurugua, between Latacunga and Riobamba; as the tremendous fubterraneous thunders all proceeded from that quarter, and the greateft ruin was in its vicinity; towards the N. the earthquake was faintly perceived at Pafto. Riobamba is diftant 90 miles S. from Quito. S. lat. 1° 20'. W. long. 78° 30'. See Quito.

RIOCHICO, a town of New Mexico, in the province of Hiaqui, on the river Hiaqui; 800 miles N.W. of Mexico. N. lat. 29° 4'. W. long. 111° 36'.

RIOFRIO, a town of Spain, in Old Caftile; feven miles S. of Segovia.

RIOJA, a town of South America, in the province of Tucuman; 240 miles W.S.W. of St. Yago del Efteros. N. lat. 29° 15'. W. long. 70°.

RIOLAN, John, in *Biography*, an able French phyfician, was born at Amiens. He was greatly diftinguifhed by his attainments both in literature and fcience, and is faid not only to have written and fpoken the learned languages with facility, but to have been thoroughly intimate with the contents of almoft all the writings of the ancients. He gave leffons in natural philofophy at the college of Boncour, at Paris, where he took his degree in the year 1574. Little is recorded refpecting his life, but that he was elected dean of the faculty in 1586, and continued in that office in the following year. He died on the 18th of October 1606. He was one of the greateft ornaments of the profeffion at Paris in his time; and was a ftrenuous advocate for the doctrine of Hippocrates and the ancients, whom he defended with great ardour againft the chemifts. His works are indicative of genius; they were collected and publifhed, together with fome pofthumous tracts, at Paris, in 1610, under the title of "Opera Omnia." Separately, we find the following; "De Primis Principiis Rerum Naturalium, Libri tres," Paris, 1571. "Ad Impudentiam quorundam Chirurgorum, qui Medicis æquare et Chirurgiam publicè profiteri volunt; pro veteri dignitate Medicinæ Apologia philofophica," ib. 1577. This was a fort of declaration of war againft the furgeons, whom he attacked for attempting to teach without any knowledge of literature; it was followed by feveral pieces on both fides. "Commentarii in fex pofteriores Phyfiologiæ Fernelii Libros," 1577. "Ars bene Medendi," Lugd. 1589. "Ad Libros Fernelii de abditis rerum caufis Commentarii," Par. 1598. "Univerfæ Medicinæ Compendium," 1598. "Ad Libavii Maniam Refponfio, pro Cenfura Scholæ Parifienfis contra Alchymiam latâ," 1600. "Chirurgia," Lipf. 1601. "Prælectiones in Libros Phyfiologicos et de abditis rerum caufis. Accefferunt Opufcula quædam Philofophica," 1602. "De Febribus," 1640.

Riolan, John, the fon of the preceding, was born at Paris in the year 1577. His father did not fail to afford every encouragement and opportunity for the cultivation of his rifing talents, and his mind was naturally turned to the ftudy of medicine by the reputation, zeal, and love of the profeffion, which the former poffeffed; his early ftudies were alfo greatly facilitated, and many difficulties removed, by the domeftic inftruction which he thus received. His progrefs accordingly was uncommonly rapid; and a very few years after he had received his degree in 1604, he came forward as an author in a way that laid the foundation of his fubfequent reputation. In 1613 he was appointed royal profeffor of anatomy and botany by Louis XIII.; and in this latter capacity he petitioned the king for the eftablifhment of a botanic garden in the univerfity of Paris. He fubfequently held the appointment of phyfician to queen Mary de Medicis, and accompanied that princefs in her travels; he arrived at Cologne, after her death, in July 1642, and returned to Paris, where he refumed the practice of of his profession. After having twice undergone the operation of lithotomy, he lived to the age of eighty years, and died at Paris in February 1657.

Riolan was devoted to the study of anatomy, and was one of the most expert and learned anatomists of his time; his learning, indeed, was rather an obstacle in the way of his progress as a discoverer, or perhaps we should say his devotion to the ancients; for, in many cases, he seemed to see only through their eyes. Yet he was arrogant in his claims to originality, and by his pertinacity and sarcastic contempt of others, he raised himself many opponents and enemies. He published several original observations, however, respecting many parts of anatomical science, especially respecting the structure of the colon, the biliary ducts, the uterus and vagina, the tongue, os hyoides, &c. None of his anatomical works contain any engravings; as he maintained that no representations could supersede the study of nature. All his studies, however, were not confined to anatomy, as the following list of his works will evince. "Brevis excursus in Battologiam Quercetani, quo Alchemiæ principia funditus diruuntur, et Artis veritas demonstratur," Par. 1604. "Comparatio veteris Medicinæ cum nova, Hippocraticæ in Hermetica, Dogmaticæ cum Spagyrica," 1605. "Disputatio de Monstro Lutetiæ 1605 nato." "Incursionum Quercetani depulsio," id. "Censura demonstrationis Harveti pro veritate Alchymiæ," 1606. "Schola Anatomica novis et raris observationibus illustrata. Adjuncta est accurata fœtus humani historia," 1607; enlarged by the author with the title of "Anatome corporis humani," 1610. "In Librum Cl. Galeni de Ossibus, ad Tyrones explanationes apologetica pro Galeno, adversus novitios et novatores Anatomicos," 1613. "Gigantomachie," 1613, written in refutation of Habicot's account of the discovery of the bones of the giant Teutobochus. Riolan published two other tracts, or more, upon this controversy, which ended with the appearance of his "Gigantologie; discours sur la grandeur des Géants, &c." in 1618. "Osteologia ex veterum et recentiorum præceptis descripta," 1614. "Discours sur les Hermaphrodits, où il est démontré, contre l'opinion commune, qu'il n'y a point de vrais Hermaphrodits," 1614. "Anatomica, seu Anthropographia," 1618. "Enchiridium anatomicum et pathologicum," 1648, and many times reprinted; the best edition is of Paris, 1658. "Opuscula anatomica nova," Lond. 1649, containing remarks on the anatomical works of the most celebrated physicians, and an attack upon Harvey, and his doctrine of the circulation, of which Riolan was a great antagonist. "Curieuses Récherches sur les écoles de Médécine de Paris et de Montpelier," 1651. He also published three different works, entitled "Opuscula anatomica," in 1650, and the three following years, opposing the doctrines of Bartholine and Pecquet, respecting the absorbents and lacteals, and Harvey's on the circulation; and two more on the same subjects, with the titles of "Responsio prima, et altera," 1652 and 1655. Eloy Dict. Hist. de la Med.

RIOLI, in *Geography*, a town of Naples, in Capitanata; 11 miles S. of Manfredonia.

RIOLO, a town of Italy, in the department of the Amone; nine miles W. of Faenza.

RIOM, a town of France, in the department of the Cantal, and chief place of a canton, in the district of Mauriac; 15 miles E.N.E. of Mauriac. The place contains 714, and the canton 7498 inhabitants, on a territory of 210 kiliometres, in 12 communes.

Riom, a town of France, and principal place of a district, in the department of the Puy-de-Dôme; eight miles N. of Clermont-Ferrand. The place contains 13,328 inhabitants in both its E. and W. divisions; the canton of the former includes 12,433, and the latter 12,441 inhabitants; the territory of the former being 70, and that of the latter $24\frac{1}{2}$ kiliometres, the former having seven, and the latter five, communes. N. lat. 45° 43′. E. long. 3° 11′.

RIONDO, in *Ichthyology*, a name used by some for the fish more commonly called *aper*, a small fish, of the shape of the faber or doree, caught in the Mediterranean.

RIONE, or Rioni, in *Geography*, a river of Asia, anciently called "Phasis," which rises in the principality of Georgia, and forming the southern boundary of Mingrelia, runs into the Black sea, N. lat. 42° 15′. E. long. 41° 25′.

RIONS, a town of France, in the department of the Gironde; three miles N.W. of Cadillac.

RIOPA, a town of Spain, in New Castile; 13 miles S. of Alcaraz.

RIOS, a town of France, in the department of the Upper Saone, and chief place of a canton, in the district of Vesoul. The place contains 578, and the canton 9028 inhabitants, on a territory of 230 kiliometres, in 34 communes.

Rios, a town of Chili; 90 miles N.N.E. of Valparayso.

RIOSECO, a town of Spain, in the province of Leon; 96 miles N.N.W. of Madrid. N. lat. 41° 52′. W. long. 5° 7′.

RIOT, in *Law*, the forcible doing of an unlawful thing, of a private nature, by three or more persons assembled together for that purpose; either with or without a common cause or quarrel (3 Inst. 176.): as if they beat a man; or hunt and kill game in another's park, chase, warren, or liberty; or do any other unlawful act with force and violence; or even do a lawful act, as removing a nuisance, in a violent and tumultuous manner.

The word is formed from the Latin *riota*, of *arietare*, to run at each other as rams do. Though, from an ancient Gaulish version of the bible, quoted by Skinner, *riot* should rather seem originally to signify luxury and excess; whence our law *riot* might proceed; because these are frequently attended with quarrels.

For the difference between a riot, rout, and unlawful assembly, see Rout, and Unlawful *Assembly*.

The punishment of riots and routs, where a number of persons from three to eleven are concerned, is, by the common law, fine and imprisonment only; to which, in very enormous cases, the pillory has been sometimes superadded. (1 Hawk. P.C. 159.) And by the stat. 13 Hen. IV. c. 7. any two justices, together with the sheriff or under-sheriff of the county, may come with the posse comitatus, if need be, and suppress any such riot, assembly, or rout, arrest the rioters, and record upon the spot the nature and circumstances of the whole transaction; which record alone shall be a sufficient conviction of the offenders; and it is held that any battery, wounding, or killing the rioters, that may happen in suppressing the riot, is justifiable. The riotous assembling of twelve persons or more, and not dispersing upon proclamation, was first made high treason by stat. 3 & 4 Edward VI. c. 5. but repealed by stat. 1 Mary, c. 1. Nevertheless, the offence was made a single felony by 1 Mar. stat. 2. c. 12. and by 1 Eliz. c. 16. with whom the law expired. However, it was revived, in order to support the execution of the act of settlement, and made perpetual by 1 Geo. I. c. 5. which enacts, that if any twelve persons are unlawfully assembled to the disturbance of the peace, and any one justice of the peace, sheriff, under-sheriff, or mayor of a town, shall think

proper

proper to command them by proclamation to disperse, if they contemn his orders, and continue together for one hour afterwards, such contempt shall be felony, without benefit of clergy. And farther, if the reading of the proclamation be by force opposed, or in any manner wilfully hindered, such opposers and hinderers are felons, without benefit of clergy; and all persons concerned, knowing of such hindrance, and not dispersing, are felons, without benefit of clergy. And the act indemnifies the peace officers, and their assistants, if they kill any of the mob in endeavouring to disperse them. Moreover, if any persons, so riotously assembled, begin, even before proclamation, to pull down any church, chapel, meeting-house, dwelling-house, or out-houses, they shall be felons, without benefit of clergy. Blackst. Comm. book iv. ch. xi.

RIOU, in *Geography*, a small island in the Mediterranean, near the coast of France. N. lat. 43° 11'. E. long. 6° 25'.

RIOU'*s Island*, or *Rovahoga*, an island in the Pacific ocean, about 24 miles in circumference; discovered in the year 1792, by lieutenant Herget, commander of the Dædalus storeship. S. lat. 8° 50'. E. long. 220° 50'.

RIOXA, a province of Spain, situated in Old Castile, on the borders of Biscay, on the banks of the Ebro.

RIPA CANDITA, a town of Naples, in the province of Basilicata; six miles S.W. of Venosa.

RIPA *Limosara*, a town of Naples, in the county of Molise; nine miles E. of Molise.

RIPA *Transona*, a town of the marquisate of Ancona, the see of a bishop, suffragan of Fermo; 12 miles N.E. of Ascoli. N. lat. 42° 58'. E. long. 13° 49'.

RIPAILLE, a town of France, in the department of the Leman lake, on the S. side of the lake of Geneva, with a convent; one mile N. of Thenon.

RIPEN, a sea-port of Denmark, in North Jutland, on the Gram; the see of a bishop, and capital of the diocese. This town was probably built about the time of the introduction of Christianity into this kingdom, and, next to Wiborg, is deemed the most ancient town in North Jutland. It was formerly one of the most celebrated and flourishing cities in the North; as it had four parish churches and five chapels, besides the cathedral, four convents with their churches, a strong castle, and between 600 and 700 free burghers. A considerable number of ships traded to Norway, France, England, Holland, &c. from this port; and the city had the privilege of coining money. But its grandeur and opulence were almost annihilated by a dreadful fire in 1580, and other conflagrations, by inundations, and by the ravages of war. The merchants' old Exchange is converted into a town-house. Some little trade is still carried on at this place, in grain, horned cattle, horses, &c.; but the shallowness of the river admits only small vessels to come up to the city, and these only at high water; 77 miles S. of Wiborg. N. lat. 55° 21'. E. long. 8° 46'.

RIPENERS, in *Medicine*, a sort of topical remedies, called also *drawers, digestives, maturantia, suppuratives*, &c. See MATURATION.

RIPENING *of Fruit*, in *Gardening*, may be forwarded several ways. See CAPRIFICATION, HOT-*Beds*, and FORCING.

RIPERA, in *Geography*, a town of Hindoostan, in Berar; 25 miles N.E. of Notchegong.

RIPERTNAU, a town of Westphalia, in the county of Lippe; three miles E.N.E. of Lemgow.

RIPIENO, Ital. in *Music*, implies full, in opposition to solo. In Corelli's concertos, the solo parts are said to be *del concertino*, the little concert; and the *tutti* parts, or *ripieno, del concerto grosso*, of the great concert. The first eight of Corelli's concertos were composed for the church, *a due cori*, for two bands or choirs, which are often in dialogue. By ripieno is always meant a subordinate part, to which few difficulties are entrusted; being what the French call *complissage*, or parts to fill up and complete the harmony.

RIPIERS, RIPIARII, in our *Old Writers*, those that bring fish from the sea-coast to the inner parts of the land.

They were thus called a *fiscella, qua in devehendis piscibus utuntur, Anglice*, a rip.

RIPLEY, in *Geography*, a market-town and parish, partly in the lower, and partly in the upper division of the wapentake of Claro, West-riding of Yorkshire, England, is five miles N.W. from Knaresborough, and 214 miles N.N.W. from London. The town had formerly a castle attached to it, some part of which is yet standing. The market here is held on Monday, weekly; and there are annual fairs on Easter Monday, and the 25th, 26th, and 27th days of August, for horses, horned cattle, and sheep. A free-school at this place, as appears from an inscription over its entrance, was built and endowed in the year 1702, by Mary, and Catharine Ingilby, daughters of sir William Ingilby, then lord of the manor. The church is ancient, and contains many monumental erections in memory of that family. In the church-yard stands the pedestal of an ancient cross, which contains eight niches curiously ornamented, but the effigies are gone, as likewise the shaft of the cross. This parish, according to the parliamentary returns of 1811, contains 222 houses, and 1053 inhabitants.

Ripley-castle, the seat of sir John Ingilby, baronet, adjoins the town. The chief part of it was built by sir William Ingilby, in the reign of Philip and Mary, but the great tower is far more ancient, having belonged to a former structure. It has been much enlarged of late years; and is now a stately and commodious family mansion. Some of the apartments are finished with great elegance; and the staircase displays a large Venetian window of stained glass, on which is represented a series of shields, shewing the quarterings and inter-marriages of the Ingilby family, since their settlement at Ripley, towards the close of the fourteenth century.

Eastward from Ripley is Copgrove, an elegant mansion belonging to H. Duncombe, esq. which contains an excellent collection of paintings, busts, and prints from the most celebrated masters. The pleasure-grounds are extensive, and are ornamented with a fine lake. Near this seat is that of Allerton-Mauleverer, the property of lord Stourton. The house is a modern edifice, built by his royal highness the duke of York. It is surrounded by a park, containing 400 acres of land, chequered by hills and dales. At this place was formerly a priory of Benedictines, subject to the abbey of Marmontier in France. It was founded by Richard Mauleverer in the reign of Henry II., and was dissolved by Henry VI. who settled its revenues on King's college, Cambridge. Beauties of England Wales, vol. xvi. by John Bigland.

RIPOGONUM, in *Botany*, so called by Forster, from ῥὶψ, ῥιπὸς, *a slender twig*, and γόνυ, *a joint*, because of its slender, jointed, twining habit, was referred by the son of the author, as well as by the younger Linnæus, to SMILAX; (see that article.) Mr. Brown, nevertheless, retains *Ripogonum*, in Prodr. Nov. Holl. v. 1. 293, because of its hermaphrodite flowers, the two bracteas at the base of each, and the racemose inflorescence. Two species are mentioned,

 R. album

R. album and *parviflorum*, the latter of which is Forster's plant, *Smilax Ripogonum*, Forst. Prodr. 70.

RIPOLL, in *Geography*, a town of Spain, in Catalonia; 14 miles N. of Vique.

RIPON, or RIPPON, a market and borough town in the lower division of the wapentake of Claro, liberty of Ripon, West-riding of Yorkshire, England, is situated at the distance of 11 miles N. from Harrowgate, and 222 miles N.N.W. from London. It occupies the declivity of a gentle eminence, between the rivers Ure and Skell, and not far from their confluence. Over these rivers are six bridges, within a mile of the town. One of these is a very handsome structure of stone, and has seventeen arches. The town is large, and the buildings are in general good; particularly in the principal street. According to the parliamentary returns of 1811, the parish contains 452 houses, and 2346 inhabitants, but this does not appear to include the borough, which is omitted in the reports.

The origin of Ripon is to be referred to a very remote era. By Salmon, it is supposed to have been the Roman Isurium, but this opinion is erroneous. The probability on the subject is, that it owes its foundation to the monastery which was established here in the year 661, by Eata, abbot of Melross, in Scotland. About that period we find it first mentioned in historical record, when it is said to have consisted only of thirty houses. This town was destroyed by the Danes, and remained a heap of ruins for several years. At length, however, it was rebuilt; and in the year 886, king Alfred is said to have incorporated it as a royal borough, to be governed by a vigillarius, or wakeman, twelve elders, and twenty-four assistants. Ripon was destroyed a second time by king Edred in revenge of a revolt of the Northumbrian Danes. This event occurred in the year 950; after which Ripon was again rebuilt and began to flourish, but did not long remain in a state of tranquillity. In the year 1069 it once more shared in the fatal consequences of a revolt of the Northumbrians against the Norman Conqueror; and sixteen years later, at the time of the general survey, the town, and the country around it, still remained waste and uncultivated. Peace having been restored, however, Ripon again revived from its embers, and continued in a prosperous condition, till the wars between England and Scotland, in the reign of Edward. II. subjected it to new misfortunes. In the year 1323, Robert I. king of Scotland, having driven Edward and his army out of his kingdom, invaded England, laying waste the country with fire and sword to the very walls of York. Ripon suffered in the general devastation, the houses having been destroyed by fire, and most of its inhabitants put to the sword. No sooner, however, had the victorious career of Edward III. freed the country from the invaders, than it was restored to a prosperous condition, principally through the exertions of the archbishop of York, and the liberality of the neighbouring gentry, many of whom fixed their residence here. Since that time Ripon has been occasionally honoured by royal visits. Henry IV. retired hither, with his whole court, in 1405, when the plague raged in London. In the year 1604, a similar cause occasioned the removal of the lord president's court from York to this town.

Ripon first sent members to parliament in the 23d year of Edward I., but this privilege was soon after discontinued, and was not revived till the reign of Edward VI. The patronage of the borough is vested in Miss Laurence, of Studley-Royal, who possesses all the burgage tenements to which the right of election is attached. The number of voters is 146, and the mayor is the returning officer. The corporation, by virtue of a charter granted by king James I., and since confirmed, and, in some degree, extended, by succeeding monarchs, consists of a mayor, recorder, 12 aldermen, 24 assistants, a town-clerk, and other inferior officers. Ripon was formerly celebrated for its manufacture of spurs, which were, indeed, so highly esteemed, that it became a proverbial expression to say "As true steel as Ripon rowels," when speaking of a man of fidelity, honesty, or intrepidity. The manufacture of woollens likewise flourished here, in former times, but this branch of business is now completely decayed. The archbishop of York has his court and prison here for the liberty of Ripon. On the nomination of the archbishop, and by his majesty's commission, justices are appointed, who, in conjunction with the mayor and recorder, hold sessions for the town and liberty. The dean and chapter of Ripon minster have likewise a prison here, and hold a court for the decision of causes arising within their manor. The market day here is Thursday; and there are fairs on Thursday after 13th January, 12th and 13th May, first Thursday in June, first Thursday after 22d August, and 22d November. The market-place is a handsome and spacious square, surrounded by well-built houses, and having in the centre an obelisk 90 feet high, erected, in 1781, by William Aislabie, esq. of Studley, who represented this borough in parliament during the long period of sixty years. Here also stands the town-hall, built in 1801, from designs by Mr. Wyatt, and at the expence of the late Mrs. Allanson of Studley. A theatre was erected here in 1792, by the late George Hassell, esq. The free-grammar school was founded by king Edward VI., and was finished, and amply endowed, by his successor, queen Mary, in 1553. The other public establishments belonging to the town are, a dispensary, Sunday schools, a school of industry, and four hospitals, *viz.* that of St. Mary Magdalen, for six poor women; of St. John, a small building, appropriated to two poor women; St. Anne, which supports eight women; and Jepson's hospital, in which twelve poor boys are maintained, clothed, and educated. This hospital was founded, in 1672, by Zacharias Jepson, a citizen of York.

The monastery, previously mentioned as the probable nucleus which gave rise to the town, appears to have been of considerable celebrity. After the destruction of the original buildings in the reign of Alfred, king of Northumbria, it was re-erected in a style of more magnificence than was usual in that age, by the famous Wilfrid, archbishop of York. William of Malmesbury mentions the new structure as remarkable "for its curious arches, its fine pavements, and winding entries." The same author says it was much resorted to by the northern nobility, and was endowed with very extensive possessions. The memory of St. Wilfrid is still honoured by an annual feast and procession at this town. His monastery received extraordinary marks of royal munificence. The great king Athelstan granted to it many immunities, and particularly the privilege of sanctuary. From that period history records few particulars respecting this establishment, except its destruction by the Scotch in the reign of Edward II., when it ceased to be a monastic foundation. The church, however, was rebuilt and made collegiate by archbishop Melton, from whose time, till the reign of Henry VIII., it had seven prebends, with distinct revenues, attached to it; besides nine chantries within the church, which were dissolved by Edward VI. King James I. renewed the collegiate privileges of this church, by the establishment therein of a dean and six prebendaries, to whom he granted "divers lands, prebends, chantries, and rectories, belonging to the said church before the dissolution." In 1607 the same monarch added a subdean, and thus completed the college as it still exists.

Ripon church is dedicated to St. Peter and St. Wilfrid, and has, attached to it, a peculiar jurifdiction, under the archbifhop of York. The king is patron of the deanery; and the fubdean is nominated by the dean from among the prebendaries. When a vacancy occurs in the number of the latter, the dean and chapter prefent three perfons to the archbifhop, who collates one of them. As a building, this church has confiderable claims to the notice of the antiquary, though its appearanee has been much injured by additions and alterations executed at different periods and in different ftyles of architecture. Its general form is that of a crofs, having two uniform fquare towers, each 110 feet high, at the weft end, and a third, called St. Wilfrid's great tower, in the centre of the tranfept. From the laft, there formerly rofe a very noble fpire, which was blown down Dec. 8th, 1660.

The fepulchral monuments in the church are too numerous to be mentioned in detail. There are many in commemoration of different branches of the principal families in the neighbourhood, efpecially the Blackets; the Kitchenmans; the Ridfdales; the Wanleys; the Oxleys; the Nortons, of Sawley; the Weddels, of Newby; the Mallories and Aiflabies, of Studley; and the Markenfields, of Markenfield. Among thefe may be noticed a beautiful monument to the memory of W. Weddel, efq. the defign of which was taken from that curious relic of antiquity, the Lantern of Demofthenes, at Athens. An altar-tomb, of grey marble, fituated in the fouth aifle of the nave, is faid to commemorate an Irifh prince, who died at Ripon on his return from the Holy Land. On the entablature are reprefented the fculptured figures of a man and a lion in a grove of trees.

The environs of Ripon are rich, fertile, well wooded, in a high ftate of cultivation, and interfperfed with villages, and feats of the nobility and gentry. Among the latter the principal are, Studley-Royal, and Newby-Hall. The firft is the property of Mifs Laurence, and is fituated at the diftance of nearly three miles S.W. from Ripon. The houfe is commodious and elegant, and contains many excellent pictures, and portraits by the beft mafters. But the chief objects of attention here, are the park and pleafure-grounds, which are generally ranked among the fineft in England. The park, which is fituated neareft the houfe, is diverfified with gentle fwells and declivities, and is adorned with ranges of lofty trees. The entrance to the pleafure-grounds difplays a mafs of the moft luxuriant foliage, and the widely extended plantations which compofe them, are judicioufly varied, and finely adapted to the different fituations. On one hand the hills gradually afcend with tufts of fhade, interfperfed over the verdure; on the other fide they precipitately rife with lofty woods covering their brows, below which the rivulet, in one place, glides with a filent ftream, and in another falls in cafcades. Near the entrance is a building, called the Cold Bath, which is conftantly fupplied by a fpring of pure water. Adjoining is the figure of a dying gladiator, and further on is a fine ruftic bridge with the river rufhing through it, and the back-ground fo darkened by trees as to excite the idea of a cafcade foaming through a cavern. Near this is a ftatue of Hercules deftroying Antæus. The view now opens with a beautiful affemblage of new objects, moft charmingly diverfified. From a little grotto not far diftant a fine expanfive lake is feen winding round the bafe of an eminence, called Tent Hill, encircled by a magnificent amphitheatre of hanging wood. The lawn is laid out with exquifite tafte, and here the water divides itfelf into various and beautiful forms, embellifhed at different points by ftatues of Neptune, Bacchus, Galen, a dying gladiator, and Roman wreftlers. On rifing grounds are fituated a temple of Piety, a Chinefe temple, a temple of Fame, a banquetting-houfe, and various other ornamental buildings.

Near Studley-Royal are the venerable ruins of the once celebrated Abbey of Fountains, which was founded in the year 1132, for the monks of the Ciftertian order, but foon afterwards fuffered total demolition by fire. It was rebuilt, however, in 1204, in the early pointed ftyle of architecture, which then began to prevail; this houfe continued to flourifh till the general diffolution in the reign of Henry VIII., when its annual revenues, according to Speed, were valued at 1073*l.* 0*s.* 7½*d.* This abbey, with all its offices and appendages, covered about twelve acres of ground. The church, the walls of which are ftill almoft entire, appears to have been a very large and magnificent ftructure. The nave, in particular, is a moft majeftic fpecimen of building, uniting fimplicity with lightnefs and elegance. The Ancient and Modern Hiftory of the Loyal Town of Rippon, by Thomas Gent of York, 8vo. 1733. Hiftory of Ripon, 12mo. 1801. Beauties of England and Wales, vol. xvi., by John Bigland. Drake's Eboracum, folio.

RIPOSTE, in the *Manege*, is the vindictive motion of a horfe that anfwers the fpur with the kick of his foot.

RIPOUR, in *Geography*, a town of Hindooftan, in the circar of Gohud; 40 miles S.S.W. of Gwalior.

RIPPACANOT Creek, a river of America, near the weftern branch of the river Wabafh.

RIPPERDA, John William, in *Biography*, baron of, was born in 1680, of a noble family, in the province of Groningen. He was educated in the principles of the Catholic religion, but upon marrying a Proteftant heirefs, he conformed to the Proteftant faith. He appears to have entered the army while he was young, and for fome time he was in the fervice of the States-General as colonel of the infantry, which poft he occupied in the year 1715, when he was fent from the States to the court of Spain, to negociate a commercial treaty. Having ingratiated himfelf with the king, Philip V., he returned to the Catholic religion, and took up his abode at Madrid. His firft wife being dead, he married, in 1721, a Caftilian lady of high birth, and rapidly rofe in the confidence of the king. In 1725 he was fent to Vienna to negociate an accommodation with the imperial court. In the fame year he figned a treaty at Luxembourg with the emperor's plenipotentiaries; and on his return to Madrid he was created a grandee of the third clafs, and duke of Ripperda. He alfo obtained the office of fecretary of ftate for foreign affairs; and the management of the war, marine, and financial departments, was entrufted to him, fo that he had all the power, without the name, of prime minifter. In a fhort time he was not only difmiffed from his employments, but confined in the caftle of Segovia, where he remained two years, when, having found means to make his efcape into Portugal, he paffed from thence into England, where he remained till 1730, when he went to the Hague, and refumed the Proteftant religion. After this he formed a connection with an envoy from Morocco, and in 1731 embarked for that country. He was favourably received by the fovereign, Muley Abdallah, to whom he propofed a fcheme of uniting the Barbary ftates againft Spain, and of invading that country. He engaged the Moors to undertake the fiege of Ceuta, and having declared himfelf a convert to the Mahometan religion, and affumed the name of Ofman, he was nominated to the chief command of the army employed for that purpofe. By his military talents he infpired the Moors with confidence in their enterprize, when the arrival of a Spanifh army in Africa, which laid fiege to Oran, difconcerted his plans. Neverthelefs, he perfifted in the fiege of Ceuta,

Ceuta, and defeated the garrifon which had fallied out againft him. But a nocturnal furprife of the Moors in the trenches broke up the fiege, and Ripperda, who fled in his fhirt to Tetuan, was received fo coldly at the court of Morocco, that he meditated an efcape to fome other country. He was ftopped by the emperor, and fully expected to pay the forfeit of his life, on account of his fuccefs; but he pleaded his caufe with fo much effect, that he was, after a fhort imprifonment, fet at liberty. He now formed a new project, which was a confolidation of different religions, efpecially the Mahometan and Jewifh, which he endeavoured to render compatible by admitting the prophetic character of Mahomet, and inculcating the expectation of a future Meffiah. He made fome converts to his opinions; but at length became fufpected of difhoneft motives, and was obliged to retire. His projecting fpirit continued to the laft, and he advanced confiderable fums to Theodore for his attempts on the crown of Corfica. He died at Tetuan, in 1737. Univerfal Hiftory. Gen. Biog.

RIPPERS, in the *Wire-works*, are the people who attend in the mills, take the prepared fmall rods of iron, and work at the barrels where they are drawn into wire.

RIPPIN, or RUPULAM, in *Geography*, a town of Hungary; eight miles N.N.E. of Leopoldftadt.

RIPPINICA, a town of the duchy of Warfaw; 25 miles N. of Wladiflaw.

RIPPLE, in *Agriculture*, a flight fcratch or tear, fometimes applied to very flight ploughings, hence called ripplings.

RIPPLE, in *Rural Economy*, an implement of the comb kind, conftructed with feveral upright triangular prongs, fet near together in a ftrong piece of wood, for the purpofe of rippling flax and hemp.

RIPPLING, in *Sea Language*, a broken and interrupted noife, produced by a current on or near the fea-coaft.

RIPPLING *of Flax*, in *Rural Economy*, the operation of taking off the feed from the flax by drawing it through a ripple or large comb. See FLAX, and RIPPLE.

RIPPON, in *Geography*. See RIPON.

RIPRAPPS, a narrow fhoal in the Englifh channel, between Folkftone and Boulogne, S.W. and N.E. about 10 miles; with a ftrong bottom, and at a low fpring-tide not covered above 14 feet with the fea.

RIPRESA, Ital., the fame as *reprife* in French, and *repeat* in Englifh; which fee.

RIPSA, in *Geography*, a town of Sweden, in Sudermanland; 13 miles N. of Nykoping.

RIPTON, a townfhip of America, in the county of Addifon and ftate of Vermont; containing 15 inhabitants.

RIQUEVILLE. See RICHENVEIR.

RIQUEURIA, in *Botany*, a name in the Flora Peruviana, deftined to commemorate Lewis Riqueur, apothecary to king Philip V. of Spain. *De Theis*.

RIS, in *Geography*, a town of France, in the department of the Puy-de-Dôme, near the Allier; nine miles N. of Thiers.

RISACO, a town of Dalmatia, in the bay of Cataro; 20 miles N.N.W. of Ragufa.—Alfo, a river of Iftria, which runs into the gulf of Triefte, about three miles from Capo d'Iftria.

RISARD, FRANCIS, in *Biography*, a French mathematical writer in the eighteenth century, publifhed feveral efteemed elementary works for the inftruction of the young in the fciences. He was a native of Neufchateau, in Lorrain, and was made profeffor of philofophy in the college of Beauvais; he died at Paris in the year 1778. His productions confift of "Elements of the Mathematics," in 4to., of which the author publifhed an abridgment, in 8vo.; "A Treatife on the Sphere," in 8vo.; "A Treatife on Gnomonics," in 8vo.; "Tables of Sines," in 8vo.; "Rectilinear Trigonometry," 8vo.; "Elements of Geometry," in 4to.; and "Inftitutiones Philofophicæ," in 2 vols.

RISBOROUGH, or PRINCE'S RISBOROUGH, in *Geography*, a market-town and parifh in the fecond divifion of the three hundreds of Aylefbury, county of Buckingham, England, is fituated at the diftance of 5 miles S.W. from Wendover, and 37 N.W. from London. The right of holding a market was granted to the inhabitants by king Henry III., who, at the fame time, beftowed upon the townfmen many privileges. The market day is Saturday, weekly; befides which there is an annual fair on the 6th of May. The manor here was anciently vefted in the families of Gifford and Humet; but having fubfequently become vefted in the crown, it was granted to Richard, earl of Cornwall, and king of the Romans, who died in 1272. It was afterwards the property of Edward the black prince, who is faid "to have had a palace here, fuppofed to have ftood within the fcite of a fpacious moat, now dry, which is in a field adjoining the church-yard." In the reign of Henry V. this manor was affigned to his queen, Catharine, in dower. Charles I. fold it to certain citizens of London, who, in 1637, conveyed it to the family of the Chibnalls; one of whom gave a confiderable fum of money to the parifh to fupply clothing annually to 24 poor women. Since the Chibnalls, it has been occupied fucceffively by the families of Abraham, Adeane, Pelham, Panton, and Grub, the prefent poffeffors. According to the parliamentary returns of 1811, this parifh contains 324 houfes, and 1644 inhabitants.

Adjoining to Prince's Rifborough is the village of Monk's Rifborough, at which place, it is faid, there was formerly a cell of Benedictine monks, fubject to the monaftery of Chrift-church, in Hampfhire. The church here is a handfome building, in the later pointed ftyle of architecture, and contains many monuments. Lyfons's Magna Britannia, vol. i. Bucks, 4to.

RISBY, a town of Sweden, in the province of Finland, near the gulf of Bothnia; 32 miles N. of Biorneborg.

RISCHEBACH, a river of Saxony, which runs into the Elbe, near Wittenberg.

RISCHIN, a town of Bohemia, in the circle of Rakonitz; 30 miles S.E. of Rakonitz.

RISCLE, a town of France, in the department of the Gers; fix miles S. of Nogaro.

RISCUS, among the Romans, fometimes fignifies a cheft or trunk covered with fkins; fometimes it is ufed for a hamper, made of twigs or rufhes to hold lint; and fometimes for a hollow place in the wall of a houfe, ufed likewife for holding lint, or the like.

RISEBERGA, in *Geography*, a town of Sweden, in the province of Skone; 28 miles N. of Lund.

RISENBURG, a town of Pruffia, in the province of Oberland; 12 miles E. of Marienwerder.

RISENKIRCH, a town of Pruffia, in the province of Oberland; 14 miles E. of Marienwerder.

RISENTITO, in the *Italian Mufic*, a brifk, lively, or expreffive manner of playing.

RISHI, in *Hindoo Mythology*, is a general name for ancient fages or faints. Confiderable difficulty occurs in determining, with any exactitude, who they were, whether they had any hiftorical exiftence, or are merely the creatures

tures of the imagination. Seven of them are most frequently spoken of; by some said to be the first rational beings created by Brahma. Each has a wife, and a numerous offspring. The names of these seven differ in different authorities; but the following list is that usually received. 1. Kasyapa; 2. *Atri*; 3. Vasishta; 4. Viswamitra; 5. Gautama or Godama; 6. Jamadagni; 7. *Bharadwaja.* (The names distinguished by capitals have furnished articles in this work.) The wives of these patriarchs have been transferred to the heavens, and are the stars called by western astronomers the Pleiades; by the Hindoos, Kritika, under which word will be found some information respecting them, shewing that the astronomical fabulists of both races have common legends. The Rishis are said to be the bright stars in the great bear. How they became so distant from their sparkling spouses is explained in the article just referred to. In several languages of India, a bear is called Rish; and there may be some allusion both to the constellation and the sages in question. Sometimes the seven Rishis, and the seven Menus, are confounded. (See Menu.) Another race of patriarchal sages is also sometimes confounded with both. These are the Munis. See Muni; in which article the reader is requested to correct a typographical error, in the second column, third line from bottom, for *many-mothered, for*, read *many-mothered son.* Jamadagni, for instance, is usually called a Rishi; yet in our article given under the name of his wife, Runeka, he is, on Puranic authority, called "a great Muni." The Rishis, as the immediate production of Brahma, are sometimes called Brahmadikas, of whom likewise there are seven; but they are not usually supposed to be the same with the Rishis: some lists have no names in common with those of the Rishis; others have several. As the production of Brahma, there is another set of seven beings of different names from any of the above-named lists, but employed in early days in peopling the world; these are called Sanakadikas, of whom something is said under the name of their principal, Sanaka. The Hindoo books differ very much in their accounts of these varieties of persons interposed between the Supreme Being and the created world; and it is not easy, if at all practicable, to reconcile their disagreements; nor perhaps worth the pains were it otherwise.

We shall not attempt to notice the disagreements, that could be picked out from high Hindoo authorities, respecting the equivocal personages named in this article. It may be briefly observed, that although *the seven* Rishis are very commonly adverted to, the appellation is by no means confined to that number. In the Siva Purana, Brahma is said to have produced Brighu and the seven Rishis, and after that Nareda, from his thigh, Kardama the Rishi from his shadow, and from the fore-finger of his right-hand, Daksha. These persons are sometimes called Rishis, Brahmadikas, Maharshis, Devarshis, &c. A sage of the name of Dadichi occurs in the Skanda Purana, as having swallowed the sacred books, for their security, at a period of great wickedness and tumult. He is called a Rishi; as is another named Uddalaka, who was half betrothed to Lakshmi, the goddess of wealth; but espoused her sister Jyeshta, goddess of poverty. These allegories may be explained. (See Uddalaka, and Kardama.) Other Puranas seem to identify in some parts the Rishis and Munis, calling both "the virtuous sages, who delight in protecting the people." In other parts distinctions are made. In the beginning of this article we have stated the term Rishi to be, as it were, generic; meaning sages, saints, patriarchs. This seems authorised by the Ramayana, where this note occurs. "There are four kinds of Rishis, or sages; the Rajarshi, or royal sage; the Maharshi, or great sage; the Brahmarshi, or sacred sage; and the Devarshi, or divine sage. Of these the first is esteemed the lowest, and the last the highest." These appear to be the specific varieties. In addition to the articles already referred to, some farther points connected with the subjects of this will be found noticed under the following: Maharshis, Matsyavatara, Pikeswari, Pitris, Pulaha, Pulastya, Rajarshi, Ravena, Runeka.

RISIBILITY, the faculty of *laughter;* which see.

Risibility is commonly supposed an attribute peculiar to man; as being the only creature capable of judging what is ridiculous.

Some philosophers go so far as to assert, that the degree of judgment is always seen in that of laughter; fools always either have too little or too much of it.

Authors do not agree as to the peculiar mechanism in man, by which laughter is raised. It is usually attributed to the communication between the plexus nervosus, and the diaphragmatic nerves. See Lungs.

RISIGALLUM, in the *Materia Medica.* See Realgar.

RISING, in *Astronomy*, the appearance of the sun, a star, or other luminary, above the horizon, which before was hid beneath it.

By reason of the refraction of the atmosphere, the heavenly bodies always rise before their time; *i. e.* they are seen above the horizon, while they really are below it. See Refraction *of the Atmosphere.*

There are three poetical kinds of rising of the stars. The *Acronychal, Cosmical,* and *Heliacal*; which see respectively.

To find the rising, &c. *of the sun and stars by the globe,* see Globe.

Rising, in *Rural Economy*, a term sometimes applied to yeast, or barm used for the purpose of fermenting different matters.

Rising, in *Ship Building*, a term derived from the figure of a ship's bottom in general, which gradually narrows or becomes sharper towards the stem and stern-post. On this account it is that the floors, towards the extremities of the ship, are raised or lifted above the keel; otherwise the shape would be so very acute, as not to be obtained from timber with sufficient strength in the middle or cutting-down. The floor-timbers forward and abaft are therefore gradually lifted or raised upon a solid body of wood, called the *dead* or *rising-wood,* which must of course have more or less rising as the body of the ship assumes more or less fullness or capacity.

Rising *of Boats,* is a narrow strake of board fastened withinside to support the thwarts.

Rising-*Floors* are the foremost and aftermost floors, which, on account of the rising of the body, are the most difficult to be obtained, as they increase in the acuteness of shape; and to preserve strength in the throat, the cutting-down must be deeper.

Rising-*Line,* an elliptical line drawn in the plan of elevation, by which line, with its corresponding half-breadth or narrowing line, the figure of the bottom near the floor-heads is determined.

Rising-*Square,* a square used in whole moulding, upon which is marked the height of the rising-line above the upper edge of the keel.

Rising-*Straight,* is a curve line used in whole moulding drawn in the sheer plan, at the intersection of the straight part

part of the bend mould, when continued to the middle line at each timber.

Rising-*Wood*, that part of the basis of a ship's body, forward and abaft, which is formed by solid pieces of timber scarfed together lengthwise on the keel. The rising-wood must be sufficiently high to seat the floors; and afore and abaft the floors, it is continued up to the cutting-down or upper side of the floors, for the purpose of securing the heels of the cant-timbers, and there left sufficiently broad to admit of a stepping or rabbit for the heels of those timbers, that they may not be continued downwards to sharp edges.

RISK, or Risque, the hazard or chance of a loss, damage, &c.

There is a great risk run in letting goods go upon credit to great lords, wives not authorized by their husbands, and young people not yet arrived at the age of majority.

Skinner derives the word from the Spanish *risco, steep;* Covarruvias, from *rigeo.* In the barbarous Greek, they say, ῥιζικαρειν, for *periclitor, I hazard;* and ῥιζικον, for *lot* or *chance;* which words, as well as *risque,* Skinner thinks, may be deduced from ῥιπτω, for αναρριπτω τον κυβον, *I cast the dye.*

To prevent any risk in invoices of merchandizes by sea, it is usual to insure them.

Accordingly the risk is a subject of primary consideration in cases of marine insurance. All the risks or perils, that are incident to sea-voyages, may be provided against by insurances, with certain exceptions founded on public policy and the interests of humanity. Thus, the insurer can, in no case, upon principles of natural justice, make himself answerable for any loss or damage, proceeding directly from the fault of the insured. No insurance can be made, even against the perils of the sea, upon illegal commerce. In most foreign countries, insurances on the lives of men are prohibited. In France they have been always deemed illegal, and are expressly forbidden by the ordinance of Lewis XIV.; nevertheless, French writers have held that this does not apply to Negro slaves. According to Valin, who has, by curious reasoning, attempted to vindicate this doctrine, the disposition to suicide is natural in Negro slaves, and imputable, as he expresses himself, to the "inherent vice of the article;" and, therefore, their death, proceeding from this cause, must be deemed natural death. But the killing of them, or the throwing of them overboard in a revolt, is a loss incident to this trade, and a peril within the policy. It is to be lamented, that, whilst the slave trade was countenanced and carried on in this country, the objects of this cruel traffic have been too much considered as mere merchandize; and the insured upon this trade formerly recovered, under the common policy, for any loss sustained in the voyage by the mortality of the slaves, whether they were thrown overboard, in cases of supposed necessity, or died a natural death, or perished by the perils of the sea. The legislature, however, while this infamous and savage traffic subsisted, interposed, and by an annual act, passed with a view to *interest* the persons concerned in this trade in the preservation of the lives and health of the slaves, declared, that though the policy remained in the same form as before, it cannot protect the insured against losses occasioned by natural death, ill treatment, throwing overboard, or by restraints of princes proceeding from attempts to get slaves by force. (See stat. 30 Geo. III. c. 33. § 8. 34 Geo. III. c. 80. § 10. and 39 Geo. III. c. 80. § 24.) But we trust the provisions of these and similar statutes are become wholly unnecessary in this country, and that the trade, of which we shall give some account in its proper place, is abolished never to revive.

The words of an English policy, which specify the various risks against which insurances are usually made, are these: "Touching the adventures and perils which we, the assurers, are contented to bear, and do take upon us in this voyage, they are of the seas, men of war, fire, enemies, pirates, rovers, thieves, jettisons, letters of mart and countermart, surprizals, takings at sea, arrests, restraints, and detainments, of all kings, princes, and people, of what nation, condition, or quality soever; barratry of the master and mariners; and of all other perils, losses, and misfortunes, that have or shall come to the hurt, detriment, or damage of the said goods and merchandizes, and ship, &c. or any part thereof, without prejudice to this insurance." The latter clause seems to be sufficiently comprehensive to embrace every species of risk to which ships and goods are exposed from the perils of sea-voyages. However, by the agreement of the parties, the general words of the policy may be altered or qualified; and any of the risks may be wholly or in part excluded, and the insurance may be made only against some particular risks, or up to, or beyond certain degrees, or upon particular articles. In England, it is now constantly stipulated in all policies, that upon certain enumerated articles of a quality peculiarly perishable, the insurer shall not be answerable for any partial loss whatever; that upon certain others, liable to partial injuries, but less difficult to be preserved at sea, he shall only be liable for partial losses above *five per cent.;* and that, as to all other goods, and also the ship and freight, he shall only be liable for partial losses above *three per cent.* This stipulation is made by a memorandum, in the form of a warranty, inserted at the bottom of all English policies. It was first introduced here about the year 1749; before which time the insurer was liable for every injury, however small, that happened to the thing insured. This clause prevented the necessity of adapting the premium to the nature of the commodity. Nevertheless our policies indemnify the insured against every loss, let it be ever so inconsiderable, arising from any cause affecting the general safety of the ship and cargo. Losses of this sort, being of the nature of "general average," are so called in the memorandum; and there is, therefore, annexed to each of the provisions above-mentioned, an exception of general average. In the policies of private insurers, the case of the "stranding of the ship" is likewise excepted. In the common policies, used in London by private underwriters, the memorandum runs thus: "Corn, (comprehending every sort of grain, and also pease and beans,) fish, salt, (excluding salt-petre,) fruit, flour, and seed, are warranted free from average, unless general, or the ship be stranded: sugar, tobacco, hemp, flax, hides, and skins, are warranted free from average, under *five per cent.;* and all other goods, also the ship and freight, are warranted free from average, under *three per cent.*, unless general, or the ship be stranded."

This form of the memorandum was generally used, not only by private underwriters, but also by the two insurance companies, from its first introduction in 1749, till the year 1754; when, in consequence of a particular case that occurred, the London Insurance Company left out of the memorandum in their policies the words, "or the ship be stranded;" and the same alteration was soon after adopted by the Royal Exchange Assurance Company. Private underwriters have, however, continued the memorandum in the old form. Many questions have arisen as to the true meaning of the words, "free from average, unless general,

or

or the ſhip be ſtranded." The word "unleſs" has been held to make an *exception*, and not a *condition;* and caſes have occurred in which judges of the higheſt eminence have put a different conſtruction upon the fore-mentioned clauſe. It is now ſettled, that if the ſhip be ſtranded, the inſurer is liable for any partial loſs in any of the articles in the memorandum, though ſuch loſs did not ariſe from the ſtranding, but from ſome other cauſe. Notwithſtanding the number of caſes, which have been decided upon the conſtruction of the memorandum, it ſtill remains a queſtion, whether the partial loſſes, from which the inſurer is exempted by it, comprehend the *total loſs* of an *entire individual*, as well as a partial injury to the *whole* of the ſpecies of goods exempted by the memorandum from ſmall average loſſes; as, *e. gr.* if out of 101 hogſheads of ſugar of equal value, five are ſo completely ſpoiled in the voyage, as to be worth nothing, and therefore *totally loſt*. If this loſs be calculated upon the whole 101 hogſheads, it will not amount to *five per cent.* In ſuch a caſe, it has been thought, that the inſurer would be protected by the memorandum, and not liable for the loſs. But the queſtion has not been decided.

There are certain injuries or loſſes, to which goods on ſhip-board are liable, that do not ariſe from the perils of the ſea; and for theſe the owners are liable. Theſe may be owing to ſome fault or defect of the ſhip: in this caſe the inſurer is not liable, becauſe, in every contract of inſurance, there is an implied warranty, that the ſhip is ſea-worthy; and if it appear otherwiſe, the contract is void. In many caſes, the maſter alſo, as well as the owners, is anſwerable. He is bound to deliver goods in the ſame ſtate in which he received them; and of courſe he, as well as the owners, is liable for all loſs or damage not proceeding from ſome inevitable misfortune. They are anſwerable for loſs or damage occaſioned by bad ſtowage, wet, theft, embezzlement, rats, &c. This is the rule of the marine law, and agrees with the common law. At common law, the owners and maſter were liable to the full value of the goods loſt; but now by 7 Geo. II. c. 15. they ſhall only be liable to the value of the ſhip and freight for any act done by the maſter or mariners. The maſter's liability, and that of the mariners, remains the ſame. But as this proviſion only extended to the caſe of embezzlement, &c. by the maſter or mariners, it did not afford a ſufficient protection to ſhip-owners. Therefore the 26 Geo. III. c. 86. limits the liability of the owners to the value of the ſhip and freight, though the maſter or mariners ſhould not be privy to ſuch robbery, &c.; and they are exempt from all liability for any loſs by fire. But though the owners are reſponſible to the amount of the value of the ſhip and freight, for loſſes occaſioned by external thieves; yet, under the policy, the inſurers are alſo liable; and, therefore, in ſuch caſes, the proprietor of the goods, or the inſurers in his name, may recover againſt the owners.

In order to charge the inſurer, the loſs muſt happen during the continuance of the riſk. This brings under conſideration a ſubject of importance. Every voyage inſured muſt have a fixed commencement and termination. It is proper, therefore, to inquire what is the duration of the riſk, with reference to inſurances upon *goods*, upon the *ſhip*, and upon *freight*. In France, and moſt other countries, it is provided, that if the time of the riſk be not regulated by the contract, it ſhall commence, as to *goods*, from the time they are put on board the ſhip, or put into barges, to be conveyed on board, that is, from the moment of their leaving the ſhore; and it continues till they are ſafely landed at the place of their deſtination. It is alleged, that the perils of the ſea commence from the moment in which the goods are on the water. In our policies, the words uſually employed to expreſs the commencement and end of the riſk on *goods* are theſe: "Beginning the adventure upon the ſaid goods and merchandize *from the loading thereof aboard the ſaid ſhip*, and ſo ſhall continue and endure until the ſaid ſhip, with the ſaid goods, ſhall be arrived at —— (her port of delivery), and until the ſame be diſcharged and ſafely landed." With us, therefore, the riſk does not commence until the goods are actually on board the ſhip; and, therefore, the inſurer is not anſwerable for any loſs or damage which may happen to them, while they are on their paſſage to the ſhip. And it may be laid down as a general rule, that the riſk on goods continues no longer than they are actually on board the ſhip mentioned in the policy; and that if they be removed from on board that ſhip, and landed, or put on board another ſhip, without the conſent of the inſurers, the contract is at an end, and the inſurers are diſcharged from all ſubſequent reſponſibility.

To this rule, however, there are ſeveral exceptions: as where the ſhip is diſabled, and the goods are put on board another veſſel, to be forwarded to their port of delivery; ſo, if it be agreed, that the goods ſhall be removed into another ſhip, at a particular place in the voyage, and no ſhip being there, they are put on board a ſtore-ſhip. The inſured is protected by the policy in carrying the goods in lighters to any part of the port of delivery, where ſuch goods are uſually landed. It is a general principle, that policies ought to be conſtrued according to the uſage of trade; and in doubtful caſes, in favour of the inſured. Although the general rule is, that the inſurance on goods ſhall continue "till they are diſcharged and ſafely landed," yet it has been holden by a very eminent and learned judge, that if the inſured take goods from on board the ſhip in his own lighter, the inſurer is diſcharged. Where goods are put into a public lighter, for the purpoſe of being landed, the riſk continues; but if the merchant ſend his own lighter, this will be a delivery to him, and the inſurer is diſcharged. Although the riſk on goods, according to the uſual words of the policy, is to continue till they are diſcharged and ſafely landed at the port of delivery, this is not to be underſtood as an authority for prolonging the riſk, after the ſhip's arrival at her port of delivery, for any indefinite length of time, at the pleaſure of the inſured; but the fair conſtruction of the clauſe is, that the goods ſhall remain under the protection of the policy for a *reaſonable time*, till they can be conveniently landed, and no longer.

As to the inſurance of the *ſhip*, the riſk, in ſome countries, is made to commence from the time ſhe begins to take in her firſt goods, or ballaſt, and to continue till after ſhe arrives at her place of deſtination, and is entirely diſcharged. In others, the riſk is made to end twenty-one days after the ſhip's arrival, or ſooner, if ſhe be unloaded. In France, if the time of the riſk on the ſhip be not regulated by the contract, it runs from the time ſhe ſets ſail, till her arrival at her port of deſtination, and till ſhe be there anchored and moored at the quay. In England, the commencement of the riſk on the ſhip varies in almoſt every caſe. In outward-bound voyages, it is generally made to commence from her beginning to load at her port of departure. Sometimes privateers on a cruize, ſhips engaged in the coaſting trade, or in ſhort voyages, are inſured for a limited period of time; and, in ſuch caſes, the riſk commences and ends with the term, wherever the ſhip may then happen to be. If a ſhip be inſured "*from*" the port of London to any other port, and before ſhe breaks ground, an accident happen to her, the inſurers are not anſwerable;

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for the risk does not commence till she sets sail on her departure from the port of London: but if the insurance be "*at and from*" the port of London, the insurers are liable for any accident that may happen to her, *from the time of subscribing the policy*. When a ship, expected to arrive at a certain place abroad, is insured "*at and from*" that place, or "*from her arrival*" there, the risk begins from the first moment of *her arrival at the place* specified; and the words "*first arrival*" are implied, and always understood in policies so worded. In such cases, the risk continues there as long as the ship is preparing for the voyage insured; but if all thoughts of the voyage be laid aside, and the ship be suffered to lie there for a length of time, with the owner's privity, the insurer is not liable; for this would be to subject him to the whim and caprice of the owner, who might choose to let the ship lie and rot there. In English policies, the risk on the ship is usually made to continue "until the ship hath moored at anchor twenty-four hours in good safety," and the insurer is answerable for no loss after the expiration of that time. If the ship, before the twenty-four hours are expired, be ordered to the proper place to perform quarantine, the risk continues, though she do not leave her moorings till long after the expiration of the twenty-four hours. Upon the same principle, if the ship, on her arrival at her port of destination, be subject to seizure under an embargo, and a declaration of reprisals, and she be in fact seized within the twenty-four hours, though she be permitted afterwards to load her cargo, the insurer is liable. The risk on the rigging, tackle, furniture, and provisions of the ship insured, continues no longer than they are attached to, or remain on board, the ship. But if it be necessary to put these articles on shore during a repair, which is the usual practice in such cases, the risk continues on them while on shore, and if they are lost or damaged by any of the perils mentioned in the policy, the insured is liable. An insurance upon an India voyage includes the risk of the country voyage by the usage of the trade, with which, in this and other instances, the underwriter is presumed to be fully acquainted. Thus an insurance was made on a ship "at and from Bengal to any ports or places in the East Indies, China, Persia, or elsewhere beyond the Cape of Good Hope, forwards and backwards, and during her stay at each place, until her arrival at London." In an action on this policy, tried before lord Mansfield, the plaintiff obtained a verdict. Upon a motion for a new trial, the court determined that, under all the circumstances, the plaintiff was entitled to recover. The reasons were, that the underwriters are presumed to know the course of the East India trade, the terms of the charter-party, and the destination of the India ships, (which are under the direction of the company and not of their owners): that the charter-party is a printed form of very long standing: that, besides the liberty thereby given, to prolong the ship's stay for a year, it is very common, by a new agreement, to detain her a year longer; for no ship comes home in ballast, and the longer a ship is kept, the more beneficial to the owners: that the words of the policy are adapted to this usage, being without limitation of time or place, and without any reference to the first voyage particularly mentioned in the charter-party: that the terms of the policy precisely describe the risk in its utmost latitude, and necessarily extend to every prolongation of stay, and every country voyage: that the usage of the India trade, and the course of the voyages in it, were notorious to insurers, who must be supposed sufficiently conusant of them, and the obligation of the policy is taken from the usage, and the words of the charter-party, which refer to that usage, in the same manner as if it were expressly inserted in the policy; whereas if every person insured should be obliged to state to the insurer all the grounds of his expectations, as to the ship's continuance in India, or her returning to England, it might produce great litigation and confusion in cases arising upon these policies: besides, it would be contradictory to the policy, to say that the underwriter did not insure for a country voyage.

If in a policy on an India voyage, there be liberty "to *touch*, *stay*, and *trade* at any ports or places;" this covers the risk, even of a *second* country voyage. In a like policy, the liberty was only to *touch* and *stay* at any port, &c. in the voyage, by the usage of the trade. This covered the risk on the intermediate voyages. Nevertheless, the general rule is, that a liberty to touch and stay at any ports and places, means only places in the usual course of the voyage. A liberty to *touch* and *stay* does not authorise the insured to break bulk and trade. If the voyage described in the policy has really been commenced, though at a time, and under circumstances very different from those which were in the contemplation of the parties at the time when the policy was effected; yet if there be no fraud, misrepresentation, or concealment on the part of the insured, this shall be a good commencement of the risk. Although the ship, through necessity, change the order of the places at which she is to touch, yet if she do not abandon the original voyage, the risk continues.

In an insurance upon *freight*, the risk generally begins from the time when the goods are put on board. If an accident happen to the ship before any goods are put on board, which prevents her from sailing, the insured cannot recover for the loss of freight, which the ship might have earned, if the accident had not happened; but if part of the cargo be put on board, and the rest be ready to be shipped, the insured may recover for the whole freight, upon a valued policy. If the ship be lost on her way to her port of loading, or to a distant place where she is to take in her cargo, the insurer is liable for the whole freight.

If, after the insurance is effected, any thing be done by the insured to alter the nature of the risk, this must be done with the consent of the insurers, otherwise it will avoid the contract. If a ship insured as a private trader afterwards takes letters of marque, without the consent of the underwriters, they are thus discharged, although no use be made of the letters of marque.

In connection with the subject of this article, we may add a few words on the loss, *i. e.* the injury, or damage, which may be incurred by those perils of the sea that constitute the risk, against which the insurer undertakes to indemnify the insured. This loss may be either total or partial; the total loss signifying, in a natural sense, the absolute destruction of the thing insured; but, in a legal sense, it means not only the total destruction, but likewise such damage to the thing insured, though it may specifically remain, as renders it of little or no value to the owner. A loss is also said to be total, when, in consequence of the misfortune that has happened, the voyage is lost, or not worth pursuing; or, if the value of what is saved be less than the freight, &c. A partial loss is any loss or damage not amounting to a total loss. Partial losses are sometimes denominated "average" losses, because they are such as are the subjects of average contributions; and they are distinguished into general and particular averages. These losses may be incurred by the perils of the sea, such as the ship's foundering, stranding, or striking suddenly against a rock, by running foul of another vessel, by fire, by capture, (see RECAPTURE and RANSOM), by arrest and detention of princes, by barratry, (see BARRATRY), by average contributions, by expence of salvage, or they may be wilful and fraudulent. The term *average*, derived from *averagium*, formed

formed from the verb *averare*, to carry, has been explained under that article. It is here ufed to fignify a contribution made by the owners of the fhip, freight, and goods on board, in proportion to their refpective interefts, towards any particular lofs or expence fuftained for the general fafety of the fhip and cargo; fo as that the particular lofer may not be a greater fufferer than the owner of the fhip and the other owners of goods on board. This juft and equitable contribution is called *general* or grofs average, becaufe it falls generally upon the whole or grofs amount of the fhip, freight, and cargo; and alfo to diftinguifh it from what is often, though improperly, termed *particular* average, but what, in reality, means a particular, and not a general lofs, and has no affinity to average properly fo denominated. The *petty* and *accuftomed* averages are fuch as pilotage, towage, light-money, beaconage, anchorage, bridge-toll, quarantine, river-charges, fignals, inftructions, caftle-money, pier-money, digging the fhip out of the ice, &c. When thefe petty charges are incurred in the ufual courfe of the voyage, they are not confidered as a *lofs* within the meaning of the policy, but only a neceffary and ordinary expence; but if incurred for any extraordinary purpofe in the voyage, as to provide againft any impending danger, or in confequence of the fhip's being driven out of her courfe by ftrefs of weather, they will then be deemed grofs or general average, for which the infurer will be liable. A contribution upon a general average can only be claimed when the facrifice, occafioning the lofs, was, after due deliberation, found to be indifpenfably neceffary for the prefervation of the fhip and cargo, whenever it appears to have conduced to this purpofe, and when the fhip and reft of the cargo were actually faved. If goods put into lighters to enable a fhip to get up a river be loft, the reft fhall contribute; but if the fhip be loft, the goods in the lighters fhall not contribute. It has been faid that the wages and expences of the crew during the detention of a fhip unjuftly captured, as well as the charge of reclaiming her, and that the charges of wages, &c. upon a fhip that is obliged to go into port to refit after a ftorm, fhould be brought into a general average. This point has never been decided in a court of juftice, but the principle feems to have been allowed by judges of great authority in cafes that have occurred.

No injury occafioned by mere fea-damage can be the proper fubject of a general average: as if the fhip be damaged in her hull or her rigging, the goods on board fhall not contribute; alfo, if a fhip fpring a-leak in a ftorm, by which goods on board are fpoiled, this is a fimple damage, or particular lofs, and cannot be the fubject of an average contribution.

The rule with regard to average contribution feems to be, that the fhip, freight, and every thing remaining on board that can properly be deemed a part of the cargo, fhall be fubject to this charge; and therefore money, plate, and even jewels, muft contribute according to their value. But the perfons on board, their wearing apparel, and alfo the jewels and ornaments belonging to their perfons, fhall not contribute; neither are feamen's wages liable to contribution. When the captain arrives at his port of deftination, it is his duty to fettle the contribution; and the average, if not fettled before, fhould be paid before the cargo is landed: for the owners of the fhip have a *lien* on the goods on board, not only for the freight, but alfo to *anfwer all averages and contributions* that may be due. If he neglect his duty in this refpect, Mr. Serjeant Marfhall conceives that an action would lie againft him, or againft the owners. If the lofs was in money paid, an action on the cafe for money paid would unqueftionably lie againft each perfon bound to contribute for his fhare; if in goods, a fpecial action on the cafe, founded on the cuftom of trade, would lie againft each perfon liable to contribute; or a bill in equity might be filed againft them all. The mode of afcertaining each perfon's contribution, though not very accurately defined, is ufually effected by afcertaining, after the fhip's arrival at her port of difcharge, the neat value of the fhip, freight, and cargo, as if nothing had been loft; and valuing thefe at the price they would fetch in ready money at the port of difcharge; and the neat amount, after deducting all charges, is the fum which is fubject to the contribution; and each perfon's fhare of the lofs will bear the fame proportion to the value of his property, as the whole lofs bears to the aggregate value of the fhip, freight, and cargo. In England, fome perfons make the fhip contribute for her full value and the freight; others, for half her value and one-third of the freight; and others, again, for half the value of the fhip and freight: and fhe fhall be valued at the price fhe was worth on her arrival at her port of delivery. The freight is valued at the fum the fhip has earned on her arrival there.

As to the mode of valuing the jettifon, it is now the fettled practice with us to eftimate the goods loft at the price they would have fetched at the port of delivery, on the fhip's arrival there; freight, duties, and other charges being deducted. Thefe contributions, under the general words of the policy, are a charge which the infurer is bound to pay; and it makes no difference whether the infured pay towards, or receive, this: he ought, in either cafe, to bear the proportion of the general lofs, and that muft fall on the infurers. For the lofs by expence of falvage, fee SALVAGE.

With regard to cafes of wilful and fraudulent loffes, the ftat. 1 Ann. ft. 2. c. 9. § 4 and 5. makes it a fimple felony to deftroy any fhip, to the prejudice of the owners of the fhip or goods on board; and takes away clergy, if committed on the high feas. And the 4 Geo. I. c. 12. extends this to the cafe of the owner or mafter who fhall deftroy any fhip, to the prejudice of the owners of, or underwriters upon, goods. The 11 Geo. I. c. 29. takes away clergy from fuch offenders in all cafes. See PIRATE.

In cafes where the infured is entitled to call upon the infurer as for a total lofs, he muft "abandon;" that is, he muft renounce and yield up to the infurer all his right, title, and claim to what may be faved, and leave it to him to make the moft of it for his own benefit. The infurer then ftands in the place of the infured, and becomes legally entitled to all that can be refcued from deftruction. The idea of "abandonment," therefore, prefuppofes a total lofs in this latter fenfe, and implies that fomething remains which may be faved, and which may be given up, or abandoned to the infurers. For if the infured could only abandon, in the cafe of a total lofs, in the ftrict and natural fenfe of the words, there would be nothing to abandon, and abandonment would then be only an ufelefs form. Some have faid that the practice of abandoning dates its origin from the period when the contract of infurance itfelf firft came into ufe; and yet it does not feem to be a right which neceffarily refults from the nature of the contract. It feems more probable that abandonment arofe from the practice of occafionally introducing into policies particular ftipulations, that if the thing infured fhould be fpoiled, or greatly damaged, by any of the perils infured againft, it fhould be abandoned to the infurers, who fhould be thereupon obliged to pay the entire fum infured; and that fimply making good the damage fhould not be fufficient to difcharge them: and fuch ftipulations, being frequently introduced into the con-

tract,

tract, became at length the foundation of general rules, which have been established in some countries by positive law, and adopted in others as part of the general law of insurance. In the first case of abandonment, that came before lord Hardwicke in the court of chancery, in the year 1744, he determined that where a recaptured ship and cargo were sold to pay the salvage, the insured had a right to abandon the surplus, and claim as for a total loss.

By the law of insurance, as understood in England, the insured may abandon in every case, where, by the happening of any of the misfortunes or perils insured against, the voyage is lost, or not worth pursuing, and the projected adventure is frustrated; or where the thing insured is so damaged, as to be of little or no value to the owner; or where the salvage is very high; or where what is saved is of less value than the freight; or where further expence is necessary, and the insurer will not undertake, at all events, to pay that expence, &c. The ordinance of the marine of Lewis XIV. confines abandonment to the following five cases: capture, shipwreck, stranding, arrest of princes, or the entire loss of the effects insured. By the French law, the right to abandon seems to depend on the "species of misfortune" which has happened: with us, it depends rather on the "degree of loss" sustained in consequence of it. These general principles have been exemplified in cases comprehending losses by capture and arrest of princes, and also other losses. Capture, or arrest of princes, is, *primâ facie*, a total loss; and immediately upon the capture, or mere arrest, or at any time while the ship continues under detention, the insured may abandon, and give notice to the insurer of his intention to do so; and thus entitle himself to claim as for a total loss from the insurer. There is, however, this difference between a policy *upon interest*, and a *wager* policy, that, in the one case, the insured may, if he think proper, abandon the moment he has notice of a capture or detention; and this will bind the underwriters, whatever may be the ultimate fate of the ship. But in the case of a wager policy, there can be no abandonment, because the insured has nothing to abandon. Nevertheless, a capture or arrest does not necessarily terminate in a total loss: for if a captured ship be retaken, and permitted to proceed on her voyage, so that she suffers but a small temporary inconvenience, this would only be a partial, and not a total loss. Neither does a recapture necessarily deprive the insured of the right to abandon. The rule is, that if the thing insured be recovered before any loss is paid, the insured is entitled to claim as for a total, or a partial loss, according to the final event; that is, according to the state of the case at the time he makes his claim. But if, after a total loss has been actually paid, the thing insured be recovered, the insurer cannot oblige the insured to refund the money he has received; but he shall stand in the place of the insured: thus no injustice is done. Two cases are adduced to shew that, though a captured ship be recaptured, yet if the voyage be lost, the loss will be total, and the insured will have a right to abandon. In one case, a ship is taken and retaken, and sold in a distant country to pay the recaptors for the salvage, and the residue of the produce of the sales remains in the court of admiralty there; and in this case the insured may abandon, and recover as for a total loss. In the second case, a ship, after throwing part of the cargo overboard in a storm, and being disabled from proceeding on her voyage, till refitted, was captured, and her crew taken out; but, after being eight days in possession of the enemy, was recaptured, and carried into an English port; upon which the insured gave notice to abandon. Before the ship could be refitted, the rest of the cargo was spoiled. This was a total loss, and the insured entitled to abandon. A title to restitution, arising from recapture, cannot take away a vested right to abandon, if the ship is unfit to perform the voyage. Serjeant Marshall observes, that he cannot find a single book, ancient or modern, which does not say that, in case of a ship *being taken*, the insured may demand as for a total loss, and abandon; and the proposition is proved more strongly by the general law which warrants him to abandon, in the case merely of arrest, or an embargo, by a prince not an enemy. If, indeed, the capture proves but a small temporary hindrance, the insured cannot abandon. The insured is in no case obliged to abandon; but he may abandon, if the voyage be defeated, or not worth pursuing: nevertheless he cannot, merely by abandoning, turn a partial into a total loss. It is not universally true, that because a ship has once been captured, the insured may abandon at any time afterwards. The rule is, that if the thing insured be recovered before any loss is paid, the insured is only entitled to a partial or a total loss, according to the final event. By the marine law, the property was not changed by the capture, till after condemnation; but since the 29 Geo. II. c. 34. the "jus postliminii" continues for ever. While the ship is in the hands of the enemy, she is considered as totally lost; yet the property is not changed, but reverts to the original owner, upon a recapture. But a recapture does not, in all cases, prevent the loss being total. If the voyage be absolutely lost, or not worth pursuing; if the salvage be very high; if further expence be necessary; if the insurer will not engage, at all events, to bear that expence, though it should exceed the value, or fail of success:—under these, and many other similar circumstances, the insured may disentangle himself, and abandon, notwithstanding a recapture. Upon a recapture, the property returns to the original owner, pledged for the salvage. Although there has at one time been a total loss, yet the insured cannot abandon, after the *final event* has determined it to be only a partial loss at the time of the action brought. There is no vested right to recover as for a total loss, till the insured, having a right to abandon, elects to do so. If the thing insured be recovered before the loss is paid, the insured can only recover according to the final event. If a ship be recovered after a long detention, it is not a total loss, even upon a wager policy. When the ship is safe, and the voyage is not lost, the insured ought not to be permitted to abandon. The insurer ought never to pay less than the value of the loss, nor the insured receive more. The insured can only recover an indemnity for his loss, at the time of the action brought, or offer to abandon. If, after a total loss has been paid, the ship be restored, the insured shall not be obliged to refund the money, and take the ship or goods. If, upon a recapture, the captain sell the ship and cargo, as being the best course to take for all parties concerned, the insured may abandon, and recover as for a total loss. If the captain purchase the ship from the captors, for account of his owners; the money paid, being in nature of a salvage, is only a partial loss.

There are other cases, besides capture and arrest of princes, in which the right of abandoning may be considered. Shipwreck is generally a total loss; but the mere stranding of the ship is not, of itself, deemed a total loss, so as to entitle the insured immediately to abandon. It is a rule that, to entitle the insured to abandon, there must have been, at some period of the voyage insured, or during the continuance of the risk, a total loss, and cases have occurred, from which it appears that no partial loss, however great, occaſioned by the perils of the ſea, can be turned into a total loſs. But if the voyage be loſt, from whatever cauſe, it is a total loſs, not only of the ſhip and freight, but alſo of the cargo, if no other ſhip can be procured to carry it to its port of deſtination. If a cargo be damaged ſo as to be reduced in value to leſs than the freight, it will be a total loſs.

Another circumſtance to be here conſidered is the time within which the inſured may abandon. In France, Spain, and Holland, the times are limited by law, according to the diſtance of the place where the loſs happens, within which the abandonment muſt be made. In England no time is limited by law for abandoning; but our courts have laid down a rule, which ſeems better ſuited to the practice of commerce, and more likely to prevent frauds than thoſe juſt alluded to. This rule is, that as ſoon as the inſured has received advice of a total loſs, he muſt make his election whether he will abandon or not; if he determines to abandon, he muſt give the underwriters notice of this "within a reaſonable time" after the intelligence arrives; and any unneceſſary delay in giving this notice will amount to a waver of his right to abandon, for unleſs the owner does ſome act, ſignifying his intention to abandon, it will be only a partial loſs, whatever may be the nature of the caſe, or the extent of the damage. When the inſured has determined to abandon, and to demand as for a total loſs, he is not obliged, as in ſome foreign countries, to make a formal proteſt, but merely to give notice of the loſs to the underwriters, and of his determination to abandon. But there is no particular form for this purpoſe; in whatever form an abandonment is declared, it muſt be explicit, and it is not to be taken as matter of inference from an equivocal act. The notice may be given either to the underwriter himſelf, or to the agent who has ſubſcribed for him. If the inſurance be entire, the inſured cannot abandon for part only; but if different articles be ſeparately inſured, or ſeparately valued, any one of them may be abandoned. The abandonment muſt be ſimple and unconditional, otherwiſe it will not transfer the entire property to the inſurers, which conſtitutes the eſſence of the abandonment. If, therefore, I abandon a captured ſhip, on condition that in caſe ſhe ſhall be releaſed, ſhe ſhall continue my property, and I ſhall repay with intereſt the ſum which the inſurers ſhall have paid me, ſuch an abandonment would be void.

As to the effect of an abandonment, we obſerve that it transfers the property inſured to the inſurers in proportion to their reſpective ſubſcriptions; and this transfer relates back to the commencement of the voyage. As in England freight is inſurable ſeparately from the ſhip, the abandonment of the ſhip does not, as in France, transfer to the inſurer the freight ſhe has earned. Where the intereſt of the inſured is not entirely covered by the inſurance, he may abandon to the extent of the ſum inſured; for he is his own inſurer for the reſidue. If goods be partly inſured, and money borrowed on reſpondentia for the reſidue, the inſurer will have the legal title to what is abandoned, and the lender only an equitable claim to his proportion. If there be three inſurances; one on the ſhip and cargo, one on the ſhip only, and one on the cargo only; Emerigon thinks, that the inſurers on the ſhip and cargo have an equal claim on the effects ſaved, with the inſurers on the cargo only, and that they have a like claim on the freight, and the remains of the ſhip, with the inſurers on the ſhip only, in proportion to their reſpective ſubſcriptions; *e. g.* If a ſhip be valued at 5000*l.*, the cargo 5000*l.*, making a total of 10,000*l.*, and theſe are inſured by different policies, thus:

On ſhip and cargo - -	£3000
On the ſhip only - -	3000
On the cargo only - -	3000
Uninſured - - -	1000
	10,000

A ſhipwreck happens, and the net proceeds of the wreck of the ſhip are 500*l.*, and of the cargo 500*l.*, total 1000*l.*; Emerigon would adjuſt the claims of all parties thus:

To the owners for their part of ſhip and cargo uninſured, - - - - - -	£100
To the inſurers on ſhip and cargo, a moiety of the produce of the wreck, - - -	225
The like to the inſurers on the ſhip, - -	225
To the inſurers on the cargo, a moiety of the produce of the goods ſaved, - - -	225
The like to the inſurers on the ſhip and cargo, -	225
	1000

By this adjuſtment the inſurers on the ſhip and cargo would have a double ſhare of the effects abandoned, which is manifeſtly unjuſt. An Engliſh merchant would, we conceive, adjuſt the different claims thus:

To the owners for their part of ſhip and cargo uninſured, - - - - - -	£100
To the inſurers on ſhip and cargo, a moiety of three-fifths of the produce of the wreck, - -	150
To the inſurers on the ſhip, three-fifths of the produce of the wreck, - - - - -	300
To the inſurers on the cargo, three-fifths of the produce of the goods ſaved, - - -	300
To the inſurers on the ſhip and cargo, a moiety of three-fifths of the produce of the goods ſaved, -	150
	1000

The abandonment does not only entitle the underwriters to all that can be ſaved of the effects inſured; but if compenſation be made to the inſured for the injury from which the loſs aroſe, this compenſation ſhall go to the underwriters; for when they have paid the loſs, they, and not the inſured, are the real ſufferers.

If, after a total loſs happening, the ſhip be abandoned, but ſhe afterwards arrives ſafe, this ſhall not avoid the abandonment; but the inſurers ſhall have all the profit of the voyage. But they cannot compel the inſured to take back the thing inſured and refund the money.

An abandonment once properly made upon a ſufficient ground, and accepted by the inſurers, is abſolute and binding upon both parties; nor can it be revoked but by mutual conſent; but if it be not upon ſufficient ground, it will be void.

In caſe of misfortune, the inſured is bound to uſe his endeavours to ſave as much as poſſible; and to enable him to do this, without prejudicing his right of abandonment, our policies make ſeveral proviſions for certain acts to be performed for this purpoſe, without prejudice to the inſurance, "to the charges of which, the inſurers agree to contribute, each according to the rate and quantity of his ſubſcription." The captain, in particular, is to exert himſelf to the utmoſt of his power in the preſervation both of the ſhip and cargo; and for whatever is recovered of the effects inſured, he is accountable to the inſurers.

 We

We ſhall here ſubjoin a few remarks on the adjuſtment of loſſes. In the adjuſtment of a loſs, the firſt thing to be conſidered is how to aſcertain the "quantity of damage" for which the underwriters are liable; and the next point to be ſettled is by what rule this ſhall be "appretiated." In order to aſcertain the quantity of damage, the inſured ought to know whether the loſs be total or partial; if it be total, and the policy is a valued one, the inſured is entitled to receive the whole ſum inſured, ſubject to ſuch deductions as may have been agreed, by the policy, to be made in caſe of loſs. On a valued policy, the value is admitted, and the inſured has only to prove, if the inſurance was on goods, that the goods valued were on board. Upon an open policy, it is moreover neceſſary to prove the value of them, for which value (not exceeding the ſum inſured) the inſurers are reſponſible. But in the caſe of a partial loſs, the indemnity, ſecured by either ſort of policy, is, that if the thing inſured do not come ſafe to the deſtined port, but is leſſened in value by damage received in the voyage, the loſs ſhall be borne by the inſurer. When the loſs conſiſts in the total loſs of one entire individual parcel of the goods inſured, and this is capable of a diſtinct valuation; as if, out of 100 hogſheads of ſugar, 10 are loſt, the inſurer muſt pay the value of the 10. When a part of the goods inſured is ſaved, and this exceeds the amount of the freight, the practice is to deduct the freight from the ſalvage, and to make up the loſs upon the difference. But where the freight exceeds the ſalvage, then it is a total loſs. Where the goods inſured are damaged in the whole or in part, it is neceſſary to aſcertain the quantity of ſuch damage, by taking the value of the damaged goods from the prime coſt, and the remainder will be the amount of the loſs. If ſeveral articles be inſured for one entire ſum, but with a diſtinct valuation to each, and only one be put in riſk; if that one be loſt, the inſured ſhall recover ſuch a proportion of the ſum inſured as the value of the article bore to the value of the whole. If there be a clauſe in the policy, to be free of average from a particular riſk, under ſo much *per cent.*, and a loſs occaſioned by that riſk takes place, the proportion which the loſs bears to the cargo muſt be calculated upon the cargo which was on board when the loſs happened, not upon that which was on board at any other time.

In appretiating the loſs, averages are ſettled according to the price of the articles at the time of ſettling. This is the rule of the Rhodian law, and of the laws of Wiſbuy. In France, where almoſt all policies are valued, the inſured has his election to fix the previous valuation, either at the prime coſt, or at the current price at the time and place of loading. The ſame rule that applies to goods, applies alſo to the ſhip, which is always valued at the ſum ſhe is worth at the time of her departure, or at leaſt at the commencement of the riſk. Goods brought from a diſtance, may be valued at their improved price; but in France it is uſually ſtipulated in the policy, that the ſhip ſhall remain of the ſame value during the voyage.

In England, if the policy be an open one, it is an invariable rule to eſtimate a total loſs at the prime coſt of the goods; that is, the invoice price, and all duties and expences till they are put on board, together with the premium of inſurance. A ſhip is valued at the ſum ſhe is worth at the time ſhe ſails on the voyage inſured, including the expences of repairs, the value of her furniture, proviſions and ſtores, the money advanced to the ſailors, and, in general, every expence of the out-fit, to which is added the premium of inſurance.

A partial loſs, upon either ſhip or goods, is that proportion of the prime coſt, which is equal to the diminution in value occaſioned by the damage. And in a caſe which occurred with regard to a valued policy upon goods, it was determined that the diminution in value was that proportion of the value, in the policy, which the difference between the price of the ſound, and the price of the damaged, bore to the price of the ſound in the port of delivery. An inſurer is never to be involved in the riſe or fall of the market.

An adjuſtment being indorſed on the policy, and ſigned by the underwriters, with a promiſe to pay in a given time, is *primâ facie* evidence againſt them, and amounts to an admiſſion of all the facts neceſſary to be proved by the inſured to entitle him to recover in an action on the policy. It is like a note of hand, and being proved, the inſured has no occaſion to go into proof of any other circumſtance. An adjuſtment, however, may be impeached by ſhewing that the underwriter was induced to ſign it by ſome fraud or concealment, or by ſome miſconception of the law or fact. Marſhall's Treatiſe on the Law of Inſurance. See Policy, Recapture, and Warranty.

In matters of inſurance, it is a maxim, that all is never to be riſked on one bottom, or in the ſame veſſel; to denote, that aſſurers muſt act with diſcretion in the ſigning of policies, and not hazard too much on each veſſel; there being more to be expected from ſeveral than from one.

RISKUPITZ, in *Geography*, a town of Moravia, in the circle of Znaym; 9 miles W. of Krumau.

RISÖER, a ſea-port town of Norway, in the province of Chriſtianſand, on a peninſula projecting into the North ſea; 52 miles N.E. of Chriſtianſand. N. lat. 58° 43′. E. long. 9° 29′.

RISOLUTIONE, Ital. in *Muſic*, the reſolution of a diſcord. See Discord, and Preparation.

RISOLUTO, Ital. reſolved ſolution, as of a cloſe canon by putting it in ſcore, or by ſigns.

RISORIUS Novus, in *Anatomy*, a name given by Santorini to a muſcle, formed of that part of the quadratus genæ which ariſes from the cheek. See Quadratus *Genæ*.

RISPOSTA, or Riposta, Ital. an *anſwer*, whether in a dialogue or to a regular fugue. For the bringing in the anſwer to a fugue agreeable to the rigid laws eſtabliſhed by the fathers of the ſcience, the old eccleſiaſtical compoſers, there are many rules to be obſerved. See Fugue.

RISS, or Russ, in *Geography*, a river of Germany, which paſſes by Biberach, and runs into the Danube, about ſix miles above Ulm.

RISTI, a town of Sweden, in the province of Cajana; 25 miles N.E. of Cajanaborg.

RISTIGOUCHE River, a river of Canada, which runs into Chaleur bay, navigable for ſhips 20 miles from its mouth. It abounds with ſalmon and wild fowl. On its N. bank, near its mouth, is an Indian village.

RISTORFF, a town of Auſtria, near Schwannaſtadt.

RISVIGLIATO, Ital. in *Muſic*, when applied to a gay and lively movement ſucceeding one that is ſorrowful, implies vivacity and ſpirit.

RISUM, in *Geography*, a town of Eaſt Frieſland; 6 miles W. of Emden.

RISUS. See Laughter, and Lungs.

Risus *Caninus* is a kind of laughter in which the lips are contracted, ſo as to ſhew all the teeth.

Risus *Sardonius*, Sardonian laughter, is a forced, ſpiteful laughter; or a laughter that does not go beyond the teeth. The phraſe is by ſome ſaid to be founded on this, that in Sardinia there is a venomous plant, which occaſions ſuch a contraction of the muſcles of the face in perſons it kills, that they ſeem to die laughing in this manner.

RISZOW, in *Geography*, a town of Poland, in the palatinate of Kiev; 30 miles N.E. of Bialacerkiev.

RITA, a town of Brasil, in the government of Goyas; 80 miles E. of Villaboa.

RITARDATO, and RITARDANDO, Ital. in *Music*, is relaxing the measure; better expressed now by *rallentando*, which see.

RITCHEL, in *Geography*, a branch of the river Indus, which separates a little above Tatta, and runs into the Arabian sea, N. lat. 24° 15′. E. long. 66° 43′.

RITE, RITUS, in *Theology*, denotes the particular manner or form of celebrating or performing the religious ceremonies, which obtains in this or that place.

The eastern people, Armenians, &c. celebrate divine service according to the Greek rite. The western world follow the Latin rite; or that of the Roman church.

The English observe the rite of the church of England, prescribed in the book of Common Prayer, &c.

RITHER, or RIDER, in *Mining*, is a stone or thin clift that lies in the vein; the ore sometimes runs on both sides it. Sometimes the rither is so thick, that it parts the vein, and makes one vein two.

RITIA, in *Ancient Geography*, *Sheebah*, a town of the interior of Africa, in Mauritania Cæsariensis, situated S. of Victoria. It is mentioned by Ptolemy; and still exhibits some fragments of Roman walls.

RITORNELLO, or REFRET, in *Music*, the burden of a song, or a repetition of the first or other verses of the song, at the end of each stanza or couplet.

The word is Italian, and signifies properly a *little return*, or a short repetition, such as that of an echo, or of the last words of a song; especially when the repetition is made after a voice, by one or more instruments.

But custom has extended the use of the word to all symphonies, played before the voices begin, and which serve by way of prelude or introduction to what follows.

In the partitions or score of the Italian music, we frequently find the ritornellos signified by the words *si suona*, to shew that the organ, harpsichord, piano-forte, or the like, are to repeat what the voice has been singing.

In accompanied recitatives, the ritornels, or interstitial symphonies, are not repetitions of vocal passages; but are often beautiful and picturesque periods of symphony, expressive of the sentiments and situation of the singer.

RITRO, in *Botany*, corrupted, as it seems, from the ῥυτρον of Theophrastus, as far as can be conjectured, appears to have been some plant of the thistle kind. The name is now used as the specific appellation of a kind of ECHINOPS; see that article.

RITROGRADO, Ital. in *Music*. See RETROGRADO.

RITSCHA, in *Geography*, a town of Bohemia, in the circle of Kaurzim; 12 miles S.E. of Prague.

RITSCHENHAUSEN, a town of Germany, in the county of Henneberg; 3 miles S.S.E. of Meinungen.

RITSCHIEN, a river of Stiria, which runs into the Laufnitz, 4 miles S.E. of Furstenfeld.

RITSON, TRISTRAM, in *Biography*, born about the year 1580, at Winscott, in Devon, was educated at Great Torrington, and by his rapid progress in learning he very soon became fitted for the higher improvements of the university of Oxford, of which he was admitted a member, being entered probably of Exeter or Pembroke college, about the latter end of the reign of queen Elizabeth. At Oxford he was much distinguished for his learning, and his accomplishments as a gentleman. He, however, appears to have left college without taking any scholastic degree, and retired into his own country, which, according to his biographer, was probably owing to the death of a sister, upon which he became possessed of the estate of Winscott. Here he drew up a large volume, entitled "The Chorographical Description or Survey of the County of Devon, with the City and County of Exeter, containing Matter of History, Antiquity, Chronology, the Nature of the Country," &c. It was begun in 1605, and finished in 1630.

The author did not print this Description, but a great many manuscript copies were long in circulation in the county. A mutilated edition of it was printed in two volumes 8vo. in 1714: it was afterwards printed from the original in one volume 4to. in 1735. But the most perfect and valuable edition was published in 1811, from a manuscript edition in the possession of John Coles, esq. of Stonehenge; to which the editors made some important additions, and prefixed, as an introduction, which renders the volume much more interesting, "Remarks on the present State of the County of Devon," the object of which was to compare the present and past conditions of the county in those particulars to which the author directed his attention, and to add a brief account of such subjects as either escaped his notice, or have acquired their existence or importance since his time.

Mr. Ritson lived to a great age, dying in the year 1640; he was interred at St. Giles Winscott, without tomb or monument. "He," says Prince in the Worthies of Devon, "that with great expence of money, time, and labour, sought to perpetuate the memory of many persons and families, hath no monument to continue his own; unless that lasting one his "Survey of the County of Devon."" See Chorographical Description, ed. 1811.

RITSON, JOSEPH, was born in 1752, at Stockton on Tees, in the county of Durham, and was brought up to the profession of the law. As a consulting barrister and conveyancer he was very much distinguished; but his literary enquiries were by no means confined within the limits of his profession; he very successfully investigated the old English literature, particularly of the seventeenth century. He died in the year 1803. His works are "Observations on Johnson's and Stevens's Edition of Shakspeare;" "Cursory Criticisms on Malone's Edition of Shakspeare;" "Observations on Warton's History of English Poetry;" "Descent of the Crown of England;" "Collection of English Songs, 3 vols. and of Scotch Songs, in 2 vols.;" "English Anthology;" "Metrical Romances," 3 vols.; "Bibliographia Poetica;" "A Treatise on Abstinence from Animal Food;" and other pieces. As an historian, he was rigidly accurate; as a critic, he was uncharitable and severe. The language of his writings is harsh, rugged, and barren; and all his publications are farther disfigured by the affected singularity of their orthography. Monthly Mag. Nov. and Dec. 1803, and Gent. Mag.

RITTANGEL, JOHN-JOSEPH, a learned professor of the Oriental languages, at Königsberg, in the 17th century. According to some writers he was born of Jewish parents, and educated in the religion of his fore-fathers, but afterwards became a convert to Christianity; others assume that he was a German by birth, and educated in the principles of Popery, and that he became a convert to the institutions of Moses, and received circumcision at Hamburgh, but that in more mature life he embraced the Protestant religion, becoming at first a Calvinist and afterwards a Lutheran. On the authority of a letter given by Bayle, he was a native of Forcheim in Franconia, in the diocese of Bamberg, and brought up to the Roman Catholic faith. Having become a proficient in classical learning, his attention was directed to the study of the oriental languages, and he went to Constantinople, where he remained twelve years, and during that time

time had much intercourſe with the learned Jews in that city. Upon his return into Germany he embraced the Lutheran religion, and went to Königſberg, where the elector of Brandenburg appointed him profeſſor extraordinary of the Hebrew tongue. He devoted himſelf now to the illuſtration of the antiquities of the Jews, and the production of evidence from their writings in ſupport of the truth of Chriſtianity, or of doctrines commonly reputed orthodox. His writings contain ſevere criticiſms on the productions of Kircher, Scaliger, Vorſtius, the Buxtorfs, and other learned men, whoſe proficiency in the Hebrew tongue he affected to hold in low eſtimation. The time of his death is uncertain, but by a dedication to one of his pieces, it is known that he was living in the year 1652. He was author of the following works: "Liber Jezira, qui Abrahamo Patriarchæ adſcribitur, una cum Comment.;" "Liber Veritatis, &c." intended to prove that the ancient Jewiſh church believed the myſtery of the Trinity, and the eternal divinity of the Meſſiah; and ſeveral others.

RITTEBURG, in *Geography*, a town of the county of Mansfeld; 2 miles S.S.E. of Artern.

RITTENHOUSE, David, in *Biography*, a diſtinguiſhed American philoſopher and mathematician in the 18th century, was a native of Pennſylvania, and born in the year 1732. By the dint of genius and application, he was enabled to mingle the purſuits of ſcience with the active employments of a farmer and watch-maker. The latter of theſe occupations he filled with unrivalled eminence among his countrymen. Some of its nicer operations continued to be his favourite mode of relaxation during all the ſubſequent periods of his life. In the year 1769, he was invited by the American Philoſophical Society to join a number of gentlemen who undertook to obſerve the tranſit of Venus; when he particularly diſtinguiſhed himſelf by his obſervations and calculations. He afterwards conſtructed an obſervatory, where he made ſuch valuable obſervations and diſcoveries, as tended to the general diffuſion of ſcience in the weſtern world. During the American war, the philoſopher did not claim an exemption from the duties of patriotiſm; he thought, ſpoke, and acted like a free man. After the concluſion of it, he ſucceſſively filled the offices of treaſurer of the ſtate of Pennſylvania, and director of the national mint: in the firſt of which he manifeſted incorruptible integrity, and in the laſt, the rare talent of combining theories in ſuch a way as to produce correct practical effects. He ſucceeded the illuſtrious Franklin in the office of preſident of the American Philoſophical Society; but towards the cloſe of his days he withdrew from public life, and ſpent his time in retirement. "There," ſays one of his eulogiſts, "we behold him the object of love, admiration, and reverence. In his intercourſes of friendſhip, ſincerity and ſimplicity went hand in hand. A ſtranger to the too common arrogance of high pretenſions, he met every man on the ground of friendly reciprocity. Feeling a ſuperior attachment to thoſe who propagated ſcience, he did not conceal the eſtimation in which he held them. He was among the firſt to welcome to America the perſecuted philoſopher of England (Prieſtley), and formed with him an intimacy which only required time to be cemented into a laſting friendſhip." After a very ſevere illneſs of a few days' continuance, he died on the 10th of July 1796, about the age of 64. He had the degree of L.L.D. conferred upon him. To the "Tranſactions" of the American Philoſophical Society he contributed ſeveral excellent papers, chiefly on aſtronomical ſubjects. Gentleman's Mag. Sept. 1796. Monthly Mag. Oct. 1796.—M.

RITTERA, in *Botany*, named by Schreber in honour of Dr. John James Ritter, a native of Berne in Switzerland, who practiſed as a phyſician, in Sileſia, during the middle of the 18th century, and who was the author of various tracts upon Natural Hiſtory. Schreb. 364.—It is now referred to Swartzia; ſee that article.

RITTERSHUYS, Conrad, in *Biography*, a learned juriſt and philologiſt, was born at Brunſwick in 1560. After having made a great progreſs in the learned languages, he went to Helmſtadt for the ſtudy of theology, but his inclination led him to prefer juriſprudence. He removed to Altdorff for the further purſuit of this ſtudy, and thence to Ingolſtadt. He took the degree of doctor of law at Baſil in 1591, and was nominated profeſſor in that ſcience at Altdorff, where he died in 1613. He was the author of "Jus Juſtinianeum, ſive Novellarum Methodica explicatio," 1615, 4to. His philological labours were notes on "Petronius" and "Phædrus;" commentaries on "Salvianus;" on "Oppian de Venatione et Piſcatione," with a Latin verſion; "Guntheri Ligurinus;" "Sacrarum Lectionum, Lib. viii."

Rittershuys, Nicholas, ſon of Conrad, born at Altdorff in 1597, was alſo a man of learning and a juriſt, and particularly applied to hiſtorical and genealogical enquiries. He ſtudied at Helmſtadt, and afterwards travelled into various countries of Europe. On his return he took a doctor's degree in 1634, and was appointed profeſſor of feudal law at Altdorff. He died in 1670. Nicholas edited ſeveral of his father's works, and in 1638 publiſhed an oration on "Hanno's Periplus." He was the author of a large folio, entitled "Genealogiæ Imperatorum, Regum, Ducum, Comitum, &c. ab Anno 1400 ad Annum 1664." Several of his letters are printed in the "Epiſtolæ celebrium Virorum," 1705.

RITUAL, Rituale, a church-book, directing the order and manner of the ceremonies to be obſerved in celebrating divine ſervice in a particular church, dioceſe, religious order, or the like.

The ancient heathens had, likewiſe, their rituals, or *rituales libri;* thoſe of the Etrurians were much famed. See Aruspici *Libri.*

Theſe books contained the rites and ceremonies to be obſerved in the building of a city, in the conſecrating of a temple or an altar, in ſacrificing and deifying, in dividing the curiæ, tribes, centuries, and, in general, in all their religious ceremonies.

There are ſeveral paſſages in Cato's books, De Re Ruſtica, which may give us ſome idea of the rituals of the ancients.

"The principal difference (ſays biſhop Stillingfleet, Orig. Brit. p. 287.) between the Roman and Gallic ritual of St. Germanus, which the Britons had adopted before the arrival of St. Auſtin, was in the *church muſic*, in which the Romans were thought to excel other weſtern churches ſo far, that the goodneſs of their muſic was the principal incitement to the introduction of their offices."

RITZEBUTTEL, in *Geography*, a town of the duchy of Bremen, on a ſmall river, which runs into the German ocean, between the mouths of the Elbe and the Weſer; 38 miles N. of Bremen. N. lat. 53° 52′. E. long. 8° 37′.

RITZENBUTTEL, a town of the duchy of Bremen.

Ritzenbuttel, or *Ritzbuttle*, is a ſmall town, containing about 200 houſes, half a mile from Cuxhaven, with a caſtle garriſoned by Hanoverians. The road for foot-paſſengers, from Ritzbuttle to Cuxhaven, is on a cauſeway, raiſed about eight feet from the carriage-road; but being made of clay, it is, in wet weather, extremely dirty and ſlippery. The road for carriages is very bad. The port of of Cuxhaven having only two or three ſmall hovels, and a wind-mill, the paſſengers by the packets reſide during their ſtay at Ritzbuttle.

RIVA, or RIFF, a town of the county of Tyrol, at the end of the Garda lake; 16 miles W.S.W. of Trent.—Alſo, a river of the Tyroleſe, which runs into lake Garda, near the town of the ſame name.—Alſo, a town of France, in the department of the Po, ſeated on an eminence, in the middle of a plain, which extends to the W. and S., and is nearly ſurrounded with water, over which are two bridges, one of wood, the other of ſtone. The adjacent hills are covered with vines and fruit-trees, and the plain produces abundance of grain; moſt of the houſes within the walls are furniſhed with gardens; two miles E. of Chieri.—Alſo, a town of Italy, in the bailiwick of Lugano; 8 miles S. of Lugano.—Alſo, a town of Italy, in the Valteline; 6 miles S. of Chiavenna.—Alſo, a town of Italy, in the department of the Mela; 14 miles N.N.W. of Breſcia.—Alſo, a town of the Ligurian republic; 6 miles N.N.E. of Savona.

RIVAGE, RIVAGIUM, a toll anciently paid to the king on ſome rivers, for the paſſage of boats or veſſels therein.

RIVAL, RIVALIS, a term of relation applied to two perſons who have the ſame pretenſion.

It is properly uſed for a competitor, in love; and figuratively, for an antagoniſt in any other purſuit. The intrigues of comedies and romances uſually turn on the jealouſies of rivals, who diſpute for the ſame miſtreſs.

The lawyers derive the word from the Latin *rivus*, *ſtream*, *quod ab eodem rivo aquam hauriant.*

Donatus ſuppoſes it to have been formed hence, that beaſts coming to drink at the ſame brook, or fountain, frequently quarrel.

Cælius ſays, that rivales were originally ſuch whoſe fields were parted by a brook or rivulet, the courſe of which being liable to be varied ſeveral ways, occaſioned frequent diſputes and law-ſuits.

RIVALTA, in *Geography*, a town of France, in the department of the Po, on the Sangon; 6 miles S.W. of Turin.—Alſo, a town of Italy, in the department of the Olona; 15 miles E. of Milan.

RIVANNA, a river of Virginia, which unites with the Fluvanna, to form James river, about two miles above Elk iſland. It is navigable for canoes and batteaux, to its interſection with the S.W. mountains, about 22 miles.

RIVAROLI *de Fuori*, a town of Italy, in the department of the Mincio; 20 miles S.W. of Mantua.

RIVAROLO, a town of France, in the department of the Po, on the Orco; 15 miles N. of Turin.

RIVAULT, DAVID, in *Biography*, a French man of letters and various writer, was born at Laval, in the province of Perche, about the year 1571. He was brought up in the family of the count de Laval, and for ſome time followed the military profeſſion, ſerving in Italy about the cloſe of the 16th century, and in Holland in the year 1602. During the following year, Henry IV. appointed him one of the gentlemen of his bed-chamber. In 1605 he accompanied the young count de Laval into Hungary, and entered into the ſervice of the emperor againſt the Turks. On his return to his native country, he devoted himſelf to literary and ſcientific ſtudies, in which he had before made conſiderable progreſs. In 1611 he was appointed ſub-preceptor to the young king Lewis XIII., and had a penſion of 3000 livres ſettled upon him. The office of principal preceptor becoming vacant during the next year, he received that appointment, and was honoured with the title of counſellor of ſtate. In 1614, the king conferred on him letters of nobility. He died at Tours, in 1616, about the age of 45. He is ſpoken of with high eſteem by ſeveral of the moſt celebrated writers of his time, particularly by Caſaubon, Scaliger, Voſſius, Erpenius, and Menage. His works conſiſt of "The States, or a Diſcourſe concerning the Privileges of the Prince, the Nobles, and the third Eſtate," &c.; "Elements of Gunnery," which is a curious and very ſcarce work; "Archimedis Opera quæ extant, Gr. et Lat. novis Demonſtrationibus illuſtrata;" &c. folio, and other pieces.

RIVE *de Gier*, in *Geography*, a town of France, in the department of the Loire, and chief place of a canton, in the diſtrict of St. Etienne; 4 miles N.E. of St. Etienne. The place contains 4263, and the canton 15,089 inhabitants, on a territory of 160 kiliometres, in 13 communes.

RIVEL *de les Semals*, a town of France, in the department of the Aube; 9 miles W.N.W. of Quillan.

RIVELLES, a town of Spain, in Catalonia; 12 miles N. of Cervera.

RIVELLO, a town of Naples, in the province of Baſilicata; 12 miles S.E. of Lauria.

RIVER, FLUVIUS, or *Flumen*, a ſtream or current of freſh water, flowing in a bed or channel, from a ſource or ſpring, into the ſea.

If the ſtream be not large enough to bear boats, or ſmall veſſels, loaden, it is properly called, in Engliſh, by the diminutive *rivulet*, or *brook;* by the Latins *rivus;* and by the French *rivière*, If it will only bear ſuch veſſels, the Latins call it *amnis.* If it be conſiderable enough to carry larger veſſels, it is called by the general name *river;* by the Latins *fluvius*, and *flumen;* and by the French *fleuve;* between all which the difference is only as to greater and leſs.

Some will have none to be properly rivers, except thoſe which bear the ſame name from their ſource to their mouth.

Others, none but thoſe which empty themſelves immediately into the ſea; and not into any other river.

Rivulets have their riſe, ſometimes from great rains, or great quantities of thawed ſnow; eſpecially in mountainous places; as in the long ridges of Africa, India, Sumatra, &c. But the generality of rivulets ariſe from ſprings.

Rivers themſelves all ariſe either from the confluence of ſeveral rivulets, or from lakes; nor is there any great river, ſuch as the Rhine, Elbe, &c. known to flow from a ſingle ſpring.

The Volga, *e. gr.* conſiſts of above two hundred rivulets, all flowing into it, before it reaches the Caſpian; and the Danube receives as many.

The Rhine and the Po receive each above a hundred others, great and ſmall; and the river of the Amazons receives into its large bed a prodigious number, ſome of which are five or ſix hundred leagues in length, and are of ſuch a depth and breadth as render them principal rivers.

Pliny, indeed, and Cardan, ſay, that the Nile receives none; but the later travellers into Abyſſinia aſſure us of the contrary.

The Rhine, Rhone, Danube, Boryſthenes, &c. ariſe originally from ſprings in the mountains; and the Nile, the Volga, the great river of St. Laurence, &c. from lakes.

It has been held by many, that all ſprings and rivers owe their origin to rains and dews; but there are ſome ſprings which cannot be accounted for on this principle, though others very well may. The intermitting ſprings, which flow

flow violently in rainy seasons, and are dry in summer, are probably owing to rains; but there are some springs which discharge more water annually than all that falls in rains and dews in the neighbouring country. The great perennial spring, at Willowbrig, in Staffordshire, is of this kind, and that of the Sorgne, in France, is much more eminently so; the river of that name being, according to Gassendus, navigable up to the very springs which are its source.

But if such springs as these discharge too great a quantity of water for the supply of rains and dews, how is it possible, that such small supplies of water as these can afford the constant currents of the larger rivers? The Volga alone, according to Ricciolus, pours forth as much water in a year's time into the Caspian sea, as would suffice to drown the surface of the whole earth. The river of St. Laurence, in America, pours forth nearly as much as this. If either of these rivers alone do, as has been affirmed, from calculations, discharge annually as much water as falls in the same time in rains and mists upon the surface of the whole earth; from whence are all the rest to be supplied, according to the system of their all being made by rains; and, particularly, where is left the supply for the Rio de la Plata, which Ricciolus affirms to be larger than the Nile, the Ganges, and the Euphrates, put together? its mouth being ninety miles wide, and running with that violence into the sea, that it makes it fresh for two hundred miles together. These, and the other rivers of the several parts of the globe, upon a very moderate calculation, discharge at least five hundred times as much water into the sea, as falls upon the whole surface of the earth, in rains, mists, dews, snows, &c. in a like space of time.

As it is evident, therefore, that these cannot be supplied by rains, so neither is it possible that the several hot springs and the salt springs can be supplied that way: the origin of springs also in places where there falls little or no rain, and where the conservatories must needs be too small to contain a supply, are great proofs that rain and mists are not the origin of springs, at least not in all places. The isles of Mago, Rotunda, and the Strophades, and the rock on which the Maiden Tower stands in the Thracian Bosphorus, cannot be supplied with, or retain a sufficiency of rain-water to supply constant springs, yet such are always found running there.

It cannot be otherwise but that there are subterranean communications between the sea and the sources of fountains, rivers, and the larger springs, by which these are supplied; and there are certainly charybdes which swallow the sea for these purposes; and when these happen to be stopped, the largest rivers have been dried up, and wholly ceased to run for a considerable time: this we have accounts in history has happened to the Thames, the Trent, and Medway, in England; the Elve, the Motala, and Gulfspang, in Sweden, and other rivers in other countries. If, on the other hand, these charybdes happen to be too open, fresh-water springs depending upon them will become salt. This we have instance of in history also; and even so old a writer as Pliny has said that this once happened in Caria near Neptune's Temple. (Plot. de Origine Fontium.) See EVAPORATION and SPRING.

RIVERS, *Phenomena and Variations of.* Rivers are found subject to great alterations, at different seasons of the year, day, &c. from frequent rains and melted snow. Thus in Peru and Chili many of the rivers are almost insensible in the night-time, and only flow by day, as being then augmented by the dissolution of the snow on the mountains Andes. Thus the Volga abounds in water in May and June, so as to cover the sand-banks, &c. which all the rest of the year lie bare, so as scarcely to allow a passage to the loaded ships. Thus also the Nile, Ganges, Indus, &c. are frequently so increased, as to overflow; and that either in the winter, from rain, or in the summer, from the melting of the snow. Some rivers bury themselves under ground in the middle of their course, and break out again in other places, like new rivers. Thus the Niger, which some cosmographers erroneously derive by a subterraneous channel from the Nile, because it swells at the same time with the Nile, without any other apparent cause—the Niger itself has been supposed by some to be hidden under the mountains of Nubia, and to rise again on the western side of those mountains; whereas, in reality, it is lost in lakes or sands. Thus, also, the Tigris is lost in the mountain Taurus, &c.

Aristotle, and the poets, mention several such rivers about Arcadia: Alpheus, a river of Arcadia, is particularly famed. This, being swallowed up in the ground, is supposed, by the Greek authors, to continue its progress under the earth, and under the bottom of the sea, into Sicily; where, breaking up near Syracuse, it forms the river Arethusa. The great reason of this opinion was, that, every fifth summer, the river Arethusa, in Sicily, cast up the dung of cattle about the time of the celebration of the Olympic games in Achaia, when the dung of victims was used to be cast into the Alpheus.

Some rivers empty themselves into the sea by one mouth, some by several. Thus, the Danube opens into the Euxine sea by seven mouths; the Nile by seven; and the Volga by at least seventy. The cause of this variety of mouths Varenius attributes principally to the banks of sand, &c. accumulated in them; which, gradually increasing, form islands, by which the channel is divided into several branches. Indeed, the ancients tell us, that the Nile formerly only emptied itself at one mouth, called the *ostium Canopicum;* and add, that the other six are adventitious, or artificial.

The channels of rivers, except such as were formed at the creation, Varenius endeavours to prove to be all artificial, and dug by men. His reasons are, that, when a new spring breaks forth, the water does not make itself a channel, but spreads over the adjacent land; so that the people have been necessitated to cut it a channel, to secure their grounds; and that a great number of channels of rivers are certainly known, from history, to have been dug by men, &c.

As to the question, whether those rivers which run into others, have made themselves that way by their own motion, or have been turned thither in canals cut by men? he takes the latter to be the more probable; and concludes the same of the arms, or branches, of rivers, and of the turns by which islands are formed in the Tanais, Volga, &c.

To the question, why we have no salt rivers, when there are so many salt springs? he answers, that it is because men, having no occasion for salt water, have not dug channels to conduct the water of salt springs; salt being procurable at less expence.

The water of most rivers carries with it particles of metals, minerals, sands, or oily and fat bodies, &c. Thus, some rivers bring sands intermixed with grains of gold; of which kind is, 1. A river in Japan. 2. Another in the island of Lequeo, near Javon. 3. A rivulet in Africa, called Arroe, breaking out of the foundation of the mountains of the moon, in which there are golden mines. 4. A river in Guinea, where the negroes separate the gold-dust from the sand, and sell it to the Europeans, who traffic thither for that very purpose. 5. In some rivulets near the city of Mexico, there are grains of gold taken up, especially

after

after rain; which is alſo to be underſtood of all the other rivers, none of which yield any thing conſiderable, except in rainy ſeaſons. 6. In Peru, Sumatra, Cuba, Hiſpaniola, and Guinea. Laſtly, there are ſeveral brooks in the countries about the Alps, eſpecially Tyrol, out of the ſediment of whoſe waters gold has been drawn, though there be no grains conſpicuous in them. Add to this, that the Rhine alſo, in many places, has afforded a golden mud.

As to rivers that bring grains or particles of ſilver, iron, copper, lead, &c. we find no mention of them in authors, though, doubtleſs, there are great numbers of each; and many of the medicinal effects of mineral waters are, doubtleſs, owing to particles of theſe kinds.

We muſt not here omit a water in Germany, which is ordinarily ſuppoſed to change iron into copper. The truth is, there is no real converſion of the metal; all that is done is, that the cuprine and vitriolic particles in the water corrode the iron; and, detaching parts of them by means of the motion of the water, coppery particles ſucceed in their room.

From this variety in the mixture of river-water reſult various qualities, different ſpecific gravities, different colours, &c.

Some rivers, at certain ſeaſons of the year, ſwell ſo as to overflow their banks, and drown the neighbouring lands. Of theſe the moſt eminent is the Nile, which riſes ſo as to cover all Egypt, except the hills. The inundation begins about the ſeventeenth day of June, and increaſes for the ſpace of forty days, and decreaſes for as many; during which period, the cities of Egypt, which are all built on hills, appear as ſo many iſlands.

To theſe inundations Egypt owes all its fertility; the heavens there affording no rain, or at leaſt none in any reſpect conſiderable. Hence, as the inundation is great or ſmall, Egypt, for that year, is fruitful or barren.

The ancient Greeks, &c. were much perplexed in aſſigning the cauſe of this inundation. From the modern Engliſh and Portugueſe traders into Congo, Angola, Monomotapa, &c. we learn, that the ſource of the Nile is in a large lake called Zaire, round which are the mountains of the moon, which being about 10° to the ſouth of the equator, inſtead of being covered with ſnow in their winter, have rain every day, at leaſt two hours before, and two hours after noon. So that their tops are always covered with clouds; and the rains are, at the proper ſeaſon, almoſt continual. Hence torrents are conſtantly deſcending from the mountains into the lake of Zaire; whence they flow into the channel of the Nile, and other rivers ariſing from the ſame lake; and hence the inundation of the Nile. See NILE and NILOMETER.

Mr. Bruce is the firſt perſon who, in his "Travels to Diſcover the Source of the Nile," has deſcribed, from his own obſervations, the ſpot in which he apprehends that the Nile ſprings.

Tracing one of the ſtreams, that run into the lake Tzana, to a ſwamp in the 11th degree of N. lat. he there remarks the head of the Nile, as our modern map-makers had actually done before he viſited this dreary region. Whether his guide deſerved credit, and whether he could juſtly infer that this rivulet was the Nile from the reſpect paid to it by the barbarous natives, it is not neceſſary particularly to enquire. The moſt important object in inveſtigating the ſource of the Nile is to account for its extraordinary inundations.

In doing this, Mr. Bruce has ſelected from the various opinions enumerated by Diodorus Siculus (l. i. c. 24.) that of Democritus of Abdera, and Agatharcides of Cnidus, which agrees in the main with that of Herodotus (l. ii. c. 8.) and has well explained the manner in which the ſun, continuing nearly ſtationary for ſome days in the tropic of Capricorn, rarefies the air, and collects a quantity of vapours from the Atlantic on the weſt, and the Indian ocean on the eaſt; and then, in its progreſs north towards the tropic of Cancer, draws theſe vapours after him. So that as he advances, the rainy ſeaſon begins upon his arrival at the zenith of every place, and the rains continue and increaſe after he has paſſed it in his progreſs northward.

In April many rivers join the Nile, and enable it to force its way through the ſtagnant lake Tzana, without mixing with it. In the beginning of May many other ſtreams pour themſelves into the ſame lake, and furniſh the Nile with an additional ſupply of water. In the beginning of June, the ſun having paſſed over Abyſſinia, the rivers are there full, and the time of the greateſt rains in this country is during the ſun's being almoſt ſtationary in the tropic of Cancer. Theſe rains are collected by the four great rivers of Abyſſinia, of which the Nile is one, which derives alſo a very copious ſupply from the White river, that riſes in a country of almoſt perpetual rain.

As the vapours meet with no mountains to interrupt their progreſs in the flat country that lies between Gerri and Syene, the tropical rains extend no farther north of the line than 16°.

When the ſun declines towards the equator, he reverſes the effects which he produced in his paſſage northward; and after his arrival at the line in the autumnal equinox, his influence ceaſes on the ſide of Abyſſinia, and extends itſelf to the ſouthern hemiſphere. Thus on the 25th of September, three days after the equinox, the Nile is generally found at Cairo to be at the higheſt, and then begins to decreaſe. Mr. Bruce explains the inundations that take place ſouth of the equator. The ancients were not unacquainted with this cauſe of the inundations of the Nile. The tropical rains falling to the extent of 16° on each ſide of the line gave riſe to the Nile and to its tributary ſtreams which flowed northward, through the kingdom of Sennar, &c. as well as to the Zebee, and many large rivers which flow ſouthward into Ethiopia, and according to the deſcent of the countries into the Indian or Atlantic ocean. Homer gives to the Nile the epithet διιπετης *qui cælitus deſcendit, a river produced and fed by rains*. See NILE.

The other rivers which have any notable ſtated inundations, are the Gambia, and the Niger, which overflow at the ſame time with the Nile, and loſe themſelves in ſands or lakes. (See NIGER.) Leo Africanus ſays, it begins on the 15th day of June, increaſes for forty days, and decreaſes as long. The Zaire, a river of Congo, is affected in the ſame manner with the Nile. (See ZAIRE.) The Rio de la Plata, in Braſil, as Maffeus obſerves, overflows at the ſame time with the Nile. (See *Rio de la* PLATA.) Of the ſame kind of rivers is the Ganges (which ſee); and the Indus, both which laſt overflow in June, July, and Auguſt; at which times the natives ſave great quantities of the water in ponds to ſerve them the reſt of the year; ſeveral rivers flowing out of the lake Chiamay into the bay of Bengal, which overflows in September, October, and November: theſe all bring a very great fertility with them to the ground; the river Macoa, in Camboïa; the river Parana, or Paranguaſa, which ſome will have to be the ſame with the Silver river; ſeveral rivers in Coromandel, a part of India, which overflow in the rainy months, from the great quantity of water iſſuing from the mountain Gatis; the Euphrates, which overflows Meſopotamia certain days in the year; and, laſtly, the river Sus, in Numidia.

The

The rivers moſt celebrated for their length, breadth, ſwiftneſs of current, &c. are, the Nile, which runs almoſt in a ſtraight courſe two thouſand five hundred and twenty geographical miles; the Niger, which runs two thouſand four hundred miles; the Ganges, two thouſand miles; the Burrampooter, the ſame diſtance; the Ob, ſixteen hundred miles; the Jenniſſee, in Aſia, about the ſame length with the Ob; the river Orellana, in America, ſixty miles broad at its mouth, and five thouſand miles long; the Rio de la Plata, about ninety miles broad at the mouth; the Omarannan, another river of Braſil; and the great river of St. Laurence, near two thouſand five hundred miles long. See the account of each river under its reſpective name.

Major Rennell, in his "Memoir," has eſtimated the proportional lengths of courſe of ſome of the moſt noted rivers in the world by the following numbers:

European Rivers.		
Thames		1
Rhine		$5\frac{1}{4}$
Danube		7
Volga		$9\frac{1}{2}$
Aſiatic Rivers.		
Indus	(probably)	$6\frac{1}{4}$
Euphrates		$8\frac{1}{2}$
Ganges		$9\frac{1}{2}$
Burrampooter		$9\frac{1}{2}$
Nou Kien, or Ava		$9\frac{1}{2}$
Jenniſſee		10
Oby		$10\frac{1}{2}$
Amoor		11
Lena		$11\frac{1}{2}$
Hoanho (of China)		$13\frac{1}{2}$
Kian Keu (of ditto)		$15\frac{1}{2}$
African River.		
Nile		$12\frac{1}{2}$
American Rivers.		
Miſſiſippi		8
Amazons		$15\frac{1}{2}$

By the ſtatute of Weſtm. 2. cap. 47, the king may grant commiſſions for perſons to take care of rivers, and the fiſhery in them; and the lord mayor of London is to have the conſervation in breaches and ground overflown as far as the water ebbs and flows in the river Thames. (4 Hen. VII. cap. 15.) Perſons annoying the river Thames, making ſhelves there, caſting dung in it, or taking away ſtakes, boards, timber-work, &c. of the banks, incur a forfeiture of 5*l*. by ſtat. 27 Hen. VIII. cap. 18. Commiſſioners were appointed to prevent exactions of the occupiers of locks, weirs, &c. upon the river Thames, weſtward from the city of London, to Cricklade, in the county of Wilts, and for aſcertaining the rates of water-carriages on the ſaid river, by ſtat. 6 & 7 W. III: and this ſtatute is revived, with authority from the commiſſioners to make orders and conſtitutions to be obſerved, under penalties, &c. by 3 Geo. II. cap. 11.

By ſtatutes 8 Geo. II. cap. 20, and 4 Geo. III. cap. 12, it is made felony, without benefit of clergy, maliciouſly to cut down any river or ſea-bank, by which lands may be deſtroyed, and to deſtroy ſluices or locks upon navigable rivers. See NUSANCE, and LARCENY.

RIVER, in *Phyſics*, denotes a ſtream of water running by its own gravity from the more elevated parts of the earth towards thoſe which are more depreſſed, in a natural bed or channel open above.

If this channel is artificial, it is called a canal; of which there are two kinds, *viz*. that whoſe channel is every where open without ſluices, called an artificial river, and that whoſe water is kept up or let off by means of ſluices, which is properly a canal.

RIVERS, *Hydraulic Theory of*.—The theory of moving waters is certainly one of great importance, and has therefore, for a long time, excited conſiderable intereſt, as well among practical engineers, as ſpeculative mathematicians; yet it muſt be acknowledged that it is but very lately any thing approaching to a well-founded theory has been eſtabliſhed. One of the firſt and moſt diſtinguiſhed of thoſe who attempted to reduce the motion and diſcharges of rivers to correct principles, was Guglielmini; and if his theory was falſe and hypothetical, yet he was the means of drawing the attention of philoſophers to theſe inquiries; and his deductions, though in many reſpects incorrect, are nevertheleſs entitled to a place in an article on this ſubject.

This author obſerves, that rivers have uſually their ſources in mountains or elevated lands, and that it is in their deſcent from theſe they acquire their velocity, or acceleration, which maintains their future current. In proportion as they advance farther, this velocity diminiſhes, on account of the continual friction of the water againſt the bottom and ſides of the channel, of the various obſtacles they meet with in their progreſs, and of their arriving, at length, in plains, where the deſcent is leſs; and their inclination to the horizon, of conſequence, greater. Thus the Reno, a river of Italy, which gave occaſion, in ſome meaſure, to theſe ſpeculations, is found, near its mouth, to have ſcarcely a deſcent of fifty-two ſeconds.

If the acquired velocity be quite ſpent, through the many obſtacles, ſo that the current becomes horizontal, nothing will then remain to propagate the motion, and continue the ſtream, but the depth, or the perpendicular preſſure of the water, which is always proportional to the depth. And happily for us, this reſource increaſes, as the occaſion for it increaſes; for, in proportion as the water loſes of the velocity acquired by the deſcent, it riſes and augments in depth.

It further appears, ſays he, from the laws of motion pertaining to bodies moved on inclined planes, that when water flows freely upon an inclined bed, it acquires a velocity, which is always as the ſquare root of the quantity or declivity of the bed. But in an horizontal bed, opened by ſluices or otherwiſe, at one or both ends, the water flows out by its gravity alone; and the flowing is quicker or ſlower in a direct ratio of the reſpective heights of the water, by reaſon of the weight of the ſuperior waters upon the inferior. Hence it follows, firſt, that as much as the declivity of the bed or channel of a river is greater, ſo much alſo will the velocity of the flowing waters be proportionably increaſed.

Secondly, as much as the water in an horizontal bed is deeper, ſo much will the velocity of the current be increaſed; and this velocity will diminiſh in proportion to the decreaſing depths of the water in the bed.

Thirdly, abſtracting from the reſiſtance cauſed by the bottom and ſides of the bed, as much nearer as the water is to the bottom, ſo much will its motion be accelerated; not only becauſe the inferior waters are more compreſſed by the ſuperior in proportion to their greater depth; but alſo becauſe the inferior ones have a greater declivity than the ſuperior, by reaſon of their greater depth in the bed, where

where they are more depreſſed with reſpect to the elevation of their common ſource or ſpring.

The upper parts of the water of a river, and thoſe at a diſtance from the banks, may continue to flow, from the ſingle cauſe, or principle of declivity, how ſmall ſoever it be; for, not being detained by any one obſtacle, the minuteſt difference of level will have its effect; but the lower parts, which roll along the bottom, will ſcarcely be ſenſible of ſo ſmall a declivity; and will only have what motion they receive from the preſſion of the ſuperincumbent waters.

The natural coheſion of the particles of water, and their implication, as it were, with one another, make the lower, which are moved by means of the depth, carry along with them the upper, which, in an horizontal channel, would have no motion at all: or, in a channel very little inclined, next to none; ſo that the lower, in this caſe, communicate to the upper a part of the motion they have received from the preſſure of it. Hence, from the preſſure, it frequently happens that the greateſt velocity of a river is about the middle of its depth, or that point, which is the fartheſt poſſible from the ſurface of the water, and from the bottom and ſides of the bed; ſuch middle parts having the advantage of being preſſed with half the depth of the river, and of being free, at the ſame time, from the friction of the bottom; whereas, on the contrary, the leaſt velocity of the water is at the bottom and ſides of the bed, becauſe there the reſiſtance reſulting from friction is the greateſt, which is communicated to the other parts of the ſection of the river, in an inverſe duplicate proportion of the diſtances from the bottom and ſides combined together.

To find whether the water of a river, almoſt horizontal, flows by means of the velocity acquired in its deſcent, or by the preſſure of its depth, ſet up an obſtacle perpendicular to it; if the water riſe and ſwell immediately againſt ſuch obſtacle, it runs in virtue of its fall; or, if it ſtop a little while firſt, in virtue of its preſſion.

Rivers, according to this author, almoſt always make their own beds. If the bottom have originally been a large declivity, the water, in conſequence of it, falling with a great deal of force, will have ſwept away the moſt elevated parts of the ſoil, and carrying them lower down, will gradually render the bottom horizontal; where the ſtream is ſwifteſt, there will the earth be moſt dug up; and, conſequently, there the greateſt cavity will be made.

The water having made its bed horizontal becomes ſo itſelf, and conſequently rakes with the leſs force againſt the bottom, till at length that force becomes only equal to the reſiſtance of the bottom. The bottom is now arrived at a ſtate of permanency, at leaſt for a conſiderable time; and the longer, according to the quality of the ſoil, clay and chalk reſiſting longer than ſand or mud.

On the other hand, the water is continually wearing away the brims of its channel, and this with the more force, as, by the direction of its ſtream, it impinges more perpendicularly againſt them. By this means it has a continual tendency to render them parallel to its own courſe; and when it has arrived as near that as poſſible, it ceaſes to have any effect that way. At the ſame time that it has thus rectified its edges, it has enlarged its own bed; that is, it has loſt of its depth, and conſequently of its force and preſſure: this it continues to do till there is an equilibrium between the force of the water and the reſiſtance of its banks, upon which they will remain without farther mutation. And it is evident, from experience, that theſe equilibriums are all real, inaſmuch as we find that rivers only dig and widen to a certain pitch.

The very reverſe of all theſe things happens on other occaſions. Rivers, whoſe waters are thick and muddy, raiſe their bed, by letting part of the heterogeneous matters contained in them fall to the bottom: they alſo contract their banks, by a continual appoſition of the ſame matter, in bruſhing over them. This matter, being thrown aſide far from the ſtream of water, might even ſerve, by reaſon of the obſcureneſs of the motion, to form new banks.

Now theſe oppoſite effects ſeem almoſt always to concur, and are differently combined, according to the circumſtances, whence it is very difficult to judge of the reſult; yet muſt this combination be known very accurately, before any meaſures can be taken about rivers, eſpecially as to the diverting of their courſes. The Lamona, which emptied itſelf into the Po, being turned another way, to make it diſcharge itſelf into the Adriatic, was ſo altered, and its force ſo far diminiſhed, after its waters were left to themſelves, that it raiſed its bed a great height, by continual depoſitions of mud, till it became much higher than the Po, in its utmoſt accretions, and needed very high banks, or dykes, to keep it from overflowing.

If various cauſes of reſiſtance to the motion of flowing waters did not exiſt, ſuch as the attraction and continual friction of the bottom and ſides, the inequalities in both, the windings and angles that occur in their courſe, and the diminution of their declivity the farther they recede from their ſprings, the velocities of their currents would be accelerated to twelve, fifteen, and, in ſome caſes, even to twenty times more than they are at preſent in the ſame rivers, by which they would become abſolutely unnavigable.

A little river may be received into a large one, without either augmenting its width or depth. This ſeeming paradox ariſes hence, that the addition of the little river may only go towards moving the waters, before at reſt near the banks of the large one, and thus augmenting the velocity of the ſtream, in the ſame proportion as it does that of the quantity of water. Thus the Venetian branch of the Po ſwallowed up the Ferrareſe branch, and that of Panaro, without any enlargement of its own dimenſions. And the ſame may be concluded proportionably of all other acceſſions to rivers, and, in the general, of all new augmentations of water.

A river offering to enter into another, either perpendicularly, or in an oppoſite direction, will be diverted by degrees from that direction, and obliged to make itſelf a new and more favourable bed towards the mouth.

The union of two rivers into one makes the whole flow the ſwifter, becauſe, in lieu of the friction of four ſhores, they have only two to ſurmount; and that the ſtream, being farther diſtant from the banks, goes on with the leſs interruption; beſides, that a greater quantity of water, moving with a greater velocity, digs deeper in the bed, and of courſe retrenches of its former width. Hence alſo it is that rivers, by being united, take up leſs ſpace on the ſurface of the earth, and are more advantageous to low grounds, which diſcharge their ſuperfluous moiſture into them, and have likewiſe leſs occaſion for dykes to prevent their overflowing.

Theſe advantages are ſo conſiderable, that S. Guglielmini thinks them worthy of nature's having had a view to them in her contriving to make the confluences of rivers ſo frequent as we find them.

Such were the views and deductions of this author, in which he has been followed by ſeveral mathematicians of the firſt eminence; but certainly without coming to any very accurate and eſtabliſhed principles, on which to found a computation of the quantity of water that would be diſcharged, in any new caſe that preſented itſelf for determination;

tion; or what ſlope, and what magnitude of current, was neceſſary for producing any required ſupply. Thus, a ſmall aqueduct, which was carried to Paris in the beginning of the laſt century, on a plan preſented to the academy, and, with ſome alteration, approved of by that learned body, was found, when completed, to yield very little more than half the quantity of water which they had computed. A ſimilar circumſtance happened at Edinburgh, when that city was ſupplied by water, under the direction of Deſaguliers; the quantity of water actually furniſhed being only about one-ſixth of the quantity which he had computed it would be, and but one-eleventh of what Maclaurin had eſtimated it at from the ſame plan.

Nothing can ſhew more clearly the inadequacy of the theory, as it exiſted at that time, than that the firſt mathematicians of their age, and we might almoſt add of any age, ſhould differ ſo widely from each other; the eſtimate of the one being but about one-half of the other, and the neareſt to the truth not agreeing with the actual ſupply by five parts out of ſix.

It required but a few inſtances of this kind to point out the neceſſity of a more preciſe and definite theory; and the ſubject was accordingly ſoon after undertaken by Michelotti at Turin, the abbé Boſſut at Paris, and by the chevalier du Buat; of whom the latter is generally admitted to have met with the moſt complete ſucceſs. Michelotti made a great number of experiments, both on the motion of water in pipes and in open canals. They were performed at the government expence, and nothing was ſpared to render them complete. A tower of fine maſonry was built, to ſerve as a veſſel from which the waters were to iſſue, through holes of various ſizes, and under various preſſures, from 5 feet to 22 feet. The water was received into baſons conſtructed of maſonry, and accurately lined with ſtucco, and of various forms and declivities. Theſe experiments on the expence of water through pipes are, of all that have yet been made, the moſt numerous and exact, and may be appealed to on every occaſion. Thoſe made on open canals are ſtill more numerous, and are no doubt equally accurate; but they have not been ſo contrived as to be ſo generally uſeful, being moſtly very unlike the important caſes which will occur in practice; and they ſeem to have been contrived chiefly with a view of overturning or eſtabliſhing certain received hydraulic principles of that time. The experiments of Boſſut are alſo very numerous, and of both kinds, *viz.* on pipes and canals; ſome particulars of which will be found under our article DISCHARGE *of Fluids*. But thoſe of the chevalier du Buat are the moſt concluſive, and his theory of rivers the moſt perfect of any with which we are yet acquainted. A few of the leading principles of this author's theory will be found in the ſubſequent part of this article.

It is certain that the motion of open ſtreams muſt, in ſome reſpects, reſemble that of bodies ſliding down inclined planes, perfectly poliſhed; and that they would accelerate continually, were they not obſtructed: but they are obſtructed, and frequently move uniformly. This can only ariſe from an equilibrium between the forces which promote their deſcent and thoſe which oppoſe it. Hence M. Buat aſſumes his leading propoſition, *viz.*

1. "When water flows uniformly in any channel or bed, the accelerating force, which obliges it to move, is equal to the ſum of all the reſiſtances which it meets with, whether ariſing from its own viſcidity, or from the friction of its bed."

From this propoſition, ingeniouſly combined with the reſult of his own and Boſſut's experiments, he then draws theſe fundamental propoſitions, *viz.*

2. "The motion of rivers depends entirely on the ſlope of their ſurfaces.

3. "Since the velocity of the water depends wholly upon the ſlope of the ſurface, or of the pipe through which it is conveyed, it follows that the ſame pipe will be ſuſceptible of different velocities, which it will preſerve uniform to any diſtance, according as it has different degrees of inclinations; and each inclination of a pipe, of given diameter, has a certain velocity peculiar to itſelf, which will be maintained uniform to any diſtance whatever. But this velocity changes continually, according to a certain function of its inclination for all degrees between its vertical and horizontal poſitions."

It is obvious that, conſidering the number of cauſes that may give riſe to inequalities in the motion of water, whether in pipes or canals, it would have been vain to attempt the determination of the function above-mentioned from theory only: the reſults of the ſeveral experiments were, therefore, examined with the moſt ſcrupulous attention, and penetrating ingenuity, and from which at length the author derived the following theorems, *viz.*

Let V be the velocity of the ſtream, meaſured by the inches it moves over in a ſecond; R a conſtant quantity, *viz.* the quotient obtained by dividing the area of the tranſverſe ſection of the ſtream, expreſſed in ſquare inches, by the boundary or periphery of that ſection, *minus* the breadth of the ſtream, expreſſed alſo in inches, *viz.* $R = \frac{wh}{b + 2h}$; where w is the mean width of the ſection, h the mean height or depth, and b the breadth at bottom.

The line R is called by du Buat the *radius*, and by Dr. Robiſon the *hydraulic mean depth*.

Laſtly, let S be the denominator of a fraction, which expreſſes the ſlope, the numerator being unity; that is, let it be the quotient obtained by dividing the length of the ſtream, ſuppoſing it extended in a ſtraight line, by the difference of level of its two extremities; or, which is nearly the ſame, let it be the co-tangent of the inclination or ſlope.

Then the general formula expreſſing the velocity V, ſuppoſed uniform, is,

$$V = \frac{307\sqrt{R - \frac{1}{10}}}{\sqrt{S} - \frac{1}{2}\text{h. log. }(S + \frac{16}{10})} - \tfrac{3}{10}\sqrt{R - \tfrac{1}{10}}, \text{ or}$$

$$V = \sqrt{R - \tfrac{1}{10}} \times \left(\frac{307}{\sqrt{S} - \frac{1}{2}\text{h. log. }(S + \frac{16}{10})} - \tfrac{3}{10}\right).$$

But when R and S are both very great, then,

$$V = \sqrt{R}\left(\frac{307}{\sqrt{S} - \frac{1}{2}\text{h. log. }S} - \tfrac{3}{10}\right) \text{ nearly.}$$

Hence it follows, that the ſlope remaining the ſame, the velocities are as R, or as the area of the ſection divided by its perimeter, *minus* the breadth of the river at the ſurface, *very nearly*; for they are as $\sqrt{R - \frac{1}{10}}$; and when the river is large, the $\sqrt{R}$ may be uſed without any ſenſible error.

Again, if R is ſo ſmall, that $\sqrt{R - \frac{1}{10}} = 0$, or $R = \frac{1}{10}$, the velocity will be nothing, which agrees very well with experiments; for in a cylindric tube $R = \frac{1}{2}$ the radius: the radius, therefore, is only two-tenths, ſo that the tube is nearly capillary, and the fluid will not flow through it.

The

The velocity may also become nothing, by the slope becoming so small, that

$$\frac{307}{\sqrt{S} - \frac{1}{2}\text{h. log.}\,(S + \frac{16}{10})} - \tfrac{3}{10} = 0;$$

but if $\frac{1}{S}$ is less than $\frac{1}{500000}$, or than $\frac{1}{10}$th of an inch to an English mile, the water will have sensible motion.

In a river, the greatest velocity is at the surface, and in the middle of the stream; from which it diminishes towards the bottom, and the sides, where it is the least. It has been found, from experiment, that if, from the square root of the velocity in the middle of the stream, expressed in inches *per* second, unity be subtracted, the square of the remainder is the velocity of the bottom.

Hence, if v be the velocity in the middle of the stream, the velocity of the bottom will be expressed by $(\sqrt{v} - 1)^2 = v - 2\sqrt{v} + 1$.

The mean velocity, or that with which, were the whole stream to move, the discharge would be the same as the real discharge, is equal to half the sum of the greatest and least velocities, as computed in the last proposition. Therefore, if v represents the greatest velocity, then will the mean velocity $= v - \sqrt{v} + \frac{1}{2}$.

Suppose that a river, having a rectangular bed, is increased by the junction of another river equal to itself, the declivity remaining the same; required the increase of depth and velocity. Let the breadth of the river $= b$, the depth before the junction d, and after it x; and, in like manner, v and v' the mean velocities before and after; then $\frac{b\,d}{b + 2\,d} = R$ *before*, and $\frac{b\,x}{b + 2\,x} = R'$ *after*, so $v = \frac{307\sqrt{R}}{\sqrt{S}}$, supposing the breadth of the river to be such, that we may reject the small quantity subtracted from R; and, in like manner, $v' = \frac{307\sqrt{R'}}{\sqrt{S}}$; then substituting for R and R′, we have

$$v = \frac{307}{\sqrt{S}} \times \sqrt{\frac{b\,d}{2\,d + b}}, \text{ and}$$

$$v' = \frac{307}{\sqrt{S}} \times \sqrt{\frac{b\,x}{b + 2\,x}}.$$

Multiplying these into the area of the sections $b\,d$, $b\,x$, we have the discharges, *viz.*

$$b\,d\,v = \frac{307}{\sqrt{S}} \times \frac{b\,d\sqrt{b\,d}}{\sqrt{(b + 2\,d)}}, \text{ and}$$

$$b\,x\,v' = \frac{307}{\sqrt{S}} \times \frac{b\,x\sqrt{b\,x}}{\sqrt{(b + 2\,x)}}.$$

And since the last of these is double the former, we obtain

$$\frac{b\,x\sqrt{b\,x}}{\sqrt{(b + 2\,x)}} = \frac{2\,b\,d\sqrt{b\,d}}{\sqrt{(b + 2\,d)}}, \text{ or } \frac{x^3}{b + 2\,x} = \frac{4\,d^3}{b + 2\,d},$$

$$\text{whence} \qquad x^3 - \left(\frac{8\,d^3}{b + 2\,d}\right)x = \frac{4\,b\,d^3}{b + 2\,d},$$

a cubic equation solvable by the formula of Cardan. As an example, let $b = 10$ feet, $d = 1$, then $x^3 - \frac{2}{3}x = \frac{10}{3}$, where $x = 1.4882$, which is the depth of the increased river. Hence we have $1.4882 \times v' = 2\,v$, and $1.4882 : 2 :: v : v'$; or v is to v' as 37 to 50 nearly.

When the water in a river receives a permanent increase, the depth and the velocity, as in the example above, are the first that are augmented. The increase of the velocity increases the action on the sides and bottom, in consequence of which the width is augmented, and sometimes also, but more rarely, the depth. The velocity is thus diminished, till the tenacity of the soil, or the hardness of the rock, affords a sufficient resistance to the force of the water; the bed of the river then changes only by insensible degrees, and, in the ordinary language of hydraulics, is said to be permanent, though, in strictness, this epithet is not applicable to the course of any river. For more on this subject, see Du Buat, "Principes d'Hydrauliques," in two vols. 8vo. Paris, 1806; Bossut's "Hydrodynamiques;" the article *River* in the "Encyclopedia Britannica;" and Playfair's "Outlines of Natural Philosophy."

The best and most simple method of measuring the velocity of the current of a river or canal, is the following. Take a cylindrical piece of dry, light wood, and of a length something less than the depth of the water in the river; round one end of it, let there be suspended as many small weights as may be necessary to keep up the cylinder in a perpendicular situation in the water, and in such a manner that the other end of it may just appear above the surface of the water. Fix to the centre of that end which appears above water, a small and straight rod, precisely in the direction of the cylinder's axis; to the end, that when the instrument is suspended in the water, the deviations of the rod from a perpendicularity to the surface of it, may indicate which end of the cylinder advances the fastest, by which may be discovered the different velocities of the water at different depths; for if the rod inclines forwards, according to the direction of the current, it is a proof that the surface of the water has the greatest velocity; but if it inclines back, it shews that the swiftest current is at the bottom; if it remains perpendicular, it is a sign that the velocities at the surface and bottom are equal.

This instrument being placed in the current of a river or canal, receives all the percussions of the water throughout the whole depth, and will have an equal velocity with that of the whole current *from the surface to the bottom* at the place where it is put in, and by that means may be found, both with ease and exactness, the mean velocity of that part of the river for any determinate distance and time.

But to obtain the mean velocity of the whole section of the river, the instrument must be put successively both in the middle and towards the sides, because the velocities at those places are often very different from each other. Having by this means found the *difference of time required for the currents to run over an equal space*; or, *the different distances run over in equal times*, *the mean proportional* of all these trials, which is found by dividing the common sum of them all by the number of trials, *will be the mean velocity of the river or canal.*

If it be required to find the velocity of the current only at the surface, or at the middle, or at the bottom, a sphere of wood, of such a weight as will remain suspended in equilibrium with the water, at the surface or depth which we want to measure, will be better for the purpose than a cylinder, because it is only affected by the water of that sole part of the current where it remains suspended.

It is very easy to guide both the cylinder and the globe in that part which we want to measure, by means of two threads of small cords, which two persons must hold and direct, one on each side the river; taking care at the same time neither to retard nor accelerate the motion of the instrument.

Having

Having the mean or medium velocity of a river, if we multiply this medium, the breadth, depth, and ſpace run over in a certain time, the product will give the quantity of water that flows down in that time. Dr. Halley, in order to eſtimate the quantity of water that flows into the Mediterranean ſea by means of rivers, makes a compariſon of the great rivers of Italy, &c. with that of the Thames. (Philoſ. Tranſact. Abridg. vol. ii. page 110.) He aſſumes the breadth of the Thames at Kingſton bridge to be 100 yards, its depth three yards, and velocity two miles *per* hour. He profeſſedly overrates the dimenſions, in order to allow more than a ſufficiency for the ſtreams received below Kingſton. This aſſumption gives the area of a tranſverſe ſection of the river = 300 ſquare yards, and the quantity of water flowing down = 20,300,000 tons in a day. This muſt be overrated by at leaſt, it is ſuppoſed, one-third. If the breadth be aſſumed 100 yards, the depth three, and velocity two miles *per* hour, it will then give two-thirds of the reſult above-mentioned; or it will amount to the ſame thing if we take one-eighth part from all the three data aſſumed by Dr. Halley, the reſult being two-thirds of that above; amounting in the year to 166,624,128,000 cubic feet, which is a little more than one-twenty-fifth part of all the rain and dew in England and Wales in a year, as above deduced. Mr. Dalton has eſtimated "that the water of the Thames is drawn from an extent of country of about 600 ſquare miles, or one-eighth of the area of the whole, nearly. The Severn, including the Wye, ſpreads over an equal or greater extent of country; and that collection of rivers which conſtitutes the Humber is ſuperior to either of the other two in this reſpect. As far as my own obſervation goes, the Severn and Wye muſt diſembogue as much or more water than the Thames; the Humber I have not ſeen collectedly, but have noticed moſt of the branches conſtituting it, and ſhould apprehend it cannot be inferior to the Thames: all other circumſtances being the ſame, the quantity of water carried down by any river ſhould be as the area of the ground from which the water is derived, and on this account the Humber ought to exceed the Thames.

"The Severn, which is partly derived from the mountainous country of Wales, is certainly the moſt rapid of the three rivers, and probably carries down the moſt water; as the Thames, however, is generally conſidered to take the lead, we will ſuppoſe, upon the whole, that theſe three rivers are equal in this reſpect.

"The counties of Kent, Suſſex, Hampſhire, Dorſetſhire, Devonſhire, Cornwall, and Somerſetſhire, from the Medway to the Lower Avon incluſively, in an extent of 11,000 ſquare miles, do not preſent us with many large rivers. From their number and magnitude, we cannot form a high eſtimate of their produce. The quantity of rain for thoſe counties is indeed near the average for the kingdom, as far as the preceding obſervations determine; but the milder temperature of their winters and greater heat of their ſprings and ſummers, will cauſe a greater evaporation than in ſome other parts: it is probable the rivers in theſe counties may amount, when taken together, to $1\frac{1}{2}$ times the magnitude of the Thames. The rivers that diſembogue their waters on the coaſt of Lincolnſhire, Norfolk, Suffolk, and Eſſex, from the Humber to the Thames, though drawn from a country of 7000 ſquare miles, manifeſtly fall far ſhort of the Thames. The two places in this diſtrict, for which we have accounts of the rain, Norwich and Upminſter, give a mean of only $22\frac{1}{2}$ inches annually. This, with the flatneſs of the country, which prevents the water from running off in ſome degree, makes the rivers much leſs than what might otherwiſe be expected from the extent of ground. There are but three or four of any conſequence. Probably all the rivers may amount to half the ſize of the Thames. There remains above 6000 ſquare miles in Wales, from the Wye to the Dee, incluſive of the laſt, and the northern counties of Lancaſter, Weſtmoreland, Cumberland, Northumberland, and Durham, with part of Cheſhire, and a ſmall part of Yorkſhire, from the Merſey round by the Tweed to the Tees, amounting to 7000 or 8000 ſquare miles, to be eſtimated.

"Theſe two diviſions, though not larger than ſome others, abound in rivers, many of which are conſiderable in magnitude and of great rapidity. The rains at an average, it is probable, are double what they are in the S.E. counties of the kingdom. The rivers in theſe two diſtricts cannot fairly be eſtimated, I think, at leſs than four times the Thames. It appears, then, that by this eſtimation, the water carried off by all the rivers in England and Wales, may amount to nine times that carried off by the Thames = 13 inches of rain. There remains ſtill ſixteen times the water of the Thames, or 23 inches of rain to account for, before we have diſpoſed of all the rain and dew."

This ingenious philoſopher concludes, from a detail of facts and reaſoning, that "the rain and dew of this country are equivalent to the quantity of water carried off by evaporation and by the rivers. And as nature acts upon general laws, we ought to infer, that it muſt be the caſe in every other country, till the contrary is proved.

"This concluſion being admitted, we are enabled to deduce a general theorem for the quantity of water carried down into the ſea by any river in any country (on the ſuppoſition that all rivers are ramified alike) provided we have certain data; theſe data are the length of the river, and the exceſs of the rain above the evaporation in the country from which the water of the river is drawn; alſo, it ſhould be known by obſervation, how much water ſome one given river carries down.

"For, from the principles of geometry, the area of country from which any river is ſupplied, will be as the ſquare of the length of the river; and the quantity of water carried off, will be in the compound ratio of the area of the country, and the exceſs of the rain and dew above the evaporation.

"Thus, let L = the length of any river, E = the exceſs of rain and dew above the evaporation, and Q = the quantity of water diſembogued in any given time by that river; l = the length of any other river, e = the exceſs, &c. and q = the quantity of water; then we ſhall have $q = \frac{Q\,l\,e}{L\,E}$.

"*E. gr.* Suppoſe the length of the Thames = 200 miles, and the exceſs = 5 inches, eſtimating the rain and dew at 30 inches, and evaporation at 25; and ſuppoſe the river Kent, in Weſtmoreland, to be 20 miles in length, and the exceſs 35 inches, the rain and dew being ſuppoſed 65, and evaporation 30 inches. Then,

$$\frac{20^2 \times 35 \times Q}{200^2 \times 5} = \frac{7\,Q}{100} = q,$$

or $Q = 14\frac{2}{7}\,q$; which reſult, I believe, will be found to accord nearly with the meaſurement of the two rivers on the principle before-mentioned." Mancheſter Memoirs, vol. v. pt. 2.

River, with regard to *Agriculture*, may be converted, in many ſituations, to various uſeful purpoſes, ſuch as thoſe of improving the meadow and other graſs-lands which lie below the ſources of them, by having their waters in particular ſeaſons turned over them. By proper attention in theſe

these refpects, vaft benefits might, in a variety of cafes, where it has never been even fo much as fufpected, be derived, and thereby immenfe favings in manure be made for the amelioration of the lefs favourably fituated lands. But befides this vaft fource of advantage, rivers may often be converted, with little trouble or expence, to other ufeful purpofes, fuch as the fupplying of live-ftock with water, the turning of different kinds of farming machinery, the conveying of cattle food, and manures of various defcriptions, as well as different forts of farm produce, and a great number of other ufes, which can only be difcovered by the particular circumftances of them, and thofe of their fituations. But though in thefe views they may be juftly confidered as of much advantage, in others they are often dangerous, troublefome, and highly detrimental to the farmer, as where they are much accuftomed to overflow their banks, injure the crops, fweep away the live-ftock, and carry down much of the lands on their borders. Where they are apt to prove hurtful by thus overflowing their banks, the beft modes of confining them in particular cafes have been pointed out in fpeaking of the nature of embankments and haugh-land. See EMBANKMENT, and HAUGH-*Land*.

There are, however, other cafes that deferve to be confidered in this place, fuch as the directing and altering the courfes of torrents coming from mountains, changing the courfes of rivers, fecuring the banks of rivers in vallies, and ftraightening the narrow, crooked windings of fmall rivers in the fame fituations, and other hollow parts of lands. By the firft of which much advantage may, in different circumftances, be procured, and great fecurity be attained for the valuable lands below. By the fecond, extenfive tracts of the moft valuable kinds of land may be obtained, while the whole is rendered more fafe and proper for the purpofes of pafturage or thofe of tillage. By the third, much ufeful land may be fecured, as well as much mifchief from the high floods be guarded againft. And as by the laft much ground is often loft, or rendered of but trifling value to the farmer, by proper means thefe inconveniencies may be obviated, and the land rendered of much greater utility. Befides thefe, the methods of fecuring the banks, in other inftances where they are liable to be carried away by large floods, may alfo prove a vaft benefit and improvement.

In the former of thefe cafes, the remedies are, in general, thofe of rendering their courfes more *free*, *open*, *ftraight*, and *regular*, by which they muft obvioufly fuffer lefs obftruction, and of courfe be lefs apt to overflow their banks, and prove injurious to the grounds below, or on the fides of them. It is, however, remarked, that this is a fort of work that ought to be maturely confidered in all cafes before it is attempted; but that in fuch upland fituations the bufinefs may often be performed with facility by fmall cuts made along the flat bafes of fuch elevations, while it is very different in thofe of ftraightening vale rivers, as much larger openings are requifite. Befides, fhallows for piers and ftops are moftly found there, while in thefe cafes they are in general wholly wanting. But in all cafes, and in every point of view, the bufinefs is evidently of the greateft intereft to the proprietors of land, as the deftruction produced in this way is not only often committed on the moft valuable forts of land, but is frequently the caufe of difputes between the neighbouring proprietors; this fort of work has, however, been little attended to, and is in common very imperfectly underftood. In many inftances a great deal may be effected by proper accommodation between the different proprietors, whofe interefts are affected.

But in undertaking works of this nature, there are different circumftances that require to be particularly confidered. The peculiar fcite or place of improvement fhould, Mr. Marfhall fays, be well ftudied, in order to fix upon the beft method of executing the work. And when this has been done, accurate plans and eftimates of the expence that may be incurred, as well as of the grofs profits that may refult from it, be made out with care. And it is advifed that, where the bufinefs is extenfive, and the perfon who has the management not perfectly acquainted with the nature of it, to contract with proper experienced labourers, or a refponfible undertaker, for the execution of the whole, binding the party who is to perform the work to uphold it for a certain number of years after it is finifhed. It is remarked, that for want of thefe precautions, fums of money are annually expended, and in great part thrown away, fo as to become, in fome inftances, a heavy tax upon eftates, and a ferious defalcation of timber. It does not follow, it is contended, that, becaufe a few fquare yards of land are annually carried away, an expenfive work fhould be erected, and upheld at ten times the value of the ground it will protect; nor that, becaufe one fide of a river is flightly injured, an over-fized work fhould be raifed to the greater injury of the oppofite banks. It will be found, it is obferved, that in ordinary cafes, oppofite proprietors have one and the fame intereft; and that fmall injuries may generally be remedied by fimple means, and at a fmall coft. What the writer is folicitous to inculcate is, that the remedy ought to be proportionate to the difeafe; and that it fhould be applied in fuch a manner as not to injure another: confequently, that it behoves a proprietor to fee that no one about him has an intereft in erecting expenfive and abortive works, or any profpect of advantage from the annoyance of his neighbour in any refpect from fuch works. It is added, that every perfon has an undoubted right to defend his property. It is often his duty, as well as his intereft, to do it. And that there are cafes on which even large fums of money may be prudently laid out, and ought to be expended in order to accomplifh the work; as by neglect great injury may be fuftained, which at firft might have been remedied at a very trifling coft.

Rivers, wherever they are properly fituated, fhould always be converted to the ufe of watering the grafs lands which lie below their levels. See WATERING *of Land*.

RIVER-*Banks*, *Securing of*, the means of guarding and protecting them from the encroachment and injury of the ftreams when in flood or otherwife. It is a work of much difficulty and labour in many cafes, and that requires the careful management of an experienced director. It is indeed remarked by the author of the Treatife on Landed Property, in fpeaking of the nature of this bufinefs, that fuppofing the uniform, and evenly-poifed, current of a reach or ftraight part of a river to be difturbed by the body of a large root of a tree, or any other matter, brought down and lodged by a flood, on this fide, which, in brooks and narrow rivers, is an ordinary caufe of mifchief, it is found that through this apparently trifling incident the current may be faid to lofe its balance. For, when the flood falls to the level of the obftruction, the water becomes confined in that part; its height, above the obftruction, is confequently increafed; and its current oppofite and below it not only accelerated, but gently turned from its direct courfe toward the oppofite bank of its natural channel; which, if it be of an earthy crumbling nature, becomes undermined: the land, or upper part of the bank, confequently fhoots down, and is carried away by fucceeding floods. And what tends to increafe the evil is, the circumftance of the channel, immediately below the obftruction, becoming occupied, even in minor floods, with comparatively ftagnant water. It is in confe-

quence

quence warped up with the fediment there depofited; and by this means an additional weight of water is thrown againft the oppofite bank; which, if the growing caufe of mifchief be not fpeedily removed, will in a fhort time be much torn away, and, in a courfe of years, a bend or bay be formed in the adjoining ground of the proprietor, nearly oppofite to the root or other body, with a correfponding bank of fand or gravel, united with and becoming part of the lands on this fide. But if the grounds, on this fide, are equally vulnerable as thofe of the oppofite neighbour, there is no caufe of exultation in the increafe of territory. For while the current is leaving the proprietor on this fide, perhaps a worthlefs fand-bank near the obftruction is, by a natural law of river-currents, fcooping out a bay below, and giving to his oppofite neighbour an increafing territory in that part. And thus a natural lofs of valuable land is incurred on each fide; and the evil (in this cafe) continually increafing; until the banks are fecurely defended, or the current is reftrained, and directed into its former channel. The remedies in this cafe are two; firft, to fheath the injured banks of the bays on both fides, with fuch materials as will refift the circuitous current, and let the river remain in its crooked ftate; and, fecondly, to erect a pier at the higher point of the bend on the oppofite fide of the river, to parry off the force of the current from the bank of it, and direct it forward; with the twofold intention of preventing further mifchief, and of bringing back the courfe of the river to its former ftate of ftraightnefs, as much as poffible.

It is likewife ftated, that the operation of guarding the immediate bank of a fharp river-bend againft a heavy current, meeting with great refiftance, is generally a work of much difficulty and expence, even where materials can be eafily procured; while that of diverting the current may frequently be accomplifhed at a comparatively fmall coft; and its effect be rendered infinitely more falutary and permanent. As it is evident that, if the accidental obftruction mentioned had been timely removed, no bad effect would have enfued, and the river would have continued its direct courfe. Or if, through neglect, it had been fuffered to remain awhile, until its mifchief was difcoverable, even then, if it had been moved from its ftation to the oppofite fide of the river, and placed in the part affected, this fmall counterpoife might have recovered the balance of the current, and directed it into its wonted channel. And in almoft any cafe, he thinks, by judicioufly placing, in a fimilar manner, an obftruction proportioned to the magnitude of the power to be counteracted, the like effect may be produced. As, for inftance, if, in the cafe propofed, the pier or river-guide above-mentioned were to be erected by the proprietor on the oppofite fide of the river, and to be inclined towards the ftream, or direct courfe of the river, in a degree proportioned to the ftrength of its current (a rapid current requiring lefs bias than a flow one), and of a fize in like proportion, not only the banks of the bay or bend would be defended, in a great degree, from the action of floods, but the fand-bed formed on this fide would be worn away, and its materials depofited in the bay on the other fide; which alfo being rendered ftagnant, comparatively, with the current of the river, would receive the depofits of foul waters in times of floods; and thus, in a twofold manner, be refilled and brought back toward its former ftate. And, further, that if, when the gravel bank on this fide is fufficiently removed, the proprietor on the fame fide were to erect a fimilar pier at the higher point of the bend on the fame fide, the fand or gravel bank on the other fide would, in like manner, be worn away, the bay on this fide be returned to its original proprietor, and the ftraight courfe of the river be regained; then the piers ought to be removed, whether they belong to one or two proprietors; the latter having generally a mutual intereft in directing the river, which feparates their properties, into a ftraight courfe, as much as can be done.

It is ftated, that in the conftruction of a river-guide for this purpofe, there are certan principles and particulars of practice to be obferved. It is fuggefted that its pofition fhould be fuch as to produce the required effect, with the leaft degree of refiftance. For the current of a river, as the waves of the fea, ought to be fubdued by ftratagem rather than by force. Refiftance ferves but to increafe their fury. A wave falling on a flat fhore, feems to die without a ftruggle; while one that is ftemmed by an abrupt rock ftrikes with tenfold force. And, in like manner, a rapid river will glide fmoothly along the fide of an even bank, though it may fomewhat deviate from the direct courfe; without perceptibly difturbing the current, or injuring the bank that directs it, even though merely of turf. But when a ftrong current meets with an abrupt projection, or a fharp bend in its channel, its fury is roufed. There, rock is fometimes barely fufficient to refift its force. On thefe principles it is, therefore, conceived, that in erecting a pier with this intention, it ought to be made to unite evenly with the natural bank of the river above it, and, where the required deviation from a ftraight line is confiderable, the face of the pier ought to pafs off from the natural bank with a fmooth hollow curve, that the force of the current may not be checked. But its outer or lower end fhould be ftraight, or nearly fo, and be directed, as a piece of ordnance, to the object it is intended to deftroy—to the obftruction it is intended to remove; and it may be obferved, that the nearer it approaches this, the greater will be the action of the current upon it, in times of flood; and the lefs liable the ftream will be, at low water, to turn back into its former channel. For, in cafes of this kind, the current of a flood, and that of low water, (if not better directed,) take different courfes, according to their heights and ftrengths. The one rufhes forward in the direction defired, the other, unable to furmount the obftruction, and flagging for want of ftrength at the point of the pier, doubles it; and falls back into the bay with an accelerated current; directed, perhaps, ftraight to the injured bank; and may thus increafe, perhaps, rather than prevent, the injury. But in order to remedy this evil effect, and to direct the current, at every height, into the fame channel, it will generally be found right, where it can be done, and at a reafonable expence, to cut a channel through the obftructing bank, large enough to admit the ftream at low water; depofiting the materials which are raifed in doing it at the point of the pier, and againft the foot of the injured bank: by thefe means not only preventing further injury to the lands on the oppofite fide, but greatly affifting the action of the flood-currents to force their way through the channel, and enlarge it; and, in a fhort time, lay open the required courfe. For although, by this procedure, the bay on that fide might not be fo readily and completely filled up, as it would by fuffering the current to throw back the obftruction, by degrees, in the manner above reprefented; yet the advantage of putting an immediate ftop to the ravages both of floods and of low water, might counterbalance that defect; even though the pier were thereby rendered neceffary to be kept up in perpetuity. The expence of the cut may generally be faved in the required *length* of the pier; whofe ufe, in this cafe, is, merely that of giving an eafy bend to the current; fo as to enable it to find its own way

to

to the channel prepared for it. And the *ſtrength* required, depends upon the weight of water, the force of the current, and the angle of deviation from the given direction of the current immediately above. If the required direction of the pier be nearly the ſame as that of the current above it, it has, it is contended, little more than the weight of water to ſuſtain. Whereas a jutment run out, abruptly, into the natural courſe of the current (as is commonly ſeen), has not only the weight, but the force, of the water to withſtand; and requires threefold, or tenfold, the ſtrength of ſtructure that is neceſſary in the other caſe. Another circumſtance to be particularly regarded in this ſort of buſineſs, is the height of the conductor. Where it is run out from the bank into the channel of the river, in rather a ſtraight manner, and if it be not raiſed high enough to prevent the waters of floods from making their way over it, its foundation may be endangered; eſpecially in a place where the general fall of the river is conſiderable. For an overfall of water, unleſs it have a firm baſis to act upon, naturally ſcoops out a pit at the foot of the fall; and undermines the precipice it tumbles over; ſeldom failing to let down ſuch as are conſtructed by art.

With reſpect to the means of obviating this effect, they are three, one of which is to raiſe the pier high enough to prevent the overfall; an expedient, however, which cannot always be practiſed with propriety. Another is to form the lower ſide, or back part of the pier, with a ſhelving or flatly inclining ſurface, to break or elude the fall. And the other, to prepare a convex floor behind the pier, for the waters to fall upon. This laſt has been found ſucceſsful in the writer's own practice. There is likewiſe another point that demands particular care in the operator, which is that of ſecuring the point or outer end of the pier, not only at the foundation, but in the ſuperſtructure. For although the main current cannot, if the pier is judiciouſly placed, exerciſe its ſtrength upon this part; yet, by reaſon of the weight of water there loſing its ſupport, and part of it, conſequently, ruſhing precipitately into the unguarded bay, the lower end of the pier is peculiarly expoſed to danger in that way. It is ſuppoſed ſcarcely neceſſary to add, that the *upper* end of the pier ought to be deeply inſerted in the firm bank of the river, to prevent the current from inſinuating itſelf behind the facing, or that the face of the pier ſhould be carried up with a ſufficient batter, to give it firmneſs; or that the *foundation* ought to be ſecurely laid, and to be kept ſeduloufly guarded in front, to prevent its being undermined by the current. Rough ſtones, thrown down looſe, and with a flat ſhelving ſurface, againſt the foot of the pier, are, in moſt caſes, the beſt guard, let its materials be of what ſort they may.

It is adviſed, that the materials for this uſe ſhould be ſuited to its occaſion, where a choice is to be had. If a low defence, only, is wanted, in a diſtrict where large rough ſtones are plentiful, a long pile of looſe ſtones, laid flatly ſloping againſt the bank of the river, or a flat ridge run out from it, may form a cheap and durable barrier. For ſhould they be diſturbed by an extraordinary flood, they may be readily replaced when the water ſubſides. Where a tall pier is required to direct a large and rapid river, in a place where ſtones and ſtrong cement may be procured at a moderate expence, maſonry may be eligible. But in expoſed ſituations, at leaſt, it ought to be guarded with timber, eſpecially at the top and the outer end (as the piers of ſea-ports, and the quays of navigable rivers, are guarded), to defend thoſe parts from injury by ice, timber, or other large floating bodies, driven againſt them in times of flood. And that where maſonry cannot be uſed, but at a great expence, a *caiſſoon*, formed with poſts and planks of adequate dimenſions, and filled with pebbles, gravel, or other indiſſoluble materials, to give ſtability to the fabric, may be found to laſt as long as its ſervices may be wanted; and, in ſome caſes, may be removed while its materials may yet be valuable.

But this, though the prevalent method, is merely palliative, and demands frequent repairs: it does not cure the evil, or bring back the loſt property to the owner who has a right to it. Nor is it in ſuch a caſe beneficial to a rival owner, for the current, as has been ſhewn, ſweeping circuitouſly along the banks of the bay, is thereby led to direct its force againſt the lands of the proprietor on this ſide, who cannot, under theſe circumſtances, defend them by the above means; but who muſt either ſecure them by a lengthened land-guard, or leave them at the mercy of a ſweeping current. It is therefore concluded, that, in a caſe of this kind, it is evidently the beſt intereſt of an oppoſite proprietor to ſuffer his ſand-bank, or gravel-bed, to be cut through, in the manner ſuggeſted, and that he ought to aſſiſt in the operation; as he will thereby not only get rid of the circuitous current, but, by the action of the floods, in the ſtraightened courſe, his bay will ſcarcely fail to be filled up with the ſcattered materials that may be removed.

There is another caſe in which this ſort of pier or river-guide may be made uſe of with ſucceſs; which is that where a ſtream of the above deſcription falls down a crooked valley, and neceſſarily takes, at certain points, a winding courſe.

In this caſe, where the quantity of water is conſiderable, its fall rapid, and eſpecially where it is conducted to the bend on the farther ſide down a ſtraight, unobſtructed reach, ſcarcely any thing but natural rock can reſiſt its force in that part. In ſuch ſituations it is not unuſual to ſee earth-banks ſcooped out and undermined, until a perpendicular cliff of twenty or thirty feet high be formed. But if a pier be erected at the upper part of the bend, with an eaſy curve from the natural courſe above, ſo as to *bend* the current without *breaking* it, and direct it into its natural channel, in the valley below, it will have nothing to contend with but the looſe gravel beds on the different ſides, which, if cut through, as in the former caſe, will preſently be torn away, and a principal part of their materials be depoſited in the bays on each ſide, but eſpecially in the latter, or that on this ſide: ſo that in this, as well as in that caſe, both ſides of the river may be benefited by the alteration which is thus produced. It is however ſtated, that there are caſes in which nothing but an immediate ſheath, or *land-guard* applied to the injured part, can be properly uſed to prevent further depredations. As, firſt, where the river is confined in the part where it is required to be bent, by rocks or otherwiſe, to an unaltered channel; as it frequently is in ſub-alpine ſituations. And, ſecondly, where a deep pool occurs in that part at low water, ſo as to render it difficult to get a proper foundation for a pier. It is obſerved that, in the former ſituation, ſtones are generally plentiful; and they require to be applied according to the circumſtances of the particular caſe. Where the foot of the injured bank is covered with a pool at low water, it is adviſed to ſhelve off the brink of the bank, and ſhoot down looſe ſtones from the top of it; ſuffering them to form their own ſlope in the action of falling, and by the operation of ſucceeding floods; continuing to pour them down until the bank be ſecured, at leaſt from minor floods; and then to

ſlope

ſlope back the upper part, to give freedom to floods of higher magnitude. But that where it is in the face of an impetuous torrent, and at ſome little diſtance from it, a gravel bed is thrown up, ſo as to lie dry during low water; yet where lands, behind, are liable to the ravages of floods, as is often the caſe, and eſpecially where ſtones are not plentiful, a more frugal arrangement of them may be made, by uſing them merely to caſe the expoſed bank, ſo as to prevent the currents of floods from laying eaſy hold of it, and tearing away the land. However, in this caſe much depends on the plan and conſtruction of a ſafeguard of this kind. It ought to be every way convex; ſo that the ſtrength of the current and the weight of the water may act upon it, as ſuperincumbent preſſure acts upon an arch. It ſhould bulge out, horizontally, towards the known current of floods, (without regard to the courſe of the ſtream at low water,) and the face of the wall ought to take the barrel form. A croſs ſection of the ſtone-work ſhould reſemble a ſemi-arch, or, in dangerous ſituations, it ought, it is conceived, to fall back flatter than the quadrant pitch. For, in general, the flatter it is made to lie, the more ſecure it will become; but the ſteeper it is carried up, the fewer materials, and the leſs labour, it will require. And in forming a work of this nature, the foundation ſhould be laid pretty deep, to guard againſt any accidental ſcoopings of the floods. The wall ought to be carried up dry, or without mortar, the ſtones being laid with their ends outwards, their inner ends pointing to the ſame centre, like thoſe of an arch, and to be backed with gravel or earth, rammed in firmly behind as the facing is carried up. The *coping*, or uppermoſt courſe of the ſtones, ſhould be ſecurely bound with thick tough ſods (eight or ten inches deep), whoſe ſurfaces, when beaten down, ought to lie even with that of the ſtone-work; and ſimilar ſods require to be laid, with a gentle riſing ſlope, until they unite ſmoothly with the natural turf of the land to be defended: ſo that the waters of floods, when they riſe above the ſtone-work, may have no abruptneſs to lay hold of, but may paſs away ſmoothly over the ſurface of the land, as they commonly do over ſmooth green-ſward, without injury. And, laſtly, that the ſtones are to be beaten forcibly into the bank with a rammer, a mallet, or a ſmall battering-ram adapted to the purpoſe; thus rendering the whole compact and firm to reſiſt the current. Where vacancies or fiſſures ſtill appear, long ſplinters of ſtone are to be driven in, as wedges, to increaſe the firmneſs, and prevent the current from tearing out an unguarded ſtone. It follows, in courſe, that the largeſt and longeſt of the ſtones ought to be uſed where the greateſt reſiſtance is known to be neceſſary, in order that the greater ſecurity may be attained. It is remarked that this ſort of defence, like that of every other ſpecies of the river kind, requires to be attended to from time to time, eſpecially after great floods. If the foundation be laid bare, it requires to be recovered with rough gravel, or with ſtones thrown looſely againſt it. If any of the facing ſtones be diſplaced, or looſened, they are to be replaced with others, or to be wedged in afreſh. Or if the turf which binds them at the top be diſturbed, the torn part ſhould be cut out ſquare, and be firmly and completely filled up with freſh turves. It is added, that this method of defence againſt rapid rivers originated in the ingenious writer's own experience and practice; and that, when compared with a wooden guard, it is cheap, ſightly, and durable.

It is noticed further, that there are caſes of other kinds, as thoſe which are found in the ſkirts or margins in the vallies of mountainous ſituations, through the plains of which the rivers are found winding with devious courſes, or tracing the margins at the feet of the containing heights. In ſome inſtances, they are confined in deep-ſunk channels, whoſe banks they ſeldom overflow; but, much oftener, their channels are ſunk a few feet only beneath the general ſurfaces of the lands they paſs through. Hence, in high floods, they may be ſaid to be let looſe over the plains, to ravage them at pleaſure. Their immediate banks, however, are generally the victims of their rage. Theſe they tear away, and ranſack off their better parts; ſubſtituting beds of ſtones and gravel, or perhaps their own channels, in the ſtead of what were, a few hours before, valuable lands. And that there are inſtances of mountain torrents, on ruſhing out of their confined channels into flat vale diſtricts, ravaging many acres during a ſingle flood. And to confine or direct theſe, is, it is obſerved, often a buſineſs of vaſt difficulty and trouble.

In theſe caſes, the beſt endeavour of the artiſt is generally, according to Mr. Marſhall, to give the river a direct or ſtraight-forward courſe, on its quitting its reſtraining channel, at its firſt entrance into the area of the plain; and, if no obſtruction lies in the way, to continue the ſtraight line to another retaining channel, at the lower end of the area to be improved. But that where the area is winding, or ſome obſtruction riſes within it, ſo that a ſtraight line cannot be drawn from the entrance to the outfall, an inſuperable difficulty may ſeem to fruſtrate this mode of improvement; as the current requires to be bent, not only after it has entered the plain, but after it has acquired an increaſe of velocity by moving in a ſtraight courſe. By actual practice and experience, he was led by another circumſtance belonging to it, to what may, perhaps, be conſidered as a principle, in conducting improvements of this nature. A ſtraight cut into the middle was deſirable: but the point of riſing-ground rendered it impracticable. Near the centre of the flat, a large inſulated fragment or iſlet of rock roſe ten or more feet above the level of the area; and at the lower end of it, near the natural outlet of the river, a bank of rock had formerly been waſhed by it. It was eaſy to perceive that the inſulated rock, which commanded both the extreme points of the area, might be employed in uniting them; and that, by the uſe of that rock the work might be rendered complete. For, by opening a ſtraight courſe to the rock in the middle, and another from thence to the bank of rock at the outlet, the current would be directed, in another ſtraight line, to the outlet, and the ſcite of improvement be entirely freed from its injurious effects. He remarks, that it is in few inſtances that prominent rocks, firm enough to reſiſt the current of an impetuous river, riſe in the areas of river-worn plains. But that, on the ſides of mountain vallies, rocks are common; and may, doubtleſs, in many inſtances, be employed to throw the river from ſide to ſide of a crooked valley, in ſtraight reaches; as rays of light may be reflected in continuation by well-placed mirrors. Even where natural rock is not preſent, either in the area, or on the ſides of ſuch a plain, or flat-baſed valley, riſing grounds may frequently be found within the former, and are never wanting on the ſides of the latter. And, againſt theſe, artificial butments, of ſufficient ſtrength, may not unfrequently be formed in alpine ſituations, where ſtones are generally plentiful, without any very great expence.

It is obſerved, in reſpect to the *altering* the *courſe* of a river or brook, that the difficulties and expence depend on the particular circumſtances belonging to it. In a ſimple caſe, in which one ſtraight cut only is required, the principal difficulty, and that which requires the beſt ſkill of the artiſt, lies in directing the current of the firſt flood out of the old into the new channel. But if a bend of the old channel, like

like that juſt noticed in the above caſe, can be made uſe of, this difficulty may be ſaid to vaniſh. The mouth of the new cut receives the current with a ſtraight courſe; conſequently, if it be made of ſufficient capacity, the river in a *flood* can have no propenſity left towards its old channel; and the looſe materials which riſe in forming the mouth of the new cut will generally be ſufficient to turn the ſtream at low water into it. But if a ſuitable bend cannot be approached by the new cut, a directing pier, like that in the above caſe, will be required to bend the flood-current, and give it a ſtraight-forward courſe into the new channel; a water-tight dam being formed between the point of the pier and the firm bank of the new channel, to prevent the water from regaining its former courſe or direction.

But in regard to the cutting of the new channel, it is merely a work of manual labour; being attended with no other difficulty than what may ariſe from the expence; which will depend on the ſize of the river, the nature of the ground to be cut through, and the value of labour in the given diſtrict. It is moſtly to be aſcertained with ſufficient accuracy, by previous calculations. And it is added that the required *ſize* of the *new cut* is ſmall compared with that of the old channel. For the currents of floods, by carrying off the earthy particles with which they come in contact, will ſoon enlarge it. It is nevertheleſs right to give ample room in the new channel, leſt the firſt flood ſhould prove high, and, by burſting its bounds, force its way back to its former courſe. Therefore, in order to give the required capacity to the new channel, and to allow for its widening, the materials which ariſe in making it ought to be formed into regular embankments on either ſide of it, and at ſufficient diſtances from its brink, to obtain the above purpoſes; and, moreover, to protect the adjacent lands from the injurious effects of unreſtrained floods. And it is further ſuggeſted, that a new river courſe requires to be carefully attended to, during a few years after it is opened, to ſee that its channel preſerves its ſtraightneſs, and that no breaches are made or threatened in its banks. And that, conſidering the uncertainty of extraordinary floods, it cannot be ſaid to be out of danger in leſs than three years. Of courſe, in contracts for theſe works, in theſe caſes they ſhould be upheld for that time, and then delivered up in the ſtate fixed upon in the agreement.

There are ſtill other caſes of rivers in lowland ſituations, where the currents of them are generally ſluggiſh, and their beds deep ſunk and narrow, with few ſhoals or firm baſes on which to found piers or bulwarks, and few ſtones with which to raiſe them; and even if erected, the ſluggiſhneſs of the current may render them ineffective. In theſe caſes the banks are ſteep, and often of the tendereſt earths, liable to the ſlighteſt attacks of agitated water, eſpecially near their feet, where they are naked of vegetable covering. Hence, it is from the frettings of the minor floods, or the waves of the dead water which occupies the channel of a river of this deſcription, that its banks are worn away; eſpecially at a bend which faces a length of reach, in which the waves have room to riſe. Theſe fretting againſt the foot of the bank undermine it. The face of the bank, in conſequence, ſhoots down; and the proſtrated ſoil is diſperſed by the next flood. It is conſequently obſerved, that the moſt eſſential work, in a caſe of this kind, is to guard the foot of the bank up to the level, and ſomewhat above the level of low water. And, this done, to ſlope back, ſmoothly, the upper part of the bank, to enable it the better to ſupport a vegetable covering, and withſtand the attacks of higher floods, as well as to render it leſs dangerous to paſturing ſtock, and enlarge their field of paſturage. And that when, with the increaſe of capacity, the channel is ſtill unable to contain the waters of great floods, lines of embankment may be raiſed on either ſide of it, with the ſoil removed in forming the ſlopes; and thus reſtrain them within due bounds. Likewiſe in particular parts, as at ſharp bends, when ordinary ſward, or paſturable turf, is not able to prevent the current, in this trying ſituation, from breaking up the ſoil, it ſhould be bound more ſecurely together by ſtronger rooted plants; of which the oſier is ſaid to be profitable to be planted upon the top of a rich river-bank; but it is altogether unfit to occupy its face for the purpoſe here required, though commonly uſed; as it tends to counteract one of the intentions propoſed in ſloping back the face of the bank; by filling up the ſpace thereby prepared for the waters of high floods to ſpread in; and thus increaſes the current at the foot of the bank. A much more eligible and effectual guard preſents itſelf, Mr. Marſhall ſays, in the furze, whoſe roots not only form a mat of ſtrong fibres in the ſoil, but bind it down to the ſubſtratum in a ſingular manner. Yet even the furze, if ſuffered to run up to its greateſt height, may fruſtrate the intention of propagating it. It ought, therefore, to be cut down from time to time as fuel; or to be kept cloſe mown, ſo as to form an invulnerable ſhield to the face of the ſlope. But it is obſerved that if we examine into nature's practice in guarding the ſoil of river-banks, we ſhall find it carried on with the beſt effect by the butter bur (*tuſſilago petaſites*).

But in theſe caſes of ſecuring the banks of rivers, Dr. Anderſon has long ſince given more full and ample directions. He remarks, that when a river runs in a bed of rich vegetable mould, the leaſt accident that may chance to direct the ſtream towards any particular part of the bank, cauſes it to ſweep away large tracts of fine ground, to the very great detriment of the proprietor, as well as the public; as this fine mould is uſually carried to the ſea, and the materials that the water leaves, to occupy the new bed that it thus forms for itſelf, is generally of a much worſe quality, conſiſting chiefly of ſtones, ſand, and gravel. And that where the whole force of the current is quite cloſe to the bank, and the materials neceſſary for fencing it are not to be there found, it may perhaps be impoſſible, or very difficult, totally to prevent this evil: but, for the moſt part, it admits of a cure, that can be obtained at a pretty moderate expence. For if you carefully obſerve the banks of rivers, you will readily remark that theſe ravages are always moſt conſiderable at thoſe places where the banks riſe perpendicularly to a pretty conſiderable height above the ordinary ſurface of the water, and never at thoſe places where the banks ſhelve down gradually towards the water's edge: for when the river is ſwelled to a great height by rains, and runs with a greater force and rapidity than uſual, it ſtrikes violently againſt theſe perpendicular banks that directly oppoſe its courſe; and as they are compoſed of earth, quite bare and uncovered, they are eaſily ſoftened by the water, and quickly waſhed away; ſo that the upper part of the bank, being thus undermined, falls by its own weight into the river, and is carried off in prodigious quantities. But when the river riſes to any conſiderable height, it generally glides along the ſurface of thoſe parts of the bank which ſhelve gradually downwards to the water's edge, which being defended by the matted roots of the graſs, with which it is covered, ſcarcely ſuſtains any damage at all, and is nearly the ſame after the water has retired within its banks, as before the inundation took place. He thinks that theſe are facts, which no one, who has beſtowed the leaſt attention to this ſubject, can fail to have obſerved; and that they clearly

clearly point out, that the firſt and moſt neceſſary ſtep towards a cure is to level down the edge of the bank that is next the water, ſo as to make it ſlope gradually down towards the river. And that where the bank is very high, and you have no other particular uſe for the earth that muſt be taken from it, the eaſieſt method of diſpoſing of it will be to throw it into the river. But in whatever manner you diſpoſe of the earth, the ſlope of the bank muſt be continued until the inner edge of it is as low as the ſurface of the water, at the drieſt time of the year, and be made to aſcend gradually upward from the water with an eaſy ſlope, till it comes to the level of the ground, or at leaſt riſes to ſuch a height as the water never exceeds. And the work ought to be performed as early in the ſummer as poſſible; and the ſlope ſhould be either immediately covered with turf, pared from the ſurface of ſome field that has a very ſtrong ſward upon it, taking care to lay their ends in ſuch a manner as to be in as little danger as poſſible of being waſhed away by any accidental flood that might happen, before they are grown together; or, if turf of this kind cannot be had, it ſhould be ſown very thick with the ſeeds of ſome ſmall mat-rooted graſs, that ſhould be kept in readineſs for that purpoſe, ſuch as the creeping meadow-graſs. If the ſtream has not been extremely rapid at the foot of the bank, ſome of the earth that was thrown into the water will be allowed to ſubſide to the bottom, and will there form a bed of looſe ſoft earth, which will be of very great uſe afterward in preventing the face of the bank under water from being waſhed away. But in order to ſecure this bulwark effectually for the future, the ſurface of this ſoft earth ought to be inſtantly ſtuck full of the roots of bog-reeds, flags, water-ſpiderwort, ruſhes, and other mat-rooted aquatic plants; which, if allowed to remain till they have once ſtruck root, will afterward form a barrier that nothing will ever be able to deſtroy. It is added, however, that if the ſtream be too rapid to admit of this, and the bank of ſoft earth much deeper than the ſurface of the water, it will be of great uſe to fill up the breaſt of the bank with ſmall looſe ſtones, with a little earth intermixed among them, careleſsly thrown in till they riſe near the ſurface of the water, which would moſt effectually ſecure it againſt any future encroachments, if the bank is ſloped away above. It is further ſtated, that in caſe it ſhould ſo happen that ſtones cannot be eaſily got for this purpoſe, the only recourſe is to dig the bank ſo low, as that at the undermoſt edge it may be always below the ſurface of the water, and carry it out in this way for a conſiderable diſtance; and then ſtick the whole ſurface, that is below the water, full of mat-rooted aquatic plants, ſtrewing it over, if poſſible, with a thin bed of ſmall gravel or ſand, as convenient, which will in a great meaſure, if not entirely, defend it from future encroachments. And this bank ought to continue to ſhelve downwards, even where it is below water; and thoſe aquatics that will grow in the greateſt depth of water be planted on the innermoſt bank, and the others behind them. The water-ſpiderwort will grow in four feet depth of water; and the roots of the common yellow-flowered water iris forms ſuch a ſtrong and compact covering, upon the ſurface of the ſoil on which it grows, as would defend that ſoil from being affected by the water almoſt as well as if it were a rock. It is likewiſe an advantage attending this plant, that it grows upon a firm bottom, and chiefly delights in running water. But where the ſtratum of ſoft earth is not ſo deep as to reach to the ſurface of the water, and lies upon a ſtratum of rock or hard gravel, there will be no occaſion for throwing in ſtones of any kind. But as it is difficult to unite the vegetable mould to any of theſe ſtrata, there will always be ſome danger of its ſeparating from them, in violent inundations; and if the water once gets an entry, the breach will not fail to grow larger and larger by every inundation. To prevent this inconvenience, it will be neceſſary, after you have ſloped the earth away till you reach the gravel or rock, to cover the place where the edge of the earth joins the inferior ſtratum with a good many ſmall ſtones, if they can be found, ſowing between them the ſeeds of any kind of plants that you think are moſt likely to thrive, which have ſtrong matted roots, with as ſmall and flexible tops as poſſible. But where the object is of great importance, it will be ſtill more effectually ſecured, if the face of the rock be dug entirely away for ſome diſtance backward, and the place which that rock originally occupied be then filled up with earth, and ſloped back in the ſame manner as if it had been an earthen bank, in which no rock was to be found. In all operations of this ſort, great care ſhould be taken that no ſtones ſhould be mixed with the mould; for every thing that makes an inequality on the ſurface, or a difference in the firmneſs of particular parts, is extremely pernicious. It is evident, that from the impoſſibility of ever making earth adhere firmly to ſtone of any kind, it muſt always be an improper practice to face the banks of a river to a certain height with ſtone, which is capped at top with earth; as it muſt always be liable to be removed. This method has been ſince found to anſwer perfectly in actual trials in ſuch caſes.

There is, the ſame author obſerves, another miſchief produced by the ſwelling of rivers, from the water overflowing the rich flat ground, that is frequently met with on the ſides of them, which ſometimes prevents them from being got laboured at the proper ſeaſon, ſometimes ſweeps off at once the whole crop, and ſometimes deſtroys it by covering the whole ſurface with ſtones and gravel, to the unſpeakable detriment of the poſſeſſors of ſuch ground. And as theſe lands, ſometimes termed *haughs*, are generally very rich and fertile, and ſometimes of great extent, the damage that is done by not getting them properly cultivated is very conſiderable. In reſpect to the mode of removing this ſort of inconvenience, it is remarked that theſe haughs are ſeldom of great extent, excepting on level tracks, where the water runs with no impetuous current; and, therefore, they may in general be preſerved by means of a ſloping bank, raiſed all along the ſide of the river, as far as the haugh extends, which, if formed by the ſame plan as thoſe deſcribed above, will eaſily confine the water within their boundaries, till it riſes ſo high as to overflow the top of the bank; ſo that if theſe are raiſed to a ſufficient height towards the back part, in ſuch a manner as to be capable of containing the whole of the water that at any time flows down the river, the fields on each ſide will be effectually ſecured. And that where the ſurface of the ground in the haugh is at any conſiderable height above the water in the river, the bank may perhaps be raiſed to the neceſſary height, by throwing the earth that is taken from the brink of the river to the other ſide of the bank, ſo as to form the new ſurface of the bank on that direction, inſtead of the old ſurface. But if the ſurface of the ground is level on the oppoſite ſide of the river, the earth that is taken from the triangle in the whole will not, in that caſe, be ſufficient to fill up the whole of the other triangle, and raiſe the bank to a proper height; to make up which deficiency, it will be neceſſary to dig a ditch at the back of the bank, throwing the earth into the higher part of the bank, and facing up the line with ſtones or turf, ſo as to make it become a fence to one ſide of the field that it preſerves from inundations. However, where the ſurface of the ground is extremely low, ſo as to be but little above the level of the water, then, inftead of raifing the bank on each fide to the proper height, it will be more advifeable to raife them only to the height of a particular line; as, in that cafe, it would be very difficult to find as much earth as would form both the banks, although there will be no difficulty in forming the fmaller one; and as the areas of the two are equal, thefe lower banks will contain an equal quantity of water within them, as the higher ones would have done; the greater width between them making up for their want of height. And it is conceived, that in this way it will be in the power of any man fo to proportion his banks to the circumftances in which he finds himfelf placed, as in the eafieft manner to accomplifh his defign: for if he has plenty of materials at hand, he may rear his banks to a greater height, and confine the river to a narrower courfe; and if he finds a deficiency in that refpect, he may make them of a fmaller height, and allow the river to fpread to a greater breadth. It is added, in concluding this account, that this method has been found to anfwer very well in actual practice; but that, in fome cafes, it was found that while the bank was new raifed, and before the furface was grown together, fome parts of that furface were broke a little, when the water rofe to a great height. In this cafe, the bank confifted entirely of loofe fand, which is the worft material it could be formed of; but this was eafily repaired, at a very fmall expence, when the water fubfided. If thefe fmall breaches, however, had been neglected, there is no doubt but the whole would quickly have been deftroyed. It was found that a few fmall ftones, laid upon the furface of the fward, near the edge of the water, proved in this cafe a very ufeful addition. In cafes where the fward is firm, this caution would have been unneceffary. Whoever attempts this mode of fencing, fhould take care to provide themfelves with a fufficient quantity of the feed of the plant, ufually called *fprots* in Scotland, to fow near the edges of the water; for thefe other kinds of graffes are fhelled, and without this precaution, the furface remains bare, and is therefore liable to be wafhed away with the water, during the time of floods.

There are other cafes in which attention is fometimes neceffary to rivers, which are in thofe of the vale kinds, which run in very ferpentine or crooked directions. In thefe cafes it is fometimes proper to ftraighten them, though it is but in few inftances, Mr. Marfhall thinks, that this can be done with propriety and advantage, in refpect to profit. And though the principles and management are the fame in the execution, there is much difference from the want of fuitable materials, &c.

The inftances in which the courfes of rivers that have their beds greatly funk below the general level of the furface of the lands, as five or fix yards, may be ftraightened in a profitable manner, are, it is obferved, where two reaches, or ftraight parts, run in a line with each other; but are feparated by a narrow neck of an extenfive tract.

In this cafe nothing more is required than that the earth which is taken out of the new cut, fhould be thrown into the ends of the old bed, by which the ftream, both at low water and in time of flood muft poffefs a ftraight unimpeded courfe. And by this means the proprietor on this fide not only obtains an acquifition of ground in the old river bed for different purpofes, but on his own fide of the river gains a length of ftraight ground for the plough or fcythe. But at the time this proprietor is thus benefited, the property on the other fide may be injured; as by fhortening the length, and that of ftraightening the direction of the river, the force of its ftream or current at the upper bend may be confiderably increafed, and the land there greatly endangered. Hence Mr. Marfhall thinks, that this obvious alteration fhould not be undertaken, except under the fanction of a commiffion of drainage, or till the proprietor below be indemnified for the injury that may be fuftained. It is fuggefted, that in the above inftance, half of the bed of the old river might be a fufficient indemnification. There is, however, a great variety of fmall ftreams and rivulets in the bottoms of fteep declivities, that have fuch winding and ferpentine courfes, that they might be ftraightened with not only profit, but vaft advantages to the lands on the different fides. In many fituations it is difgraceful to fee the deftruction and injury that is caufed by thefe little winding ftreams in the time of floods, and when they are in high water.

The proper protection and management of river-banks is unqueftionably a work of great intereft and importance in many inftances; as they are very liable to be extenfively deftroyed by the ftreams, and much lofs of valuable land to be thereby produced, as well as to be the caufe of frequent difputes and litigations between neighbouring landholders. Rivers for the moft part form the moft tedious, troublefome, and indifferent boundaries of any betwixt landed properties.

The fubject of guarding and fecuring their banks has hitherto been but little underftood, either in theory or practice, though it obvioufly requires equal, if not more attention, than any other rural practice, as being very ferious in its confequences, both as to the mifchiefs, and the ineffectual, though expenfive, modes of preventing them. The practical directions that have been given above fhould therefore be well confidered, as they may fave much labour and expence, when well applied; as well as prevent a variety of difputes, and the frequent lofs of much ufeful land. Plans of the methods of accomplifhing the work in different cafes, may be feen in the fecond volume of the Farmer's Dictionary.

Before undertakings of this nature are begun, proper plans and eftimates of expence and profits fhould conftantly, as has been feen, be prepared, and contracts, where poffible, entered into for their execution with perfons of experience, always binding them to uphold the works for a certain number of years afterwards; as by thefe means much money, timber, labour, and unneceffary trouble, will be faved, which would otherwife be thrown away, and the works be improperly managed. Befides, the means will be properly proportioned to the ends which are defigned, in all cafes. The intereft of oppofite proprietors will likewife often be fhewn to be one and the fame, which will greatly promote fuch works in different inftances. See EMBANKMENT.

RIVER *Guards*, terms applied to fuch piers, mounds, or other folid embankments, as are carried out for the purpofe of altering, directing, or confining, the courfes of rivers. They are diftinguifhed into common, and what are termed *dwarf* guards; the former being thofe employed for large rivers, and the latter, fuch as are made ufe of where the force of the currents are lefs violent and lefs heavy.

With regard to the fubftances that are moft commonly made ufe of in this intention, they are all forts of hard weighty materials, fuch as rough coarfe ftones of different kinds, large pebbles, heavy pieces of timber fecured by piles firmly driven into the ground, and fupported behind by coarfe gravel ftones, or other fimilar materials, the roots of trees with the earth about them, pofts firmly driven in with planks nailed to them, and well banked with ftrong fubftances, piles driven in and wattled with fods, being well banked with the fame fubftances. Befides thefe, various other materials are prefented to the attention of the workmen in different situations and circumstances where these sorts of guards are wanting.

River *Guide*, a strong work of the pier kind, carried out on them for the purpose of disposing their streams to take more suitable directions or courses for preventing their mischievous effects on the banks or lands on their sides. See River-*Banks, Securing*.

River *Weeds*, in *Farming*, are such sorts of plants as grow on the sides, and other parts, of rivers. When collected in large quantities, they are highly valuable for the purpose of manure. And in compost with other substances they have been found of much utility in the practice of several writers in the Transactions of the Bath society. And Mr. Crowe, of Lakenham, in Norfolk, according to Mr. Young's agricultural survey of that district, manures four acres annually for turnips, with the weeds of a river that runs by his farm; the plants are chiefly the philandrium aquaticum, and sium nodiflorum, the water hemlock and water parsnip. It is stated that he lays twenty loads of thirty bushels *per* acre, and ploughs in directly; which are as good on sand and mixed loam as the best dung; but not equal on stiff soils; and it is added, that Mr. Bloomfield, of Billingfold, has been in the habit of manuring his turnip lands with weeds fresh from the river, and ploughed in quickly; they have answered as well as yard muck.

But where these sorts of materials are made use of for the purpose of manure, the plants should be removed while in their most succulent green state, and be turned into the soil as quickly as possible afterwards. In the making of them up into composts, a great loss is probably sustained in the extrication and dissipation of the more fluid parts. And it is obvious, that as manure they must be the most useful when applied to the light friable descriptions of soils, as in these they run more rapidly into a state of putrefaction. It is probable they cannot be used with advantage on the stiff heavy soils in their green state. See Manure and Weeds.

River, *Fordable*, in *Military Language*, a river which may be passed without the assistance of any floating machines. In order to found the ford, and to ascertain the state of it, men on horseback are first ordered to cross. By that means you will be able to know whether any obstacles have been thrown in the way by the enemy; for nothing is more easily effected. The passage of a ford may be rendered impracticable by throwing whole trees in, by tables or platforms covered with nails, and by stakes. The two latter impediments are the most dangerous. But stakes are not easily fixed, and are consequently seldom used. When fords are embarrassed by them, it requires some time and trouble to clear the river; and it is equally difficult to get rid of the inconvenience that arises when wells have been sunk. Whenever there is reason to apprehend such obstacles, it is always best to reach the ford at dusk.

When the prince of Condé, in 1567, resolved to cross the river Seine, the Royalists, who were on the opposite side, endeavoured to prevent his passage by throwing quantities of madriers or thick planks that were nailed together, iron hoops and water-cats into the ford. The Huguenots or Protestants, however, were not diverted from their purpose. Aubigné, a French writer, says, that on that occasion they placed 400 arquebusiers upon the bank to protect the men that raked the ford.

This was certainly a singular method which was used to clear a ford, nor could it be done without much difficulty, and no inconsiderable share of danger. The chevalier Folard has proposed a much safer, and a much easier way, by means of grappling hooks, tied to long ropes, which might be thrown into the ford. Yet even in this case, observes the writer, the object could not be accomplished if the river were broad, unless the persons employed in the undertaking be under the cover of so heavy a discharge of ordnance and musquetry, that the enemy would not be able to interrupt them, even from an intrenched position on the opposite bank.

With respect to caltrops, the removal of them, when properly distributed at the bottom of a ford, must be attended with great difficulty; for they must render the passage absolutely impracticable, unless they were to sink very deep into the mud and sand, and thus become useless. The men that first enter are in this case the only persons incommoded, but the rest may follow without much hazard.

It sometimes happens, that the bottom of a stream or rivulet is firm and gravelly; when this occurs, the greatest precautions must be taken to escape the effects of caltrops, which would be extremely hurtful to any persons that might attempt to cross. In order to obviate their mischievous consequences, and to render them in a manner useless, a good stock of hurdles must be provided. The soldiers will hand these to one another, force them into the water, and then cover them with stones.

When one or two fords in a river are so situated, that several battalions cannot cross them upon one front, it is then highly prudent to throw a bridge over, either above or below the ford; for a swell may intervene and render it otherwise impassable; add to which, you have the advantage of getting a greater number of troops over at once.

In order to effect a passage for his army over the river Segre, Cæsar gave directions that ditches, thirty feet broad, should be dug in such parts of the banks as might, with ease, receive the water out of the stream, and render it fordable. Having accomplished this object, he found no difficulty in reaching Petréius, who, being in the daily fear of wanting provisions and forage for his men, was on the eve of quitting his position and marching forwards.

The passage of the Granicus by Alexander the Great, is likewise mentioned in history, as an instance of bold enterprise. But however celebrated that act may be in ancient records, we shall not be thought partial to the moderns when we state, that the passage of the river Holowitz by Ch. XII. of Sweden, was equally bold and well managed.

The passage of the Teglimenti by Bonaparte during his campaign in Italy, is the most celebrated of the present day.

River *Bay*, in *Geography*, a bay on the N.E. coast of Barbadoes; two miles N.W. of Cuckold's Point.

River's *Canal*, an inlet on the N.W. coast of North America, discovered by Capt. Vancouver in the year 1792. This canal extends from S. to N. about 16 miles, and terminates in N. lat. 51° 42′. E. long. 232° 22′.

River *of the West*, a river of North America, which runs into the Pacific ocean, N. lat. 43° 18′. W. long. 122° 30′.

River *Horse*, in *Zoology*. See Hippopotamus.

River *Navigations*, in *Hydrology*, denote those which are wholly or in a great part restricted to the ancient channel or bed of a river. See Canal.

River, *New*. See Canal and Company.

RIVERHEAD, in *Geography*, a township of New York, in Suffolk county, Long island; it was taken from the township of Southold, incorporated in 1792, and contains 1501 inhabitants.

RIVERIUS, Lazarus, in *Biography*, a distinguished physician of the 17th century, was born at Montpellier in the year 1589. He studied in his native university, but was very slow in his attainments, insomuch that he failed in his first

first examinations for his degree. This failure, however, occasioned him to redouble his exertions, and he gave sufficient proofs of his acquirements in the following spring, 1611, when he was admitted to the degree of doctor. His attachment to study became very great; and in 1622 he was appointed to the professorship of medicine in the university, an office which he continued to fill with great honour during the remainder of his life. He died in the year 1655. Riverius published "The Institutes of Medicine," in five books, in Latin, of which there are many editions, and which must be deemed a very respectable work for the time. But his principal work, and that which has gained him considerable reputation, is a course of medicine, entitled "Praxis Medica." The first publication of this work consisted of a mere practical treatise, without any pathological discussion, as a sort of text-book, used in his lectures. But finding that many editions of it were printed in France and Holland, he enlarged and improved it, and it was printed in this state at Paris in 1640, and a great number of editions have subsequently appeared, as well as translations into French and English. It treats of most of the diseases to which the body is subject, in seventeen books, in a clear style; but in many places he appears to have borrowed copiously from Sennertus. He published also a work, entitled "Observationes Medicæ et Curationes insignes," which has been frequently reprinted, and is not now without its value. These works have been collected, and published together, under the title of "Opera Medica Universa." Eloy observes, that a friar, Bernardin Christin, who had been a pupil of Riverius, compiled some secrets of chemistry, which he published with the name of Riverius; and although it has been clearly proved that he was not the author of these papers, yet they have been frequently printed, in the collections of his works, and separately, under the title of "Arcana Riverii." Eloy Dict. Hist. de la Med.

RIVERS, Cape, in *Geography*, the N.W. point of the island of Celebes. N. lat. 1° 25'. E. long. 120° 30'.

RIVES, a town of France, in the department of the Isere, and chief place of a canton, in the district of St. Marcellin; 14 miles N.W. of Grenoble. The place contains 1530, and the canton 12,019 inhabitants, on a territory of 115 kiliometres, in 12 communes.

RIVESALTES, a town of France, in the department of the Eastern Pyrenées, and chief place of a canton, in the district of Perpignan; six miles N.N.W. of Perpignan. The place contains 1986, and the canton 10,036 inhabitants, on a territory of 422½ kiliometres, in 14 communes.

RIVET de la Grange, Anthony, in *Biography*, a French Benedictine monk, was born at Confolens, a small town belonging to the diocese of Poictiers, in the year 1683. Afterwards he was sent to study philosophy under the Jacobins, or Dominican monks at Poictiers, where he gave the greatest satisfaction by his application and proficiency. At the age of 21, he became a noviciate in the abbey of Marmoutier, and took the vows in the year 1705. After completing his courses of philosophy and divinity, he was transferred to the abbey of St. Florence, at Saumur, where his order was establishing a kind of academy, consisting of such members as were most distinguished by their talents and literature, for the purpose of studying the scriptures in their original languages, the councils, the fathers, and the historians of the church, without being shackled by the trammels of the schools. He undertook to write "A Literary History of France," the plan of which he had already conceived. However, before he became wholly occupied on this work, he gave to the public, through the medium of the Dutch press, another favourite production, entitled "The Necrology of Port-Royal in the Fields, &c. containing historical Eulogies; with the Epitaphs of the Founders and Benefactors of that Monastery, &c." 1723, 4to., preceded by an historical preface. In the year 1733 he published the first volume of his work under the title of "The Literary History of France; treating of the Origin and Progress, of the Decline and the Revival, of Learning among the Gauls and among the French; of their respective Taste and Genius for Literature in each Age; of their ancient Schools, and the Establishment of Universities in France; of the principal Colleges; of the Academies of Sciences and Belles-Lettres, &c." in 4to. This was followed, at different periods, by other volumes, till the author had printed the ninth, which includes the first years of the twelfth century, when he died, towards the beginning of 1749, in the 66th year of his age. This work was afterwards extended to twelve volumes. It has been compared, and not undeservedly, with the "Memoirs" of the learned Tillemont, for accuracy of citation, and depth of research, and it will be found to furnish the reader with much interesting matter, not only on the subjects mentioned in the title, but also relating to the lives of the learned men who flourished in the ages of which it treats.

Rivet, in the *Manege*, is the extremity of the nail that rests or leans upon the horn when you shoe a horse.

Rivets, in *Agriculture*, a term sometimes applied to a sort of bearded wheat. See Wheat.

In Essex, throughout all the district of the Roodings, this sort of wheat is found very general, and to yield much better crops on these heavy lands, than any common sort; but on the more light soils the Kentish red is superior.

RIVIERA, or Palese, in *Geography*, a town of Italy; five miles N. of Bellinzona.

Riviera *di Levante*, a name given to that part of Genoa which extends from the city of Genoa, included in it, to Etruria.

Riviera *di Ponente*, that part of the Genoese territory which extends westward from the city of Genoa to France.

Riviera, *La*, a town of France, in the department of the Doubs; 10 miles S. of Ornans.

RIVIERE, Grande. See Grand *River*.

Riviere *Pelote*, a town on the S. coast of the island of Martinico.

Riviere *Salée*, a town on the S. coast of the island of Martinico.

Riviere *Mahaut*, *La*, a town of the island of Guadaloupe, situated in a bay to which it gives name. N. lat. 16° 27'. W. long. 61° 46'.

Riviere *de Theyrargues*, a town of France, in the department of the Gard; 14 miles N.N.W. of Uzés.

Riviere *de Thibouville*, a town of France, in the department of the Eure, 18 miles N.W. of Eure.

RIVINA, in *Botany*, was so named by Plumier, in honour of the great German systematic botanist; see Rivinus. Linnæus at first called the genus *Rivinia*, which would have been more correct, but he did not persist in the amendment, nor has it prevailed.—Linn. Gen. 63. Schreb. 87. Willd. Sp. Pl. v. 1. 694. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 273. Juss. 84. Plum. Gen. 47. t. 39. Lamarck Illustr. t. 81. Gærtn. t. 77.—Class and order, *Tetrandria Monogynia*. Nat. Ord. *Holeraceæ*, Linn. *Atriplices*, Juss. See Piercea.

Gen. Ch. *Cal.* Perianth inferior, coloured, permanent; of four obovate, obtuse leaves. *Cor.* none, except the calyx be so called. *Stam.* Filaments four or eight, shorter than the calyx, approaching each other in pairs, permanent;

nent; anthers ſmall. *Piſt.* Germen ſuperior, large, roundiſh; ſtyle very ſhort: ſtigma ſimple, obtuſe. *Peric.* Berry globoſe, ſtanding on the reflexed calyx, (which is hardened and become green,) of one cell, and crowned with a little incurved point. *Seed* ſolitary, roundiſh, lenticular, rough.

Eſſ. Ch. Calyx coloured, in four deep ſegments, permanent. Corolla none. Berry with one lenticular ſeed.

Obſ. The error of Linnæus in ſubſequently terming *corolla*, what he had, with indubitable propriety, called *calyx*, is difficult to be accounted for. He is followed by Willdenow, who has miſled Dryander and Aiton. The natural order of the plant, as ſettled by Linnæus himſelf, determines the queſtion without appeal.

1. R. *humilis*. Downy Rivina, Linn. Sp. Pl. 177. Willd. n. 1. Ait. n. 1. (Amaranthus baccifer, circææ foliis; Comm. Hort. v. 1. 127. t. 66.)—Stamens four. Leaves downy.—Native of the Weſt Indies. Common in our ſtoves for above a century paſt, flowering at moſt parts of the year, and always decorated with drooping cluſters of little berries, of a peculiarly bright ſcarlet, which make the chief beauty of the plant. The *ſtem* is buſhy, ſhrubby, three or four feet high. *Leaves* alternate, ſtalked, ovate, acute, entire, thin, flaccid, light green, downy, about three inches long. *Cluſters* from the forks of the branches, ſolitary, downy, of many ſmall, greeniſh-white, drooping *flowers*.

2. R. *lævis*. Smooth Rivina. Linn. Mant. 41. Willd. n. 2. Ait. n. 2.—Stamens four. Leaves ovate, pointed, even, ſmooth. Stem round.—Native of the Weſt Indies. Flowers in the ſtove, moſt part of the year. Cultivated by Miller in 1733. *Aiton.* Like the foregoing, but ſmooth. Margins of the *leaves* purpliſh. *Flowers* reddiſh at the outſide.

3. R. *braſilienſis*. Wave-leaved Rivina. Nocca in Uſteri Annal. faſc. 6. 63. Willd. n. 3. Ait. n. 3.—"Stamens four. Leaves ovate, undulated and rugged. Stem furrowed."—Native of Brazil. Introduced at Kew by ſir Joſeph Banks, in 1790. It bloſſoms in the ſtove in June and July. *Stem* ſhrubby. *Leaves* ovate, or heart-ſhaped, wavy, ſmooth. *Flowers* white or reddiſh. *Berry* round, of a ſhining red.

4. R. *octandra*. Climbing Rivina. Linn. Sp. Pl. 177. Willd. n. 4. Ait. n. 4. (R. dodecandra; Jacq. Obſ. faſc. 1. 6. t. 2. R. ſarmentoſa, &c.; Browne Jam. 149. t. 23. f. 2.)—Stamens eight or twelve. Leaves elliptic-oblong, ſmooth.—Native of the Weſt Indies. Cultivated by Miller, before 1752. It flowers in the ſtove in May and June. *Aiton.* The *ſtem* is deſcribed by Jacquin as very tall, though ſlender, throwing out long ſlender ſhoots, amongſt other ſhrubs and buſhes. *Leaves* entire, acute at each end. *Calyx* white, turning to a purpliſh-red. *Berry* dark purple, the ſize of a pea, eagerly devoured by birds. *Jacquin.*

R. *paniculata*, Linn. Syſt. Nat. ed. 10. v. 2. 899, though retained as ſuch by Murray, in Syſt. Veg. ed. 14. 165, is no other than *Salvadora perſica*, as cited in Linn. Sp. Pl. 178. This being removed from *Rivina*, the character of "ſimple cluſters" for the remaining ſpecies, being common to all, becomes ſuperfluous.

Rivina, in *Gardening*, contains plants of the ſhrubby evergreen kind, of which the ſpecies cultivated are; the downy rivina (R. humilis); the ſmooth rivina (R. lævis); and the climbing rivina (R. octandra).

Method of Culture.—All theſe plants may be increaſed by ſeeds procured from the places where they are natives, ſowing them, as ſoon as they are obtained, in pots filled with freſh light earth, plunging them in a hot-bed when in ſummer, but in the tan-bed of the ſtove, in the autumn or winter. The earth ſhould be well moiſtened during the ſummer ſeaſon, but very ſparingly in the winter. They ſhould be carefully preſerved in theſe ſituations till the ſeeds vegetate, which is often a great length of time, of courſe the pots ſhould not be diſturbed. When the plants have attained about two inches in growth, they may be removed into ſeparate ſmall pots, filled with light loamy mould, plunging them into a hot-bed, ſhading them till freſh rooted.

They afterwards require the management of other ſtove exotic plants.

They may likewiſe ſometimes be raiſed by layers and cuttings, aſſiſted by the heat of the bark hot-bed.

After theſe plants have been preſerved in the ſtove of the hot-houſe till they have attained a good growth and ſtrength, they are capable of being preſerved in moderate warmth in winter, and in the warmeſt part of ſummer in the open air, in a warm ſheltered place.

They afford variety among other potted evergreen ſtove plants.

RIVINI Foramen, in *Anatomy*, a ſuppoſed opening in the membrana tympani of the ear. See Ear.

RIVINUS, Augustus Quirinus, in *Biography*, an eminent phyſician, but much better known as a botaniſt, formed, with Ray and Tournefort, the triumvirate of ſyſtematical teachers, who, in the latter part of the 17th century, and the beginning of the 18th, divided the homage of the ſtudents of botany between them. Their importance aroſe from the neceſſity, which nobody could overlook, of a methodical arrangement of plants; but even the memory of their labours has now almoſt paſſed away, becauſe thoſe labours proved, all nearly alike, inſufficient for the deſired purpoſe. The ſervices they have rendered to practical ſcience ſtill indeed remain; and the laurels which ſpring from that ſoil are unfading. Of theſe Rivinus may claim a ſhare, though by no means an equal portion, with his Engliſh, or his French, contemporary. He endeavoured in vain to bring his German ſquadrons, with any great force, into the botanical field; while the pupils of Ray, as well as of Tournefort, poured forth in abundance; and by their own proficiency diſplayed the merits of their reſpective leaders.

Rivinus was the ſon of a learned phyſician and critic, Andrew Bachmann, whoſe name, according to the faſhion of the time amongſt literary people, being tranſlated into Latin, became *Rivinus*. The ſubject of our memoir was born at Leipſic in 1652. He graduated at the age of twenty-four, and fifteen years afterwards obtained the profeſſorſhips of Phyſiology and of Botany in his native univerſity. He became a foreign member of the Royal Society of London, and was aſſociated with many other learned bodies, filling his different appointments with honour to himſelf, till his death in 1723, at the age of ſeventy-one. His publications ſhew him in the light of an elegant ſcholar and a gentleman; and if he betrayed a little impatience in his controverſies with Ray, and ſomewhat of diſdainful ſeverity towards Dillenius, who, when a young man, had attacked him; the latter fault, at leaſt, may be pardoned, in one who had attained ſo conſiderable a rank in ſcience, and who perhaps had ſagacity enough to feel that Dillenius had no ſyſtematical talents at all commenſurate with his own. Having propoſed to himſelf three great objects; a commodious claſſification of plants; a compendious nomenclature; and an univerſal delineation of ſpecies, as far as they came under his own obſervation, he might perhaps not be very patient of contradiction from thoſe whom he thought more able to hinder than to aſſiſt him. The ſame apology may be made for many philoſophers, who unjuſtly incur the charge of petulance, or of pride.

The

The botanical fyftem of Rivinus is founded on the moft elegant and attractive, if not the moft folid and important, parts of plants. His claffes are marked by the number, the regularity, or irregularity, of the petals. He could not proceed far in this path without perceiving that he made moft unnatural, and, as Haller juftly terms them, paradoxical, combinations. He therefore afferted, and doubtlefs believed, the inutility and impracticability of a really natural claffification. This principle brought him to one right conclufion, which even the philofophical Ray did not attain, or was afraid to admit, that the old primary diftribution of vegetables into trees, fhrubs, and herbs, is unfcientific and erroneous.

Rivinus publifhed, at his own expence, in 1690, his fplendid illuftration of the firft clafs of his fyftem, comprifing fuch plants as have a monopetalous irregular flower. Thefe are the ringent flowers of Linnæus, accompanied by the *Scitamineæ*, and even by *Arum*. This part confifts of one hundred and twenty-five plates; but though each plate often contains more than one plant, the intelligent reader will perceive how imperfect the catalogue of fpecies muft be. A learned *Introductio generalis in rem herbariam* is prefixed; and this introductory part was, at different times, republifhed in a fmaller form. The fecond part of the fumptuous work of which we are fpeaking, came forth in 1691. This confifts of one hundred and twenty-one plates, of plants with four irregular petals; into which clafs, by means of fome contrivance, and many grains of allowance, are admitted all the papilionaceous tribe, the cruciform genus *Iberis*, the *Euphorbia*, and a few things befides. The genus laft named is referred rather arbitrarily to this clafs, merely becaufe its ftalked pendulous germen muft be turned to one fide, and therefore, in the author's opinion, the flower is rendered irregular. In 1699 the third part, containing flowers with five irregular petals, was given to the world. Even more liberty is taken in the affemblage of genera here than in the former clafs. The natural order of *umbelliferæ* is admitted entire; very juftly indeed as to practical or philofophical propriety; but with great laxity of artificial principle, many of the plants having regular or equal petals. Next to thefe follow *Tropæolum;* the irregular *Gerania* (which now conftitute the genera of *Pelargonium* and *Erodium*); fome leguminous plants not papilionaceous; *Viola; Aefculus; Delphinium; Aconitum; Dictamnus;* and the whole concludes with *Pyrola*, whofe flight and partial irregularity of flower has gained it admittance here. This third part of the work of Rivinus confifts of one hundred and thirty-nine plates. A fourth part, the *hexapetalæ irregulares*, confifting of the *Orchideæ*, was finifhed, but not publifhed, before the author's death; nor indeed have any more than a very few copies of this ever got abroad into the world, fo that it conftitutes one of the greateft bibliothecal rarities. With refpect to utility or beauty, thofe who are poffeffed of the tranfcendent engravings of this favourite tribe in Haller's Hiftory of Swifs Plants, may difpenfe with the figures of Rivinus. The author had prepared feveral fupplementary plates to his work, which never came forth, and of which perhaps the only fpecimens are to be feen in fir Jofeph Banks's fine copy of the whole work, except two duplicate plates beftowed by his bounty on the writer of this article. There is every reafon to believe that the copy in queftion belonged to the author himfelf, or to his fon, as may be gathered from its manufcript additions and corrections. A complete copy, of even the three firft parts of Rivinus's book is, indeed, difficult to be met with; for feveral of the plates having from time to time received additions of feed-veffels, or of entire plants; the earlier impreffions of fuch plates are confequently imperfect. The beft copies are required, by faftidious collectors, to have every plate with and without the additions. Haller truly remarks, that the author evidently derived his materials chiefly from garden plants, and having fyftem in view, was more folicitous to exhibit flowers than roots, or the lower part of the herbage; a great defect as to the *Orchideæ* and *Umbellatæ*. We ought, at the fame time, to recollect, that the tribes he has felected are among the moft interefting, attractive, or difficult, that could have been wifhed. His fcheme of nomenclature deferves high commendation as fuch, though it proves totally inadequate to the author's purpofe, which was to comprehend, in a fingle word accompanying the generic name, the effential character or idea of each particular fpecies.

As a medical writer, Rivinus has the merit of faithful obfervation and defcription, in his treatife *de Pefte Lipfienfi*, publifhed in 1680. He wrote alfo on Dyfpepfia, on Intermittent Fevers, and various other fubjects. He did not fcruple to attack whatever practice or opinion he found ever fo ftrongly eftablifhed on the bafis of prejudice and ignorance. In this refpect his *Cenfura Medicamentorum officinalium* ranks very high. His commendable aim, in this work, was to clear the Materia Medica of its various difgraceful incumbrances; fo many of which originated in error, impofition, or fuperftition. His attempts have been followed up by various men of ability and authority; and it is to the united labour and good fenfe of fuch, that the world is indebted for the purified and improved ftate of our modern Pharmacopeias.

Though not a great practical anatomift, or diffector, Rivinus is faid to have difcovered a new falivary duct. He left a fon, John Auguftus Rivinus, who fucceeded him as profeffor, and under whofe prefidency was publifhed a differtation, in 1723, on Medicinal Earths. This gentleman died in 1725, aged thirty-three, having furvived his father but two years. His premature death feems to have prevented the publication of the fourth part of his father's great botanical work, at leaft for fome time. Haller fays, Ludwig afterwards edited the plates of the *Orchideæ*, without any letter prefs; but this publication has never come under our infpection. Rivini Opera. Hall. Bibl. Bot. Aikin's Gen. Biogr. Dryand. Bibl. Banks.

RIVISONDOLI, in *Geography*, a town of Naples, in Abruzzo Citra; 9 miles S.E. of Sulmona.

RIULI, a town of Naples, in Calabria Citra; 16 miles N.N.E. of Caffano.

RIVOGLIOMENTO, Ital. in *Mufic*, changing the place of the parts of a compofition. It is placing the treble or other upper part in the tenor or bafe, and *vice verfâ.* This frequently happens in double counterpoint, when the treble ferves for the bafe, or the bafe for the treble; and in fuch a manner, as that the harmony, though different, fhall remain equally correct and pleafing as in the firft arrangement of the parts.

RIVOLGIMENTO, Ital. inverfion.

RIVOLI, in *Geography*, a town of France, in the department of the Po, fituated at the declivity of a hill on the road from France into Italy by the Cottian Alps, in a fertile country and climate more falubrious, as it is faid, than that of Turin. It contains three parifh churches and three monafteries. The king of Sardinia had a palace here. The inhabitants are fuppofed to be about 800; 6 miles W. of Turin.—Alfo, a town of Italy, in the Veronefe; 12 miles N.W. of Verona.

RIVOLTA, a town of Italy, in the department of the Mincio; 4 miles W. of Mantua.—Alfo, a town of of Italy, in the department of the Adda; 2 miles S. of Crema.

RIVOLTA *Secca*, a town of Italy, in the department of the Adda; 10 miles W. of Crema.

RIVOLTARE, Ital. in *Music*, to reverfe; whence

RIVOLTATO, reverfed. See ROVERSCIO.

RIVOLTELLA, in *Geography*, a town of Italy; 17 miles E. of Brefcia.

RIUT, a Ruffian fettlement on the W. coaft of America. N. lat. 65° 25′. E. long. 209° 36′.

RIVULARIA, in *Botany*, fo called by Dr. Roth from its growing generally in rivulets, is a cryptogamic genus, feparated, by that able botanift, from *Ulva* and *Conferva*: to each of which genera fome or other of its fpecies had been, by preceding writers, referred.—Roth Catal. v. 1. 212. Sims and Konig's Ann. of Bot. v. 1. 247. Smith Engl. Bot. v. 25. 1797.—Clafs and order, *Cryptogamia Algæ*. Nat. Ord. *Algæ fubmerfæ*.

Eff. Ch. Frond gelatinous, firm, deftitute of an external cuticle. Fructification among jointed filaments, lodged in the fubftance of the frond.

Roth defcribes eleven fpecies of this genus, in his Beyträge, v. 1. 239, tranflated in Ann. of Bot. above cited. He there alfo adopts a genus from Micheli, by the name of *Linckia*, whofe character is as follows. Frond gelatinous, pellucid, enclofed in a membranous pellucid integument, and ftuffed with granules of fructification, difpofed in curved beaded lines. Of this he defines four fpecies.

Of his *Rivulariæ*; *elegans*, n. 5, Engl. Bot. t. 1797, and *tuberculofa*, n. 11, Engl. Bot. t. 2366, are acknowledged natives of Britain; as are two of his *Linckiæ; pruniformis*, n. 2, which is *Ulva pruniformis* of Linnæus, and of Engl. Bot. t. 968; and *Noftoc*, n. 3, which is *Tremella Noftoc* of Linnæus, and of Engl. Bot. t. 461. The *pruniformis* juft mentioned, is in the index to Engl. Bot. referred to *Rivularia;* how juftly we dare not pofitively fay. In the fame work the following fpecies are added to thofe of Roth. Refpecting the marine ones, there may poffibly be fome difference of opinion as to their genus; but they can fcarcely be referred to any other at prefent eftablifhed.

R. *Opuntia*. Indian-fig Rivularia. Engl. Bot. t. 1868. (Fucus Opuntia; Gooden. and Woodw. Tr. of Linn. Soc. v. 3. 219. Tremella marina cæfpitofa, fegmentis tenuibus; Dill. Mufc. 50. t. 10. f. 9.)—Compreffed, branched, red, jointed; joints elliptical, confluent. Internal filaments repeatedly forked; their ultimate joints fhortened, filled with feeds.—Found on rocks, on the Britifh coaft, forming fmall, creeping, purplifh tufts, between high and low-water marks. The *fronds* are entangled, much branched, compreffed, of a fpongy texture, but not hollow, compofed of elliptical joints. Thefe, when cut tranfverfely, prove full of innumerable forked, beaded filaments, whofe joints, near the furface of the *frond*, are fhorteft, and full of red grains, prefumed to be *feeds*. We do not pretend that this fpecies anfwers well to the character of a *Rivularia*. It will probably hereafter conftitute a new genus, along with feveral more, now difperfed in *Fucus*, *Conferva* or *Ulva*, but whofe fructification and economy are not fufficiently known, for any decifive meafure to be taken concerning them. Among them perhaps is *Fucus Wigghii*, Engl. Bot. t. 1165; for we are not yet perfuaded of its being a real *Rivularia;* nor have we examined it minutely ourfelves.

R. *vermiculata*. Worm-fhaped Rivularia. Engl. Bot. t. 1818.—Cylindrical, much branched, brown; branches fcattered, fubdivided, crooked. Internal filaments compound and divaricated; their ultimate branches cluftered, beaded, thickened upwards. Fruit obovate, feffile at the bafe of the beaded branches.—Found on the coafts of Ireland and the fouth of England, in fummer. A very curious fubmarine plant, four or five inches high, olive brown, much and irregularly branched, folid, gelatinous, invefted with a pale flimy mafs, of minute, jointed, branched fibres, fome of which are darker, and beaded, and accompanied by a dark, oval, folitary *feed* at their bafe.

R. *verticillata*. Whorled Pink Rivularia. Engl. Bot. t. 2466. (Ulva verticillata; With. v. 4. 127.)—Cylindrical, much branched, very gelatinous, pale pink; branches alternate; the ultimate ones very numerous, of equal thicknefs. Internal filaments whorled, repeatedly forked. Fruit obovate, lateral.—Found on the fea beach of Ireland and Suffex, in fummer. Highly gelatinous and tender, of a delicate flefh-colour. Its generic characters nearly accord with the laft.

R. *incraffata*. Thick Green Rivularia. (Ulva incraffata; Hudf. 572. Engl. Bot. t. 967. Tremella paluftris gelatinofa, damæ cornuum facie; Dill. Mufc. 51. t. 10. f. 10.)—Compreffed, much branched, gelatinous, finuated and toothed, green; thickened at the margin. External filaments loofely tufted, forked, with pale pellucid tips.—Grows on moffes, in pools of frefh water. Whole plant gelatinous and flippery, of a grafs green. It feems very near *R. Cornu damæ* of Roth, if not the fame.

R. *tuberiformis*. Potatoe Rivularia. Engl. Bot. t. 1956.—Irregularly globofe, inflated, pale brown; white within. Seeds vertically difpofed in rows at the fummits of the filaments.—Grows on rocks and fubmarine plants, on the fouth coaft of England. When floating it looks like a group of young potatoes. Each plant is hollow, confifting of a thick tender coat. The outfide is not, as in the laft, covered with pellucid filaments, beyond the feed-bearing part.

R. *atra*. Small Black Rivularia. Roth Catal. v. 3. 340. Engl. Bot. t. 1798.—Hemifpherical, folitary, feffile, hard, black. Internal filaments ftraight, compact, branched, concentric, green; their joints cylindrical.—This is found on mud, or on wooden piles, in falt marfhes, or about the mouths of rivers; confifting of black granules the fize of muftard-feed. Thefe, when highly magnified, and cut perpendicularly, are found to confift of concentric rows, of more or lefs pale, green, denfe filaments.

R. *calcarea*. Calcareous Rivularia. Engl. Bot. t. 1799.—Hemifpherical, feffile, cluftered, hard, green. Internal filaments ftraight, compact, entangled, fimple, with fcarcely any appearance of joints.—This is found in the beds of rivers, and mountain torrents, in Ireland, Wales, &c. in maffes, either feparate, the fize of a large pea, or aggregate and confluent. Their colour a glaucous green; their fubftance firm, of fimple parallel fibres, or tubes, all conglutinated, as it were, with calcareous earth.

R. *echinulata*. Little Hedgehog Rivularia. (Conferva echinulata; Engl. Bot. t. 1378.)—Floating, glaucous, globofe, muricated with the points of its concentric, fimple, jointed, fhort filaments.—Found by the Rev. H. Davies, in a lake, in Anglefea, covering the furface in June and July, with a floating mafs of little feparate prickly globules, each the fize of a pin's head.

RIVULET, a diminutive of river.

RIXAS, in *Geography*, a mine-town of Brazil, in the government of Goyas; 80 miles N. of Villa Boa.

RIXDOLLAR, in *Commerce*, a money of account and filver coin in Holland, Germany, Denmark, and Sweden. In Holland, a rixdollar is worth $2\frac{1}{2}$ gilders, 50 ftivers, or 800 pennings. A pound Flemifh is equal to 6 gilders, or $2\frac{2}{5}$ rixdollars, and is divided into 20 fhillings, 120 ftivers, or 240 pence Flemifh, called alfo groots: hence a rixdollar is equal to 8*s*. 4*d*. Flemiſh, and a gilder = 3*s*. 4*d*. Flemiſh. A gold gilder, with which accounts are kept in the corn trade, is worth 28 ſtivers. At Copenhagen accounts are kept in rykſdalers or rixdollars of 6 marks, or 96 ſhillings Daniſh. In the duchies of Holſtein and Sleſwig accounts are kept in rixdollars of 3 marks, or 48 ſhillings Lubs, and at Elſineur on the Sound, accounts are kept in rixdollars of 4 orts, or 96 ſkillings Daniſh. The baſe rixdollar (ſletdaler), which is an imaginary coin, is reckoned at 4 marks, or 64 ſkillings Daniſh. A mark is divided into 16 ſkillings or ſhillings; and a ſkilling into 2 fyrkes, 3 wittens, or 12 pfenings Daniſh. The Daniſh denominations of marks and ſhillings bear only half the value of the ſame denominations in Lubs or Hamburgh money: thus, 2 marks Daniſh are worth 1 mark Hamburgh, &c. In ſilver, ſpecie rixdollars, which paſs for 7 marks 6 ſkillings Daniſh currency, are commonly reckoned at 6 marks 12 ſkillings crown money, at the toll on the Sound. There is alſo the new Holſtein currency, coined ſince the year 1788, conſiſting of ſpecie rixdollars, at 48 ſhillings ſpecie, or 60 ſhillings Holſtein currency; and pieces of 32, 16, 8, 4 and 2 ſhillings ſpecie, or 40, 20, 10, 5 and $2\frac{1}{2}$ ſhillings Holſtein currency. In this money, the Cologne mark of fine ſilver is coined into $9\frac{1}{4}$ rixdollars ſpecie, or $11\frac{9}{16}$ rixdollars currency.

Any perſon, whether a native or a foreigner, may open an account at the bank of Copenhagen, on paying 4 rixdollars a year for each folio, and whenever he wiſhes to have his account ſettled. Beſides, this bank charges a commiſſion of 1 *per* 1000 for all the money inſcribed or transferred in the books. Bank notes are iſſued of the value of 80, 40, 20, 8, and 4 rixdollars ſpecie; or 100, 50, 25, 10, and 5 rixdollars currency. Theſe are current through the Daniſh dominions, and they are to be paid off on demand at the bank.

By a royal edict of 1776, ſettling the rate of coinage, $9\frac{1}{2}$ rixdollars ſpecie are to contain a mark of fine ſilver; each piece weighing 537.69 eſchen, Cologne weight, or 447.9 Engliſh grains, and being 14 lods or $\frac{14}{16}$ths fine; ſo that it contains 391.9 Engliſh grains of fine ſilver. The rixdollar Daniſh currency, in current ducats or 12 markpieces, is equivalent to 28.48 German aſes, or $21\frac{1}{8}$ Engliſh grains of fine gold; and the ſame rixdollar, in ſilver currency, contains 429 aſes, or 318 grains of fine ſilver. The rixdollar in crowns may be valued at 467 aſes, or $346\frac{3}{8}$ grains of fine ſilver. Thus the proportion of gold to ſilver is as $15\frac{9}{189}$ to 1. One hundred rixdollars Hamburgh banco anſwer to $113\frac{1}{8}$ rixdollars in crowns, or $123\frac{1}{13}$ rixdollars Daniſh currency: the latter may be conſidered at par with Hamburgh currency. The rixdollar currency is = 3*s*. $8\frac{1}{2}$*d*. ſterling; and the rixdollar in crowns = 4*s*. $0\frac{1}{2}$*d*. ſterling; or a ſingle crown piece = 16*d*. ſterling; a current ducat = 7*s*. $5\frac{1}{2}$*d*. ſterling; and 1*l*. ſterling = 5 rixdollars 2 marks 6 ſkillings currency, or 4 rixdollars 5 marks 12 ſkillings crown money.

The moſt common way of keeping accounts in Germany is in rixdollars of 90 creutzers, or in guldens or florins of 60 creutzers; the rixdollar of account, or (as it is generally called) rixdollar current, is reckoned at $1\frac{1}{2}$ florin, and the rixdollar ſpecie or effective at 2 florins, or 120 creutzers. In Pruſſia, Saxony, Hanover, Brunſwick, and Luneburg, accounts are kept in rixdollars of 24 good groſchen, each good groſche being divided into 12 pfenings; or in rixdollars of 36 marien groſchen, each marien groſche being divided into 8 pfenings. At Hamburgh, Altona, Lubeck, Holſtein, and Mecklenburg, accounts are kept in marks of 16 ſhillings lubs, each ſhilling being divided into 12 pfenings; and the rixdollar reckoned at 3 marks. Each independent ſtate or city of Germany has its own coins, moſt of which may be referred to, or compared with, the following, *viz.*; in gold, the ducat, the piſtole, and the gold florin or gulden; and in ſilver, the rixdollar ſpecie, and its ſubdiviſions. The piſtoles are all reckoned at 5 rixdollars current. The gold florins, chiefly current in countries on the banks of the Rhine, paſs generally for 2 rixdollars current, and are to contain $18\frac{1}{3}$ carats of fine gold, $3\frac{2}{3}$ carats of fine ſilver, and $1\frac{5}{6}$ carat of copper: 72 gold florins are to weigh a Cologne mark. Since the eſtabliſhment of the convention in 1763, the Cologne mark of fine ſilver is valued at $13\frac{1}{3}$ rixdollars of account, or 10 rixdollars effective, or 20 florins. In ſmall payments, the Cologne mark of fine ſilver being reckoned at 16 rixdollars of account, or 24 florins, each of the coins is rated 20 *per cent.* higher than its value in convention money; the ſpecie rixdollar paſſes for $2\frac{2}{5}$ florins, the convention florin for $1\frac{1}{5}$ florin, and the copfſtuck for 24 creutzers. According to the Leipſic rate of coinage, the Cologne mark of fine ſilver was valued at 12 rixdollars of account, 9 effective rixdollars, or 18 florins; 8 ſpecie rixdollars were to weigh a Cologne mark of ſilver, 14 loths 4 grains fine: in the ſmalleſt coins, ſuch as double and ſingle marien groſchen, the mark of fine ſilver was coined at the rate of $12\frac{2}{3}$ rixdollars. Theſe coins are known by the name of "conſtitution coins:" 100 rixdollars, coined after the Liepſic rate, are worth $111\frac{1}{3}$ convention rixdollars. The fineneſs of gold is valued all over Germany by dividing the mark fine into 24 carats, and the carat into 12 grains; the fineneſs of ſilver, by dividing the mark fine into 16 loths, and the loth into 18 grains. At Hamburgh, the reichſthaller, or rixdollar, is 3 marks, 48 ſhillings, or 576 pfenings; the rixdollar of exchange is 2 marks, 32 ſhillings, or 384 pfenings. The ſilver coins of this city are rixdollars reckoned at 3 marks ſpecie, which commonly paſs for $\frac{1}{2}$ *per cent.* better than banco, or for 3 marks 12 ſhillings 5 pence Hamburgh currency. All ſorts of ſpecie rixdollars, when they are full banco weight, are reckoned at 3 marks, with about $\frac{1}{2}$ *per cent.* premium againſt banco, or at 4 marks light money, with about 33 *per cent.* diſcount below banco. But the value of a common ſpecie rixdollar, in current money, is 3 marks 12 ſhillings, and the halves and quarters in proportion.

Accounts are kept in Sweden in rikſdaler of 48 ſkilling, the ſkilling being ſubdivided into 12 runſtycken or ore. By the regulations of 1777, the ſpecie rikſdaler was to paſs for the ſame value that 6 ſilver dahler, or 18 kopper dahler, formerly did; and there were coined whole rikſdaler, and pieces of $\frac{2}{3}$ds, $\frac{1}{3}$d, $\frac{1}{6}$th, $\frac{1}{12}$th, and $\frac{1}{24}$th of a rikſdaler. According to the mint regulations, the Swediſh ſpecie rikſdaler ſhould weigh 609 Swediſh aſs, or $451\frac{2}{3}$ Engliſh grains, and contains 535 aſs, or $396\frac{1}{3}$ grains of fine ſilver; it is therefore worth 4*s*. $7\frac{1}{2}$*d*. ſterling, and the ſkilling $1\frac{1}{6}$*d*. nearly. For the value of rixdollars, current in various places, according to the mint price of ſilver in England, ſee MONEY.

The rixdollar (conſtitution) of the Auſtrian dominions has on it the head of the reigning emperor, with name and titles, thus: CAR. VI. D. G. R. I. S. A. G. HI. H. BOH. REX; that is, *Carolus ſextus, Dei gratia, Romanus imperator ſemper auguſtus, Germaniæ, Hieroſolymæ, Hungariæ, Bohemiæ rex* (Charles VI. by the grace of God, emperor of Rome, ever auguſt, king of Germany, Jeruſalem, Hungary, and Bohemia); reverſe, a two-headed eagle crowned, bearing on his breaſt the arms of Auſtria, and in his talons a ſword and ſceptre; legend, ARCHID. AUST. D. BU. M. MOR. COM. TY. (archduke of Auſtria, duke of Burgundy, marquis of Moravia, count of Tyrol), with the date; and on the edge of the piece, CONSTANTER CONTINET ORBEM, (he guides the globe ſteadily).

The

The rixdollar (convention) has the head of the reigning sovereign, with name and title, thus: M. THERESIA, D. GR. IMP. GE. HU. BO. REG. (Maria Theresa, by the grace of God, empress of Germany, queen of Hungary and Bohemia); reverse, as on the rixdollar constitution; the legend on the edge of the piece of Francis I. is, PRO DEO ET IMPERIO (for God and the empire). On that of Maria Theresa, JUSTITIA ET CLEMENTIA (justice and clemency). On that of Joseph II., VIRTUTE ET EXEMPLO (by virtue and example).

The rixdollar of Hungary has the head, name, titles, and legend, on the edge as above; reverse, the Virgin and Child, and the letters K. B.; legend, S. MARIA, MATER DEI, PATRONA HUNG. (Holy Mary, mother of God, patron of Hungary).

The florin, or half rixdollar, bears the same impressions as the rixdollar; as also the half florin.

The copfstuck, or copstick, (the 20 creutzer piece,) bears the same impressions as the rixdollar, except that there is no legend round the edge, and it is marked 20 on the reverse; the half copfstuck is marked 10.

The rixdollar of Baden has the head of the reigning prince, with name and title, thus: CAROLUS FRID. MARCHIO BAD. ET H. (Charles Frederick, marquis of Baden, &c.); reverse, arms of Baden; legend, AD NORMAM CONVENTIONIS (according to the rule of the convention); and at the bottom, the date, and X EINE F MARCK (10 pieces to a mark fine).

The thaler or rixdollar of Basil has the griffin, arms, and legend, as on the patagon; reverse, a wreath of laurels, inclosing the value, I THALER; legend, MONETA REIPUB. BASILEENSIS (money of the republic of Basil). The half piece is marked $\frac{1}{2}$ THALER; and the third is marked $\frac{1}{3}$.

The rixdollar of Bavaria has the head of the reigning prince, with name and titles, as in the gold coins; reverse, arms of Bavaria, and the date; and on other pieces, the Virgin and Child, with the legend, PATRONA BAVARIÆ (patroness of Bavaria); but the new rixdollar coined in 1800, bears the arms of Bavaria, and the legend, PRO DEO ET POPULO.

The rixdollar of Brunswick (old) has the head, name, and title of the reigning prince, as in the gold coins; reverse, the horse and legend as on the Carl d'or; but at the bottom there are X EINE FEINE MARCK CONVENTION M. (ten pieces to a mark fine, convention money).

The rixdollar of 1795 has on one side the words I SPECIES THALER, and the date; legend, X EINE FEINE MARCK, &c. as above; reverse, arms of Brunswick, with the name and title of the reigning prince.

The rixdollar of Cologne has the head of the reigning emperor of Germany, with his name and titles; reverse, arms of the city; legend, MONETA NOVA LIB. ET IMP. CIVIT. COLON.; that is, *Moneta nova liberæ et imperialis civitatis Coloniensis* (new coin of the free and imperial city of Cologne); and on some rixdollars, MON. NOVA LIB. REIPUB. COLONIENSIS (new coin of the free republic of Cologne).

In Denmark the rykSdaler (old), coined for Norway, has the head of the reigning king, with name and title, thus: FRIDERICUS V. D. G. REX DAN. NOR. V. G. or D. G. DAN. NORV. VAND. GOTH. REX (Frederick V. by the grace of God, king of Denmark, Norway, the Vandals, and the Goths); reverse, a lion and battle-axe, with 6 M. (6 marks), and the following legend in the Norwegian language, in two concentric circles, MOD TROFKAB DAPPERHED. OGH VAD DER GIVER ÆRE DEN HEELEN VERDENBAND BLANT NORSKE KLIPPER LAERE, which is thus translated: spirit, loyalty, valour, and whatever is honourable, let the whole world learn among the rocks of Norway. On the same coin, of a later date, the legend is TROE JOVE MOD OGH VAD DAN KONGENS GUNST KAND VINDE, MENS NORGE KLIPPE HAR MAN SKAL HOS NORDMAND FINDE; that is, true lion's heart and whatever can win a Danish monarch's love, whilst Norway has rocks, shall be found among Norwegians.

The rykSdaler of 1777 has the king's cypher and a crown; legend, D. G. DAN. NOR. VAND. GOTH. REX, as before; reverse, arms of Denmark; legend, GLORIA EX AMORE PATRIÆ (glory from the love of our country), and the date.

The rykSdaler of 1795 has the head, name, and titles of the reigning king; reverse, arms of Denmark; legend, I RIGSDALER SPECIE, with the date.

The rykSdaler of Holstein has the head, name, and title, as above; reverse, arms of Denmark, and I SP.; legend, 60 SCHILLING. SCHLESW. HOLST. COURANT (60 schillings Sleswig and Holstein currency), with the date. The pieces of $\frac{2}{3}$ds and $\frac{1}{3}$d are marked $\frac{2}{3}$ SP. and $\frac{1}{3}$ SP., and the number of schillings is also expressed: SP. means specie.

The rixdollar of Francfort has varied much in the impressions: most of them bear an eagle; but the reverses and legends are very different in coins of different dates; they may be easily distinguished by the word FRANCKFURT or FRANCOFURT, which is to be found on some part of the piece, as also the words AD NORMAN CONVENTIONIS (according to the rate of convention money), and X E. F. MARK, or X EINE FEINE MARK (10 to a mark of fine silver): these last words, within a circle or wreath, form the reverse of the more modern pieces; and coins of 1796 bear likewise the following German legend, AUS DEN GEFŒSEN DER KIRCHEN UND BURGER (out of the plate of the churches, and of the citizens); and on the other side, DER STADT FRANCKFURT (of the city of Francfort).

The rixdollar specie or banco of Hamburgh has on the front the arms of Hamburgh; legend, MONETA NOVA HAMBURGENSIS (new coin of Hamburgh), and at the bottom, 48 SCHIL. SPEC.; reverse, a two-headed eagle crowned, with the name of the reigning emperor of Germany, thus: JOSEPHUS II. D. G. ROM. IMP. SEMP. AUGUST. (Joseph II. emperor of Rome, ever august).

The rixdollar of Hanover has the arms of the reigning king, with his name and title; reverse, a horse running over rough ground; legend, NEC ASPERA TERRENT (neither do rough places deter him), and the date. Some rixdollars bear a figure of St. Andrew on the cross; legend, the king's German titles.

The rixdollar convention of Hesse has the head of the reigning prince, with name and titles, thus: WILHELMUS IX. D. G. HASS. LANDG. HAN. COM. (William IX. by the grace of God, landgrave of Hesse, count of Hanau); reverse, arms of Hesse Cassel; legend, X ST. EINE FEINE MARCK (10 pieces to a mark fine), and at the bottom the word JUSTIRT (adjusted or verified). In pieces of more modern date, 1796, &c. this last word is not to be found, but under the above legend the words BIBERER SILBER (silver of the mine of Biber); and in some pieces of 1770, the words EX VISCERIBUS FODINÆ BIEBER (from the bowels of the mine of Biber). The half and quarter rixdollars are marked XX ST, &c. and 40 ST, &c. and under the coat of arms $\frac{2}{3}$ or $\frac{1}{3}$.

The thaler or rixdollar of account has the head, name, and title, as above; reverse, a star with a lion in the centre, and the words VIRTUTE ET FIDELITATE, as before; or the arms of Hesse; the legend, in both cases, is EIN THALER (one thaler): and on the half piece, EIN HALBER THALER.

The rixdollar or 3 markpiece of Lubec has a two-headed eagle crowned, with 48 on its breast; legend, MON. NOV. IMP. CIVITAT. LUBECÆ (new coin of the imperial city of Lubec); reverfe, arms of the city; legend, 48 SCHILLING COURANT GELDT ANNO, &c. (48 fchillings currency; the year, &c.)

The rixdollar (fine) of Manheim has the head of the reigning prince, with name and title, thus: CAR. THE. C. P. S. R. I. A. T. & EL.; that is, *Carolus Theodorus, comes palatinus, fancti Romani imperii archi thefaurarius et elector* (Charles Theodore, count palatine, high fteward and elector of the holy Roman empire); reverfe, arms of the prince; legend, EX VISCERIBUS FODINÆ WILDBERG (from the bowels of the mine of Wildberg), and FEIN SILB. (fine filver) at the bottom.

The piece of $\frac{2}{3}$ bears the fame impreffions as the rixdollar, except that it is marked ($\frac{2}{3}$) under the arms. Some pieces of an ancient date bear no head but $\frac{2}{3}$ in large figures, and under this, FEIN SILBER; legend, DEUS SERVET METALLI FODINAS MONTENSES (may God preferve the mines of Wildberg); the names and titles are on the reverfe, round the arms.

The rixdollar (convention) has the head, name, and titles, as above; reverfe, arms of the prince; legend, AD NORMAM CONVENTIONIS (according to the rule of the convention); or 10 EINE FEINE MARCK (10 to a fine mark).

N. B. The coins of Manheim and the Palatinate now bear the fame impreffions as thofe of Bavaria, both countries being united under one fovereign.

The rixdollar of Mentz has the head of the reigning prince, with name and titles, thus: FRID. CAR. JOS. D. G. A. EP. MOG. S. R. I. P. G. A. C. ET EL. E. W.; that is, *Fredericus Carolus Jofeph Dei gratia archiepifcopus Moguntiæ, fancti Romani imperii pro Germania archi cancellarius et elector, epifcopus Wormenfis* (Frederick Charles Jofeph, archbifhop of Mentz, high chancellor for Germany and elector of the holy Roman empire, bifhop of Worms); but the pieces of 1796, &c. have their legend in German, thus: FRIED. CAR. JOS. ERZB. U. KURF. Z. MAINZ. B. Z. W.; that is, *Erzbifchoff und Kurfurft zu Mainz Bifchoff zu Worms* (archbifhop and elector of Mentz, bifhop of Worms); reverfe, arms of the bifhop; legend, ZEHEN EINE FEINE MARCK (ten to a mark fine).

The rixdollar (conftitution) of Nuremberg has the head of the reigning emperor, with name and title, thus: CAROLUS VI. D. G. ROM. IMP. SEMP. AUG. (Charles VI. by the grace of God, emperor of Rome, ever auguft); reverfe, a view of the city, with an eagle flying over it; legend, AUGUSTO DOMINO TUTA ET SECURA PARENTE EST (it is fafe and fecure under its auguft lord and father), and at the bottom, NORIMBERGA.

The rixdollar (convention) varies in the impreffions, fome bearing the head, name, and title of the reigning emperor, as above; and others a view of the city, with a fun over it; reverfe, a two-headed eagle crowned, bearing the arms of the city on its breaft; or a fingle-headed eagle carrying two efcutcheons in his talons. The pieces are marked with the letter N, or the word NURNBERG, or the legend, MONETA NOVA REIPUBL. NORIMBERGENSIS (new coin of the republic of Nuremberg); and the words, X EINE FEINE MARCK (ten to a mark fine), are alfo to be found in fome part of the piece.

The rixdollar of Pruffia (coined before 1791) has the head of the reigning king, with name and title, thus: FRIDERICUS BORUSSORUM REX (Frederick king of Pruffia); reverfe, an eagle and military trophies; legend, EIN REICHS THALER (one rixdollar). The half rixdollar bears the fame impreffions; and its value is marked thus, 2 EINE R. THALER (two to a rixdollar).

The rixdollar current (coined fince 1791) has the head of the reigning king, and the legend in German, as before; reverfe, arms of Pruffia, with EIN THALER at the bottom; but the rixdollar convention money bears the legend, ZEHN EINE FEINE MARCK (ten to a mark fine).

The florin of Silefia has the fame impreffions as on the rixdollar of 1791; but on the reverfe it is marked XXI EINE FEINE MARK.

The rixdollar of Anfpach and Bareuth has the head of the reigning prince, with name and title, thus: ALEXANDER D. G. MARCH. BRAND. (Alexander, by the grace of God, marquis or margrave of Brandenburg); reverfe, arms of Anfpach, &c. with ZEHEN EINE FEINE MARK (ten to a mark fine); but thofe of modern date, 1790, &c. bear the impreffions of the Pruffian coins, Anfpach having been at that period ceded to Pruffia.

The rixdollar of Ratifbon has the head, name, and title of the reigning emperor, as on the coins of Hamburgh and Nuremberg; reverfe, a view of the city; legend, MONETA REIP. RATISPON (coin of the republic of Ratifbon), and at the bottom, X ST. EINE F. C. M.; that is, *X ftuck eine feine Collnifch marck* (ten pieces to a mark fine, Cologne weight). The half and quarter rixdollars are marked 20 ST. EINE F. C. M. and 40 ST. EINE F. C. M.

The rixdollar of Saltzburg, and its divifions, has the head of the reigning prince, with name and titles, thus: HIERONYMUS D. G. A. & P. S. A. S. L. N. G. PRIM.; that is, *Hieronymus Dei gratia archiepifcopus et princeps Salifburgenfis, Germaniæ primas* (Jerome, by the grace of God, archbifhop and prince of Saltzburg, primate of Germany); reverfe, arms of the reigning prince, without a legend; and the copfftuck or 20 creutzer piece differs only in being marked (20) on the reverfe.

The rixdollar (convention) of Saxony has the head of the reigning prince, with name and titles, thus: FRID. AUGUST. D. G. DUX SAX. ELECTOR (Frederick Auguftus, duke and elector of Saxony); reverfe, arms of Saxony, with the infcription, X EINE FEINE MARCK (ten to a mark fine).

The florin or piece of $\frac{2}{3}$ bears the fame impreffions as the rixdollar; but the infcription on the reverfe is XX EINE FEINE MARCK, and it is marked $\frac{2}{3}$ at the bottom; the half florin is marked XL EINE, &c. and $\frac{1}{3}$ at the bottom; and the quarter florin is marked LXXX or ACHZIG EINE, &c. and $\frac{1}{6}$.

The rixdollar of Saxe Gotha has the head, name, and title, of the reigning prince, thus: ERNESTUS D. G. GOTHAN. SAXONUM DUX (Erneft, by the grace of God, duke of Saxe Gotha); reverfe, arms of Saxe Gotha, with X EINE FEINE MARCK, as above.

The rixdollar of Sweden of 1752 has the head of the reigning king, with name and title in Latin, thus: GUSTAVUS III. D. G. REX SUECIÆ (Guftavus III. by the grace of God, king of Sweden); reverfe, arms of Sweden; legend, SALUS PUBLICA SALUS MEA (the public fafety is my fafety); and on the edge, MANIBUS NE LÆDAR AVARIS (that I may not be hurt by rapacious hands). The half rixdollar bears the fame impreffions.

The rixdollar of 1779 has the head, name, and title, as before; reverfe, arms of Sweden, with I RD.; legend, FADERNES LANDET (the land of our fathers). The divifions of the rixdollar bear the fame impreffions, but have their value marked on them, thus: $\frac{2}{3}$ RD., $\frac{1}{3}$ RD., $\frac{1}{6}$ RD. The rixdollar, and other pieces coined fince 1795, have the legends on both fides in the Swedifh language. The infcription

tion on the edge of the piece is MANIBUS, &c. as on the old rixdollar.

The rixdollar of Friburg, and its divifions, have the arms of the canton; legend, RESPUBLICA FRIBURGENS (republic of Friburg); reverfe, a crofs formed by eight F's, and four crowns; legend, AUXILIUM NOSTR. DEUS (God is our help). The quarter rixdollar has, on a fquare in the centre of the crofs, the number 56; and the inferior divifions are marked 28, 14, and 7.

The rixdollar of Treves has the head of the reigning prince, with name and titles, thus; CLEM. WENC. D. G. A. EP. TREV. S. R. I. A. C. ET EL.; that is, *Clemens Wenceflaus Dei gratia archi epifcopus Trevirenfis fancti Romani imperii archi cancellarius et elector* (Clement Wenceflas, by the grace of God, archbifhop of Treves, arch chancellor and elector of the holy Roman empire); reverfe, arms of the prince; legend, EPISC. AUG. APP. COAD. ELEC. (bifhop of Augfburg, and other titles), befides the words, IO EINE MARC F. or IO EINE FEINE MARK (ten to a mark fine).

The rixdollar of Wirtemburg has the head of the reigning prince, with name and title, thus: CAROL. ALEX. D. G. DUX WUR. ET T. (Charles Alexander, by the grace of God, duke of Wurtemburg, &c.); reverfe, arms of Wurtemburg; legend, PROVIDE ET CONSTANTER (providently and conftantly), befides the words, IO EINE FEINE MARK (ten to a mark fine).

The rixdollar of Wurtzburg (coined before 1795) has the head of the reigning prince, with name and titles, thus: FRANC. LUD. D. G. EP. BAM. ET WIR. S. R. I. P. F. O. DUX; that is, *Francifcus Ludovicus Dei gratia epifcopus Bambergii et Wirtfburgii, fancti Romani imperii princeps, Francorum Orientalium dux* (Francis Louis, by the grace of God, bifhop of Bamburg and Wurtzburg, prince of the holy Roman empire, duke of Eaft Franconia); reverfe, arms of the bifhop, legend, IO EIN FEINE MARCK (ten to a mark fine). But the rixdollar of 1795, &c. bears on the front the head of the bifhop, with names and titles as above; and on the reverfe only the words, IO EINE FEINE MARCK, encircled by two fprigs of laurel; and above it the legend, PRO PATRIA (for the country). See Kelly's Cambift, vols. i. and ii.

RIXI, in *Geography*, a town of Hindooftan, in Bahar; 23 miles S. of Palamow.

RIXOUSE, LA, a town of France, in the department of the Jura; fix miles N. of St. Cloude.

RIXTOWN, a town of the duchy of Holftein; feven miles S.W. of Lutkenberg.

RIZAH, a town of Afiatic Turkey, in the government of Trebifond, near the Black fea; 45 miles E.N.E. of Trebifond. N. lat. 48° 9′. E. long. 40° 20′.

RIZEA, in *Ancient Geography*, a town of Afia, in that part of the Colchide, which lay to the left of the Phafis. Procopius fays, that it was fituated on the frontiers of the empire, and that it was very populous.

RIZIUM, in *Botany*, a name given by the ancients to a peculiar kind of red root brought from Syria, and ufed by the Grecian women to paint their cheeks red.

The Latin writers, who have mentioned this, have called it *radicula;* and Pliny, who has more than once mentioned it, calls it *herba lanaria*, or *radix lanaria*. This, however, is a very great error, confounding it with the *ftruthium* of the Greeks. It is probable, that the rizium was no other than the anchufa, or alkanet root, which grows very plentifully in the countries from whence the Greeks had their rizium, and which will anfwer all the purpofes for which they ufed it.

RIZOA, fo named by Cavanilles, Ic. v. 6. 56. t. 578, after Salvator Rizo, a botanical artift employed by Mutis, is a genus of the *Didynamia Gymnofpermia*, whofe diftinctive characters are fcarcely fufficiently marked, for us, without a fpecimen, to decide concerning it.

The fpecies is *R. ovatifolia*, an herbaceous plant of Chili, flowering there in February. *Corolla* pale rofe coloured.

RIZSKOI, in *Geography*, a province of Ruffia, formerly Livonia, fo called from Riga, its capital; bounded on the N. by Revelfkoi, on the E. by the government of Peterfburg and Pfkov, on the S.E. by Polotzkoi, on the S. by Semigallia, and on the W. by the gulf of Riga; about 160 miles long, and 100 broad. N. lat. 56° 30′ to 59° 15′. E. long. 24° to 27° 34′.

RIZZIO, DAVID, in *Biography*, born at Turin, but brought up in France, was a good mufician, and fung agreeably. His father was a dancing-mafter. The count de Merezzo took him to Scotland, when he went thither ambaffador from Savoy. Rizzio charmed the queen by his talents, which were not confined to mufic, and there were rumours that fhe favoured him too much. Henry Stuart Darnley, the queen's hufband, had him arrefted in the mufic room of this princefs. But it is faid, in fome accounts, that he was actually at fupper with her majefty and the countefs of Argyle in her cabinet. Some fay that he was maffacred in her prefence; others affert, that the duke of Rothfay dragged him out of the room and murdered him at the door. There is no doubt but that the queen made ufelefs efforts to fave his life; (but to fave the life of a cat, a dog, or a fquirrel, common humanity would naturally have done as much). However, it is added, that fhe revenged his death afterwards on feveral of his affaffins. Laborde.

We wifhed to know what foreigners fay of this tranfaction, as party concerning Mary, queen of Scotland, ran fo high at the time, and it ftill runs, that there is no great credit to be given to either fide.

His inftrument feems to have been the lute, the general favourite at that time all over Europe.

At Turin, fome years ago, among many other mufical enquiries, David Rizzio was not forgotten. Imagining, as he was a native of that city, and his father a mufician as well as a dancing-mafter there, if we could find any mufic compofed by either of them or by their Italian contemporaries, it might determine the long difputed queftion, whether David Rizzio was author of the Scots Melodies afcribed to him. The refult of this enquiry is related in the article JAMES I. king of Scotland; which fee.

Sir John Melvil, in his Memoirs, tells us that "the queen had three valets of her chamber, who fung in three parts, and wanted a bafe to fing the fourth part; therefore, telling her majefty of this man, Rizzio, as one fit to make the fourth in concert, he was drawn in fometimes to fing with the reft." This was about the year 1564.

He quickly crept into the queen's favour; and her French fecretary happening at that time to return to his own country, he (Rizzio) was preferred by her majefty to that office. He began to make a figure at court, and to appear as a man of weight and confequence. Nor was he careful to abate that envy which always attends fuch an extraordinary and rapid change of fortune. On the contrary, he feems to have done every thing to increafe it; yet it was not his exorbitant power alone which exafperated the Scots; they confidered him as a dangerous enemy to the Proteftant religion, and held for this purpofe a conftant correfpondence with the court of Rome. His

prevalence,

prevalence, however, was very ſhort lived; for, in 1566, certain nobles, with lord Darnly at their head, conſpired againſt him, and diſpatched him in the queen's preſence with fifty-ſix wounds. Biog. Dict. vol. xi. p. 94.

RIZZUTO, Cape, in *Geography*, a cape on the coaſt of Calabria. N. lat. 38° 57′. E. long. 17° 25′.

ROA, a town of Spain, in Old Caſtile, on the Duero; 25 miles N. of Segovia.

ROACH, in *Ichthyology*, the Engliſh name of a well-known fiſh, called by the generality of authors the *rutilus* and *rubiculus*, by ſome the *rubellio*. It is a ſpecies of the cyprinus according to the new ſyſtem of Artedi, and the cyprinus rutilus of Linnæus. It has been deemed, though without much reaſon, remarkable for its livelineſs and vivacity; whence the proverb, *ſound as a roach*.

In ſome parts of the world this fiſh will only live in ſtanding waters; with us it equally thrives in ponds and in deep ſtill rivers, and is remarkable for its numerous progeny; a pond being much ſooner ſtocked with this than with any other fiſh.

Roach *Fiſhing*. See Fishing.

Roach-*Leech*, in *Sail-making*, the maſt-leech of ſails cut with a curve, or roach.

ROACHING *of Alum*, one of the laſt proceſſes uſed in the alum making, and is what renders it fit for the market.

After the alum liquor has been left four days in the cooler, and is ſufficiently ſhot, they drain it out; and taking out the alum, they waſh it in a ciſtern of alum water ſo ſtrong, that it can ſcarcely take up any more of that ſalt, but only cleanſes it of its accidental foulneſſes. After this waſhing the alum is put into large pans, and a quantity of water added to it. It is ſet over the fire to melt in this water and boil a little; then it is ſcooped into a great caſk, where it is ſuffered to ſtand about ten days; and it is then fit for the market under the name of *roach alum*, or *roached alum*; the liquor let out of the cooler is boiled up again, and ſhoots more alum. See Alum.

ROAD, Via, an open way or paſſage, forming a commodious communication between one place and another.

The Romans, of all people, took the moſt pains in their roads; the labour and expence they were at to render them ſpacious, ſtraight, ſmooth, and agreeable, to the very extremities of their empire, are incredible.

Uſually, they ſtrengthened the ground by ramming it, laying it with flints, pebbles, or ſand; ſometimes by a lining of maſonry, rubbiſh, bricks, potſhreds, &c. bound together with mortar.

F. Meneſtrier obſerves, that in ſome places in the Lyonnois he has found huge cluſters of flints cemented with lime, reaching ten or twelve feet deep, and making a maſs as hard and compact as marble itſelf; and which, after reſiſting the injuries of time for ſixteen hundred years, is ſtill ſcarcely penetrable by all the force of hammers, mattocks, &c. and yet the flints it conſiſts of are not bigger than eggs.

Sometimes they even paved their roads, regularly, with large ſquare free-ſtones; ſuch are the Appian and Flaminian ways, &c.

The roads paved of very hard ſtones, they uſually called *viæ ferreæ*, either becauſe they reſembled iron, or becauſe they reſiſted the iron of the horſes feet, chariots, &c.

Roads are either *natural* or *artificial*, *terreſtrial* or *aquatic*, *public* or *private*.

Road, *Natural*, is that which has been frequented for a long ſucceſſion of time, and ſubſiſts with little expence by reaſon of its diſpoſition, &c.

Road, *Artificial*, is that made by labour of the hand, either of earth or maſonry; and in the making of which, ſeveral difficulties were to be ſurmounted; ſuch are moſt of thoſe along the banks of rivers, and through marſhes, lakes, &c.

Roads, *Terreſtrial* or *Land*, are not only thoſe made upon the ground, but alſo thoſe formed of earth heaped up in manner of a bank, and ſuſtained by ſpurs, buttreſſes, and counterforts.

Road, *Aquatic*, is a road made in the waters, whether current, as thoſe of rivers, &c. or ſtagnant, as banks and cauſeways, or over moraſſes, &c.

Under this denomination are alſo comprehended navigable rivers, and artificial canals. See Canal.

Road, *Public*, or *grand road*, is any common road, whether ſtraight or acroſs, military or royal, &c. *Private* road is that made for the convenience of ſome particular houſe, &c. See Highway.

Roads, *Military*, ſo called among the Romans, were grand roads appointed for the marching of their armies into the provinces of the empire, for the aſſiſtance of their allies, &c.

The principal of theſe roads, in England, are Watling-ſtreet, Ikenild-ſtreet, Foſs-way, and Erminage-ſtreet. See Way.

Roads, *Double*, among the Romans, were roads for carriages, having two pavements or cauſeways, the one for thoſe going one way; the other for thoſe returning the other, to prevent claſhing, ſtopping, and confuſion.

Theſe two ways were ſeparated from each other by a bank raiſed in the middle, paved with bricks, for the convenience of foot people, with borders and mounting ſtones from ſpace to ſpace, and military columns to mark the diſtance. Such was the road from Rome to Oſtia, called *Via Portuenſis*.

Road, *Subterraneous*, is that dug in a rock with a chiſſel, and left vaulted. Such is that of Puzzuoli, near Naples, which is near half a league long; and is fifteen feet broad, and as many high.

Strabo ſays, it was made by one Cocceius, a relation probably of Nerva; but it has ſince been widened by Alphonſus, king of Arragon and Naples, and made ſtraight by the viceroys. There is another of the ſame kind in the ſame kingdom, between Baiæ and Cumæ, called the Grotto of Virgil, becauſe mentioned by that poet in the ſixth book of his Æneid.

Road, in *Rural Economy*, a track or way conſtructed with ſome ſort of hard materials for the purpoſe of travelling upon, with carriages, horſes, and other animals. Roads are of different kinds, as public and private, or parochial. The firſt ſort may be ſubdivided into toll and free-roads, and the latter into lanes or bye-roads: there are likewiſe other ſorts of roads, as carriage and horſe tracks, &c. It has been remarked by a writer, in the firſt volume of "Communications to the Board of Agriculture," that the conveniencies and beneficial conſequences which reſult from a free and eaſy communication between different parts of a county and diſtrict are ſo various, and the advantages of them ſo generally and extenſively felt by every deſcription of individuals, from the higheſt to the loweſt; that no labour or expence ſhould be ſpared in providing them; as, without ſuch ready means of intercourſe, all ſorts of internal commerce and improvement are either much embarraſſed, or wholly at a ſtand. And it is, indeed, well added, that roads and canals, or navigable rivers, may juſtly be conſidered as the veins and arteries through which all improvements flow. To internal commerce and agriculture,

culture, they are as the veins and arteries to the human body. Through thefe the blood circulates in every direction, and thus keeps alive the animal fyftem; but, if this circulation is by any means checked or obftructed, even in the remoteft part, that part foon becomes ufelefs, and finks into decay, and in fome degree is felt throughout the whole body. So it is with refpect to the commercial and agricultural fyftems. Without a free and uninterrupted intercourfe, it is impoffible they can exift, or at leaft produce, to the community at large, fo many important benefits as they otherwife might have done. How many, for example, are the places, in almoft every country, that might be rendered doubly valuable, if the accefs were practicable and eafy. How immenfe the quantities of the fineft timber, perhaps growing in inacceffible woods, which, on that account alone, are loft to fociety. How many the valuable ftrata of the richeft metals and minerals, which, from the fame caufe, lie buried and undifturbed in the bowels of the earth; and how many thoufands of acres of the moft fertile foil, that might be improved and cultivated to the higheft degree of perfection, and thus very largely contribute to increafe the food and the comforts of man, were the ingrefs and egrefs rendered practicable and free. And the value of a farm, confequently the riches, perhaps the ftrength of a country, greatly depend on an eafy and uninterrupted communication by good roads.

And the able author of the "Wealth of Nations" has well fuggefted, that good roads, canals, and navigable rivers, by diminifhing the expence of carriage, put the remote parts of the country more nearly upon a level with thofe in the neighbourhood of the town. They are, upon that account, the greateft of all improvements. They encourage the cultivation of the remote, which muft always be the moft extenfive circle of the country. Though they introduce fome rival commodities into the old markets, they open many new markets to its produce. It is even further obferved, that the Romans were fo fenfible of this, that we are told, the firft writer fays, they did not think it beneath the dignity of the commonwealth to attend to the conveniencies from good roads. That great and wife people, it is faid, carried on, at an immenfe expence, roads, whofe remains are to this day the admiration of the curious, from the centre of the empire to many of the remoter provinces. The readier march of their armies was, perhaps, he thinks, their firft motive; but the eafier intercourfe of the feveral parts of the great empire was another, which they had too much prudence and too much wifdom to overlook. We are alfo told by Diodorus, Strabo, and other hiftorians, he fays, that the famous Semiramis, being fo fully convinced of the importance of an eafy and general intercourfe, applied herfelf to render the roads practicable throughout the whole extent of her empire.

Mr. Donaldfon alfo ftates, that, in an agricultural view, the benefits derived from good roads are incalculable. Before the eftablifhment of turnpike roads in England, many parts of that kingdom, like the highlands of Scotland, were fcarcely acceffible. Coal, manure, grain, &c. as is ftill the cafe in many parts of Cornwall, were carried on horfes' backs. Where waggons were ufed, feven or eight horfes were neceffary to draw about two tons, and feldom were able to proceed above twenty miles in a day. Now, where turnpikes are eftablifhed, or other means ufed for keeping the roads in a proper ftate of repair, the fame number of horfes will draw at leaft five tons, and travel nearly double the diftance, with much more eafe. How abfurd, then, continues he, for any perfon to fcruple the payment of an inconfiderable toll, when the faving is fo great and fo evident; where the tear and wear in one cafe are not one-twentieth part of what they are in the other!

It is likewife contended by Mr. Beatfon, in refpect to the turnpike laws in this country, that they are liable to many exceptions; for although immenfe fums of money are annually levied for the purpofe of making and repairing the highways, yet, either from bad management, from party influence, or from the chicanery and ignorance of furveyors and contractors, the roads in many places are not only laid out in the moft abfurd direction, but are fo badly conftructed, and kept in fo wretched a ftate of repair, that they are almoft impaffable. It is furprifing that in fo enlightened a country, and where the turnpike laws have fo much engaged the attention of many very ingenious men, thofe laws fhould ftill remain fo very defective; more efpecially as there is hardly a country gentleman who attends a turnpike meeting, but confiders himfelf completely mafter of the whole bufinefs and management, as well as of the making of roads; at leaft, if we may judge from the violent difputations and bickerings that frequently happen at thefe meetings, where a propofed new line of road, or perhaps the repair of an old one, will fometimes be contefted with as great keennefs and vehemence, as if the parties were contending whether Great Britain fhall be a monarchy or a republic. And it is contended, that it too often happens party influence rules the proceedings at fuch meetings, and that thofe who are entrufted with the management of this bufinefs, delegate their powers, and truft the infpection and whole management and direction of the roads to fome ignorant or pretended furveyor; who, almoft to a certainty, will impofe upon them, efpecially if he is empowered to fettle with contractors; and thus the bufinefs of the public, in one of its moft important concerns, is either altogether neglected, or terminated according to the convenience of the ftrongeft party, without any regard to the interefts of the community at large. In fupport of this affertion, he has only to refer to many parts of the principal thoroughfares in Britain. In fome, it will be obferved, the roads are directed in the moft irregular zigzag manner, through a level part of the country, where they ought evidently to have gone ftraight forward. In other places, the traveller and the public, and the poor overloaded horfe, are obliged to fubmit to all the inconvenience, the labour, and the fatigue of afcending and defcending the fteepeft hills, when they might have gone, with the greateft eafe and comfort, on a level road, by proper attention in the firft making and laying them out. He is, however, far from thinking it would either be juft or proper to force a road unneceffarily through any part of a gentleman's property without his confent, unlefs for very powerful reafons indeed.

If to avoid a deep afcent, or to fhorten the diftance confiderably, and that there is no other way to do fo, in that cafe there fhould be no hefitation; but if the advantages to the public are not very material, and that another line can be adopted, nearly as good, which will do lefs injury to an individual, the latter line fhould unqueftionably be preferred in all fuch cafes of laying out roads.

It fhould be a general maxim, he thinks, that private confiderations ought, in all cafes, to give way to public convenience and advantage. Society, fays he, is formed for the mutual and general benefit of the whole, and it would be a very unjuft meafure to incommode the whole, merely for the convenience, or perhaps to gratify the whim or caprice of an individual. However, the property of an individual ought by no means to be taken to ferve the

public,

public, without allowing him, not only the full value, but more than the value proportioned to the inconvenience or injury he may ſuſtain by the meaſure.

But he contends, farther, that while the preſent turnpike laws remain in force, and the common mode is practiſed of chooſing ſurveyors annually, or by rotation, without the ſmalleſt regard to abilities or experience, it cannot be expected the public convenience will be ſo much attended to as it ought to be; neither is it to be expected, that the generality of ſurveyors, ſo choſen, can know the proper directions to give in making or repairing roads, nor the proper manner of making eſtimates, ſo as either to conclude an agreement with an artful contractor, or to form a correct judgment of ſuch propoſals as may be made. From theſe diſadvantages, it is inconceivable the loſs that may be occaſioned, or the miſchief that may be done by an ignorant and inexperienced ſurveyor. For he is decidedly of opinion that a ſurveyor of roads ſhould be a man of conſiderable abilities, and of the ſtricteſt honour and integrity. A man not apt to be ſwayed by party influence, or by private or perſonal conſiderations; for if he once allows himſelf to be led away or biaſſed by thoſe, or to act in any manner inconſiſtent with the public intereſts, he is unfit for that office. He ought not to be a man, who has all his life-time been confined to the narrow limits of a ſingle diſtrict or county, or who has ſuddenly, or by a ſlender recommendation, been brought forward as a perſon qualified for ſo arduous an undertaking. He ought to have ſeen, in various places, the different ſyſtems adopted in the management and conſtruction of roads, and to have made it a particular object of his attention, the judging of the beſt and moſt advantageous practices, under the particular circumſtances of different caſes. And beſides theſe, there is another probable reaſon why, under the preſent ſyſtem, the public roads cannot be ſo impartially managed and conducted as they ought to be, in the unlimited power given to country gentlemen over the roads in the county or diſtrict in which they live. Many of thoſe gentlemen, for their benevolence and liberality, are truly deſerving of every praiſe that can be beſtowed upon them; but, however honourable and reſpectable they may be, and however deſirous to promote the public good, it would be doing an injuſtice to human nature to ſuppoſe they can view, with impartial eyes, the fine plantations, the beautiful incloſures, and other improvements, they have made on their eſtates. We may as well imagine, that a doting mother can coolly and deliberately ſee an inciſion made in the ſkin of her darling child, however much it may be benefited by the operation, as that a country gentleman can with indifference behold a turnpike road carried through an incloſure, which he himſelf has been at the pains and the expence of adorning. He adds, that ſo ſituated, it is natural to believe this gentleman would wiſh that road to go in any other direction, even though it ſhould not be quite ſo convenient to the public. He will not only uſe his own perſuaſion and endeavours to point out arguments againſt its coming that way, but he will even endeavour to prevail on his friends to exert themſelves alſo, and thus a party is often formed in oppoſition to the public intereſt; and if he is a man of opulence and power, and generally reſpected, it is more than probable his influence will prevail in this buſineſs.

It conſequently appears to him neceſſary, in order to obviate theſe abuſes and inconveniencies, that there ſhould be a controlling power over the meaſures propoſed by country gentlemen reſpecting turnpike roads: for to allow thoſe gentlemen to decide ultimately on the laying out a new road through their own lands, or even on the diſtribution of the money to be expended in repairing old roads, is, in fact, making them judges in their own cauſe. In ſhort, it is an object ſo truly important to the intereſts of the community at large, and of the kingdom in general, to procure the moſt eaſy, ſafe, and expeditious, and the leaſt expenſive intercourſe with every part, by means of the beſt roads, that it is a meaſure, he preſumes, highly deſerving the attention of the legiſlature; and which, from the great extent of buſineſs, would probably require a board, with proper ſurveyors appointed by it, for the purpoſe. If ſome plan of this nature were adopted, we ſhould then hear no more of thoſe numerous complaints that are ſo often made reſpecting the abuſes committed in the management of turnpike roads, and of the money levied at the toll-bars, at many of which, it is ſaid, by the author of the "Wealth of Nations," the money levied is more than double of what is neceſſary for executing, in the completeſt manner, the work which is often executed in a very ſlovenly manner, and ſometimes not executed at all.

But in reſpect to the improvement of both the public and private roads, the following hints have been thrown out in the able Agricultural Survey of Shropſhire. In lieu of ſurveyors in each pariſh (who are generally choſen in turn, and conſequently have neither time nor experience ſufficient to act properly, and are generally not inclined to exert themſelves by enforcing the duty, &c.), the writer would propoſe for the magiſtrates to have power to appoint a proper ſurveyor with a ſalary, who ſhould act under their direction, and be amenable to them for his conduct; ſuch ſurveyor to undertake the arrangement of a certain diſtrict (ſay ten miles ſquare), whoſe duty it ſhould be to employ deputies, to call in and ſee the ſtatute duty done under his direction: by this means the forming of the roads, which is the firſt principle, would be done in the moſt approved method, and the ſtatute duty regularly called out. There may be an inſpector, an inhabitant in each pariſh, appointed, and choſen yearly, whoſe intereſt it would be, as well as his duty, to act as a check upon the general ſurveyor and his deputy: this office, being eaſy, might be filled by one of the moſt liberal perſons in the pariſh. He apprehends that an arrangement of this ſort would very ſoon inſure good private roads. And ſomething like the following would, he thinks, procure good turnpike roads alſo; namely, the truſtees of all the turnpike roads throughout England, to be obliged to erect weighing engines at all their gates or bars, at which tolls are received, on or before the 24th day of June next, the expence of ſuch erections to be repaid to them, by their being empowered to add to their preſent reſpective tolls any ſum to be paid by ſuch carriage to be weighed, not exceeding ſo much as has been heretofore paid within one year laſt for the tolls; ſuch ſums to be paid, until all expence of erecting the ſaid engines ſhall be fully repaid. The account of ſuch repayment to be made out and ſettled by the clerks and gate-keepers belonging to the reſpective roads, and to be atteſted upon oath before two juſtices of the peace. And from and after the ſaid 24th day of June next, it may be lawful for all carriages to be drawn with any number of horſes along any turnpike road. But to prevent the injuries done to roads, by the great burdens too frequently drawn along them, it ſhould be enacted, that from and after the ſaid 24th day of June, it ſhould be lawful for all truſtees appointed by any act or acts of parliament, for the repair of any turnpike road, or any five or more of them, and they ſhould be required at a public meeting, to be held

for

for that purpose on or before the 24th day of April next, to order to be erected at all the gates and bars which they have erected, or shall erect, for the receiving of tolls, or upon any part of the road within their respective jurisdictions, and at such a distance from any turnpike, bar, or toll-gate, as they shall think requisite and expedient to order and cause to be erected, a crane, machine, or engine, proper for the weighing of carts, waggons, or carriages conveying any goods or merchandize whatever; and by a writing signed by them, or any five or more of them, to order all and every such carriage or carriages which shall pass loaded through any such gate or bar, to be weighed, together with the loading thereof; and for them, or any five or more of them, or for any person or persons empowered by any five or more of them, to receive and take, over and above the tolls already granted, or hereafter to be granted, the sum of 10*s.* for every hundred weight, 112lbs. to the hundred, which every waggon or cart hereafter described, together with the loading thereof, shall weigh over and above the weights hereafter allowed to them respectively; that is to say, to every waggon or four-wheel carriage, having the fellies or rollers of the wheels of the breadth of sixteen inches, eight tons in summer, and seven in winter: to every waggon or wain, having the axle-trees thereof of such different lengths, that the distance from wheel to wheel of the nearer pair of the said wheels be not more than four feet two inches, to be measured at the ground, and that the distance from wheel to wheel of the other pair thereof be such, that the fore and hind wheels of such waggons and wains shall roll only one single surface or path of sixteen inches wide at the least, on each side of the said waggons or wains, and having the fellies thereof of the breadth of nine inches from side to side at the bottom or sole thereof, six tons ten cwt. in summer, and six tons in winter: to every waggon or four-wheel carriage, having the sole or bottom of the fellies of the wheels of the breadth of nine inches, six tons in summer, and five tons ten cwt. in winter: to every cart, having the fellies of the same dimensions, three tons in summer, and two tons fifteen cwt. in winter: to every waggon, having the sole or bottom of the fellies of the wheels of the breadth of six inches, four tons five cwt. in summer, and three tons fifteen cwt. in winter: and to every such waggon, so constructed as to roll, and actually rolling a surface of eleven inches by the wheels thereof, five tons ten cwt. in summer, and five tons in winter: to every cart having the fellies of the same dimensions, two tons twelve cwt. in summer, and two tons seven cwt. in winter: to every waggon, having the sole or bottom of the fellies of the wheels of less breadth than six inches, three tons fifteen cwt. in summer, and three tons twelve cwt. in winter: and to every cart, having the fellies of the same dimensions, one ton fifteen cwt. in summer, and one ton to twelve cwt. in winter. And if such trustees as aforesaid shall neglect to erect such engine at their respective gates by the said 24th day of June, then it shall and may be lawful for any mortgagee or mortgagees of the said gate or gates to erect such engine or engines, and to take upon them the same power as the said trustees were by the act invested with, and under the same regulations, on or before the 29th day of September next; and if the said trustees and mortgagees shall neglect to erect such engine or engines by the respective times hereinbefore stipulated for erecting the same, then it shall and may be lawful for all horses, carts, and other carriages, from and after the said 29th day of September next, to go through and pass along such road or roads, without any obstruction or payment for tolls whatsoever, until such trustees or mortgagees shall erect such weighing engine or engines as aforesaid, and occasion the same to be regularly used; any thing contained within the respective acts for turnpike roads to the contrary notwithstanding.

And it is usefully remarked, in respect to the effects of these regulations, that, first, the weighing engines will sufficiently prevent carriages of all sorts being overloaded, which will be a preservation of the road, whereas, the restraint upon the number of horses does not answer the purpose; for a short and overpowered team does more damage to the roads, than a greater number of horses, which draw easy, and consequently pass along much quicker. That disagreeable restraint will be thereby made unnecessary, which empowers and encourages some poor indolent wretches to wander about the country with their ready printed notices, to catch a prey, which, when got, is lavished away in drunkenness, debauchery, and disorder; and if they fail in their lawful attempt, which is often the case, and perhaps distressed to the greatest degree, being despised by persons of all denominations, pursue poaching and fowl-stealing, which lead to greater acts of thievery, of which there are many instances; for all the convictions are grounded upon the poor wretches as above described, being by the law allowed to be credible witnesses, who obtain the reward to the amount of 5*l.* or more, when the team-owner's servant or servants are all deemed prejudiced; so that, as the act now stands, no one is safe from these convictions.

Besides, the occupiers of farms in general, particularly those upon the middling-sized ones, find themselves, it is said, very much oppressed and injured by the law now subsisting for regulating the turnpike roads, by their being restrained from drawing more than four horses in waggons, the fellies of the wheels thereof being under six inches broad. Were farmers permitted to draw any number of horses, it would be of great public utility in lowering the price of those animals, which is now enormously high; the farmer would find it his interest, as formerly, to keep breeding mares, which, with the colts they breed, may be made useful great part of the year, provided they may be worked easy. The law, as it now stands, acts nearly as a prohibition to farmers breeding horses; for a breeding mare, or a colt under five years old, is not fit to draw one of four in a waggon, with no more than sixty bushels of barley or wheat, which is the common load of the Shropshire or Staffordshire farmers, neither of which bring more than two tons, which is considerably under the weight the present act allows to be drawn on the turnpike roads in winter. Before the said turnpike laws were in force, the farmer's team, to draw his sixty bushels of wheat or barley, consisted of six in number, two of which at least were mares, either in foal or sucklers, two colts, one of them two, the other three years old, which were never oppressed or hurt by their work; consequently a succession came on, and the owner had one or two good sound colts to sell off every year to the harness or draft, as they best suited. Good waggon horses were then bought at from 10*l.* to 15*l.* each, which are now, by their scarcity, from 25*l.* to 35*l.*; and those for the coach, that is, the light active half-blood horses, are from 40*l.* to 60*l.*

And another evil occasioned by this law is, that such farmers are obliged to keep horses of the largest size, which consume the produce of much land, by eating a large quantity of corn, when the smaller horses, working easy, seldom eat any. It is conceived by the same writer, that upon this principle, a law for regulating roads may be enacted, so as to answer every good design of the present, and at the ſame time relieve thoſe individuals who are exceedingly injured, and alſo be of general utility.

It is likewiſe remarked in regard to private roads, that they are by no means properly attended to; and which may be attributed to the general highway act being ſo eaſy of evaſion, that every farmer is able to avoid doing ſtatute duty, or at leaſt next to none. Nothing is more valuable than *time*, eſpecially to a man of buſineſs; and a farmer who executes the office of ſurveyor of the highway, *impartially and effectually*, will find he muſt neglect no ſmall part of his own buſineſs; and after all he might, perhaps, have been as little out of pocket had he done the whole work with his own team and labourers. It is ſtated, that there is no trick, evaſion, or idleneſs, that ſhall be deemed too mean to avoid working on the road; ſometimes the worſt horſes are ſent, at others a broken cart, and a boy, or an old man paſt labour, to fill; they are ſometimes ſent an hour or two too late in the morning, or they leave off much ſooner than the proper time, unleſs the ſurveyor watch the whole day. It is true, that redreſs may be had by application to a magiſtrate; but then how often cauſes of complaint occur; and how many days muſt be loſt to bring each home to the offender; who, *from cuſtom*, thinks he is doing no harm; beſides the conſtant breach of good neighbourhood that muſt be occaſioned by theſe petty litigations. It is ſuggeſted that a remedy might eaſily be had in the following manner. Aboliſh all perſonal ſervice upon the highways. Let ſurveyors be appointed, as at preſent, who ſhould have power, under the authority of two magiſtrates, to raiſe, by rate, certain ſums that may be neceſſary for the repair of the roads within the reſpective pariſhes and townſhips, and to account for the ſame at going out of office at the year's end. The farmer, who acts as ſurveyor, might then be able to repair the highways when moſt convenient to himſelf, and when he could give attention to them without any interruption or impediment, whereas at preſent ſome duty is given up, or nearly ſo, from the difficulties ariſing in collecting it. On the ſame principles, the author of the Preſent State of Huſbandry in Great Britain contends, that an act of parliament ſhould be introduced, for the purpoſe of reſcinding the ancient laws reſpecting ſtatute labour; which have in every inſtance been found ineffectual, and to eſtabliſh other general rules and regulations more likely to anſwer the purpoſe in the new improved ſtate of the country. He adds, that the exiſting acts of parliament reſpecting the making and repairing roads, where the juſtices of the peace cannot commute the ſtatute labour, are not ſufficient for the purpoſe of raiſing a fund ſufficient for keeping the roads in repair. Where the juſtices of peace have it in their power to aſſeſs the inhabitants in a ſum of money in lieu of the ſtatute labour, it is in general not the want of means, but the miſapplication of that means, or negligence in the general management, that is the cauſe why the pariſh roads are almoſt every where a diſgrace to the country. The imperfect and indifferent modes of executing the ſtatute work, as ſtated above, render it neceſſary, it is ſuppoſed, that thoſe ſtatutes enforcing the performance of this neceſſary duty ſhould therefore be aboliſhed; and in every county the juſtices of the peace ought to be inveſted with the power to aſſeſs the inhabitants of the diſtrict by ſome equitable *ratio*, whereby they would pay only in proportion to the benefit they received. Were this generally done, as is the caſe in ſeveral parts of Scotland, the counties divided into diſtricts of ſuch ſize, that the proprietors could conveniently meet as occaſion required; the money ariſing from the commutation act collected by one perſon, who ſhould be allowed a certain *per centage* on the ſum collected, be continued during good behaviour, and be reſponſible for his conduct to the gentlemen of the diſtrict; the money ſo collected be afterwards expended under the direction of theſe gentlemen, and the whole be ſubject to the review of the quarter-ſeſſions; the pariſh roads would, it is ſuppoſed, ſoon be materially improved. If to theſe regulations a power were added to mortgage the ſum ariſing from the commutation of the ſtatute labour for ſuch a number of years, and to ſuch an extent, as was found neceſſary to put the uſeful private roads in a perfect ſtate of repair, they might, it is ſuppoſed, in a few years, be made the reverſe of what they are at preſent. The laſt meaſure would be found the moſt effectual of any that could be adopted, and is probably the only one that can be reſorted to for the purpoſe of effecting an immediate and general improvement.

It has likewiſe been remarked by the author of the "Landed Property of England," in reſpect to the improvement of farm-lands by theſe means, that the art of planning, forming, and repairing roads, is a ſubject with which, for various reaſons, every manager of a large eſtate ought to be familiarly converſant. It is not enough for him to know the theory, or general principles, of the art. It is neceſſary that he ſhould ſtudy it practically in the particular diſtrict in which he is placed; and with the given materials that it happens to afford; as by theſe means he can only be capable of executing the buſineſs with the greateſt poſſible advantage. In this buſineſs a moſt material point, whether in the *laying* out of *new* roads, or *improving* ſuch as have been long eſtabliſhed, is that of giving them all the advantage in direction and other circumſtances that the peculiarity of their nature and ſituation admit of. It has been ſtated by the above writer, that moſt of all the old roads of the kingdom (the remains of the Roman ways excepted) owe their preſent lines to fortuitous circumſtances. Many of them were, no doubt, he thinks, originally foot-paths; ſome of them, perhaps, the tracks of the aboriginal inhabitants, the patriarchal ſavages, who lived by hunting; or of the paſtoral tribes, who travelled with their flocks and herds from paſture to paſture, as herbage and browze invited; or of the firſt ſettlers, between biding places which may not now exiſt. And that theſe incidental foot-tracks, eſpecially when they led through woods, became, as the condition of ſociety advanced, the moſt convenient horſe-paths; as we not unfrequently find at the preſent day. Conſequently, that in this ſtate of ſociety, before wheel-carriages were in uſe, many of the lands of the kingdom were appropriated, by which circumſtance thoſe fortuitous lines of roads became fixed and unalterable; there being no other legal lines left for carriage roads, than thoſe incidental horſe-ways, or ſmall tracks. He ſuppoſes, that in this account of the probable origin of roads, we have, at leaſt in part, the cauſe of the crookedneſs, as well as the ſteepneſs, of carriage roads, between the places which are now inhabited: for true it is, that the traveller is not unfrequently led down one ſteep to make an angle, and aſcend another; while the hang of the hill would conduct him nearly on a level, and by a more direct line. But, admitting that a cluſter of habitations heretofore ſtood at the angle, the ſeeming abſurdity ceaſes. He adds, that formerly, it is probable, the zigzag direction of roads, between towns and villages, was much more obſervable than at preſent. In more modern times, and ſince the legiſlature wiſely interfered with reſpect to appropriated lands, many improvements of lines have been made. And, by the general laws which have more recently been paſſed, magiſtrates are inveſted with authority to alter eſtabliſhed lines. So that now, the expence of alteration may be ſaid to be the only obſtacle, in ordinary caſes, to the perfection of the lines of roads in this country. And which is, of courſe, a circumſtance that has had much effect in improving the convenience of travelling.

And it is ſuggeſted, in reſpect to the direction of roads, that the moſt perfect line is that which is ſtraight and level. But this is to be drawn in a country only which is perfectly flat, and where no obſtructions lie in the way :—joint circumſtances that rarely happen. Where the face of the country, between two points or places to be connected by a road, is nearly but not quite level, by reaſon of gentle ſwells that riſe between them, a ſtraight line may be perfect ;—may be the moſt eligible under theſe circumſtances. But where the intervening country is broken into hill and dale, or if one ridge of hill only intervenes, a ſtraight line of carriage road is ſeldom compatible with perfection. And that in this caſe, which is nearly general, the beſt ſkill of the ſurveyor lies in tracing the midway between the ſtraight and the level line. Here the level line of perfection, for agricultural purpoſes, is to be calculated, by the *time* and *exertion* jointly conſidered, which are required to convey a given burden with a given power of draft from ſtation to ſtation. On great public roads, where *expedition* is a principal object, time alone may be taken as a good criterion. It is likewiſe added, that the moſt regular method of finding out the true line of road, between two ſtations, where a blank is given,—where there is no other obſtruction than what the ſurface of the ground to be got over preſents,—is to aſcertain and mark, at proper diſtances, the *ſtraight line ;* which is the only certain guide to the ſurveyor. And that where the ſtraight line is found to be ineligible, each mark becomes a rallying point, in ſearching on either ſide of it for a better. If two lines of equal facility, and nearly of equal diſtance from the ſtraight lines, preſent themſelves, accurate meaſurements are to determine the choice. If one of the two beſt lines, which the intervening country affords, is found to be eaſier, the other ſhorter, the aſcent and the diſtance are to be jointly conſidered, the exertion and the time required are likewiſe to be duly weighed. Further, alſo, the nature of the ground, the ſource of materials and, generally, the comparative *expence* of forming the road by two doubtful lines, as well as their comparative *expoſure*, are to be taken into conſideration. A long line of road, acroſs a broken country, ſhould not be haſtily drawn or determined upon by the directors of this ſort of buſineſs.

But in regard to the moſt difficult and troubleſome part of this ſort of work,—the neceſſary management in the aſcent of hills,—it is obſerved that, whether in laying out a freſh line, or in altering an eſtabliſhed one, modern road ſurveyors, like many other reformers, have run from one extreme to another. To do away the abſurdity of going up one ſteep and down another, to aſcend a third in order to reach the required elevation (a common occurrence on fortuitous roads), they have ingeniouſly, but very injudiciouſly, given an uniform riſe from the bottom to the top of the aſcent. In the theory of mechanics, and where mechanic powers only were to be uſed, a regularly inclining plane would be perfectly proper, in a caſe of this kind. Where the requiſite power is to be applied by rational beings, the ſame principle, though not altogether perfect, may be allowed ; but when the moving power is neither purely mechanical, nor in a ſufficient degree rational, but an irregular compound of theſe two qualities, the nature and habits of this power require, he thinks, to be conſulted. It is, he conceives, one of many inſtances, which ſhew the impropriety of applying purely mechanical principles, in agriculture and rural concerns, in which they are to be combined, not only with the power but the will of the animals. No man who has been accuſtomed to drive a road team, or in the habit of ſeeing one driven in a hilly country, and who properly regards what he ſees, would lay out a long line of aſcent without one or more breaks, or convenient reſting-places ; in which the animals of draft may relax at their eaſe, and ſet off again without difficulty. He, however, obſerves, theory will readily ſuggeſt that, by a dragſtaff, or pall, a carriage may be ſecurely ſtopped on the ſteepeſt aſcent. But practice well knows the danger of checking the efforts of beaſts of draft while they are ſtruggling againſt the collar. For if they poſſeſs any habits, or even the ſeeds of reſtiveneſs, nothing is, he contends, more likely to encourage, or produce it, than ſuffering them to ſtop under the difficulties of draft. Beſides, thoſe which are true to their work, well knowing the extraordinary difficulty to be overcome, in putting a carriage at reſt into motion in ſuch a ſituation, ſtop under a degree of anxiety ; while the more ſpirited and irritable ſtand on the rack, and tremble at the apprehenſion of the painful effort they have to make. But let them ſee an end, or a reſpite, of their endeavours, and they will ſtruggle with willingneſs. A reſt, after the difficulty is ſurmounted, comes as a reward for their exertions. But where the natural ſurface of the ground is well ſtudied in any given caſe, there will ſeldom, he ſuppoſes, be much difficulty in aſſigning the places proper for reſts ; ſo as to make the road not only eaſier for carriages of burden, but ſafer and more pleaſant to travellers, as well as more ſightly : beſides being better to be kept in repair, than an uniform deſcent ; by reaſon of the flatter ſtages being checks to the ſurface water, and convenient places to get rid of it, without injury to the face of the road. But where ſuch breaks do not occur, the line of aſcent ſhould be uniform ; or as nearly ſo as the natural ſurface, or immoveable obſtructions of the acclivity to be ſurmounted, will allow in the particular caſe.

Likewiſe in the ſetting out of theſe lines, the common level is to be ſet by an obſervation from the bottom to the top of the aſcent (theſe points having been previouſly determined on, by the given circumſtances of the general line of the road), or from ſtation to ſtation where a clear view cannot be had between the extremities ; and the degree of aſcent, thus aſcertained, is to be marked with a pencil upon the inſtrument that is made uſe of for the purpoſe. And by this mark it is adviſed to trace a rough line along the face of the hill ; in order to determine, with ſufficient truth, reſpecting the proper breaks, or reſting-places, that may be required ; endeavouring to fix upon ſuch natural breaks in the ſlope as are ſituated in, or ſufficiently near, the general line of aſcent. And that when this has been done, to aſcertain, by ſimilar obſervations, the exact angle of elevation, or degree of ſteepneſs of each riſe, or length of aſcent between the breaks, &c. by theſe means procuring an unerring guide, in marking out and forming the baſe or bed of the road ; without the riſk of incurring unneceſſary labour and expence in doing the work twice over to bring it to the truth, or a ſtate of ſuitable exactneſs.

But it is well remarked by Mr. Marſhall, that the beſt ſervices of the road ſurveyor lie in avoiding, not in ſurmounting hills. And that in a long line of road, between places of nearly equal elevation, this may often be done. There are inſtances of the moſt public roads going over the tops of hills, where lines of equal length might be traced along their baſes ; and the difficulty and danger of aſcending and deſcending the ſteeps be avoided by ſuch means.

Very much attention has lately been beſtowed on this department

partment of the road-maker's bufinefs, efpecially in the more northern parts of the kingdom; but much is ftill left to be accomplifhed, efpecially in the weftern diftricts of the fouthern parts of the ifland, where an attachment ftill remains to the original lines or directions.

And it is fuggefted by Mr. Beatfon in the paper above alluded to, that the bufinefs of laying out the lines of roads may, in fact, be reduced to three fimple principles; thofe of fixing upon the *fhorteft*, the *moft level*, and the *cheapeft* directions, for which, though apparently very eafy of execution, from the frequent occurrence of circumftances that render it neceffary to deviate from them, the knowledge and experience of the furveyor are found requifite. The firft requifite from its being a ftraight line, is often neceffary to be departed from in order to avoid the removal of expenfive obftacles, fuch as hills, rocks, water, and moraffes. The fecond is of vaft importance, and fhould invariably be adhered to, if poffible, even though the other two fhould, in a certain degree, be given up; for it is infinitely better to go a confiderable way about to obtain a level road, than to go ftraight forward and be obliged to take an afcent; but it may, in fome cafes, be preferable to afcend a gentle rife, in order to obtain a good hard bottom, and a road eafily made, than to go on a level through a fwamp, or piece of water, which would require a much greater quantity of materials, be much more difficult to keep in repair, and occafion a great deal more expence. It is not the moft hilly line to appearance that is always to be rejected as being the leaft level; for the fteeper and fhorter fome hills are, it will be the eafier to obtain a level road in that direction, by cutting down the fummits, and laying the materials taken from them in the vallies or hollow parts, which, in many inftances, may be done with great facility. And the third, or the leaft expenfive line, is alfo frequently given up, in order to obtain one or both of the other two. It is therefore concluded, that much depends on the fkill and ability of the furveyor, who, before he finally determines on a line of road, ought to make himfelf perfectly mafter of every part of the intermediate and adjacent country; nor fhould he rafhly determine at once, but fhould examine repeatedly, over and over again, whether no other line would be better than that he firft thought of.

And with refpect to the parts or divifions of which a public road fhould confift, it is obvious that they fhould vary in fome meafure, according to the nature of the traffic or bufinefs which is carried on upon them, the fituation in which they are placed, and the particular circumftances of the different cafes. It is, however, contended by the author of the "Landed Property of England," that the plan and formation of all *public* roads fhould be the fame; every public lane, or other fcite of a public road, he conceives, ought, where the width and other circumftances will permit, to be divided into three travellable lines, namely: 1. A middle road of hard materials, for carriages and horfes, in winter and wet feafons: 2. A foft road, formed with the natural materials of the fcite, to be ufed in dry weather, to fave the unneceffary wear of the hard road, and to favour the feet of travelling animals; as well as for the fafety, eafe, and pleafantnefs of travelling in the fummer feafon: and 3. A commodious path, for the ufe of foot paffengers, at all feafons. But in thefe cafes, he thinks, modern practice has fimplified too much. Inftead of thefe three requifites of a public road, we generally find a parliamentary or turnpike road (away from the environs of great towns), confifting, fimply, of one uniform broadway of hard materials; upon which horfes ftumble, and carriages jolt, the year round: while travellers on foot are feen wading to their ankles in mud, or in duft, according to the ftate of the wind and weather. His notion of what the nature of a public road ought to be, is, that within the fences of a lane or road there fhould be a raifed foot-path, a convex hard road, a foft fummer road, and channels to carry off the water collected by the carriage roads; the foot-path being cut acrofs, in proper places, to permit the water, which falls on that fide of the middle road, to pafs off freely into the ditch at that fide, as well as to prevent horfemen from riding along the path; the oppofite hedge-bank being perforated, to let off, into the other drain on the contrary fide, the waters which may collect on that fide of the lane or road.

And in regard to *private* roads it is contended, that where they are much ufed, as in fuch as lead from a village or other place to a public road, they fhould have a double carriage path, fo that carriages may any where pafs each other. But that for fuch as lead merely to a farm-houfe or a hamlet, a fingle line fufficiently wide to let a fingle or faddle horfe pafs a carriage with occafional dilations for carriages to pafs in, are only in general requifite.

Form of Roads.—Further, in regard to the moft appropriate form of roads, there has been a great difference of opinion among the perfons engaged in this fort of work, fome contending in favour of the *convex* form, while others are inclined to think the *concave* fhape preferrable in many cafes; and ftill others, that they fhould be either made perfectly flat from one fide to the other, with inclined planes longitudinally, or be *wholly flat* in every direction. But experience fully fhews, that fome degree of the convex form is neceffary in almoft every cafe, in order that the wetnefs and moifture may be difcharged with greater facility, and of courfe the roads be preferved in a more dry ftate. And in fpeaking of this form of road, Mr. Beatfon obferves, that the rife in the middle is more or lefs according to the fancy or whim of the makers, but in general it is a great deal too much. This form is adopted on the idea, that whatever wet falls upon the road will run off towards the fides into drains made there for the purpofe of receiving it. If the roads were a perfect fmooth hard furface, this theory would, no doubt, he thinks, hold good; but in practice it is found not to be the cafe, for the wheels of carriages occafion fo many ruts, and fuch a roughnefs on the furface of the roads in general, that little or no water can run towards the fide-drains, however convex the road may be. It confequently lodges in thofe ruts, and every fucceeding carriage, he thinks, the more eafily makes them deeper, and works the water and materials together in fuch a manner, as very foon to render the road extremely difagreeable. This frequently happens, he afferts, even on roads that have been made moft incommodioufly convex, for the very purpofe of keeping them dry; confequently, the convexity of a road has not the defired effect of preventing water lodging upon the furface. Befides, it is, he conceives, extremely inconvenient for all wheel carriages, and deftructive to the road itfelf, by making the loading reft unequally upon the wheels, unlefs when going on the very middle of the road, for the loweft wheel will always bear the greateft part of the burden, and therefore will injure the road the more in proportion. If a cart or any carriage with two wheels is loaded, we will fuppofe, with two tons weight; when that cart is upon a level from fide to fide, the load is equally divided, and each wheel fuftains the weight of one ton; but if that cart is going on the fide of a convex road, there will perhaps be the weight of a ton and a half upon one wheel, and only half a ton upon the other, confequently the lower wheel, in this cafe, will do the road as much injury, as if the cart were loaded with

with three tons upon a level, inftead of two upon fuch a declivity. The proportion of weight upon each wheel, according to the declivity, will depend on the nature of the loading of the cart, for the higher the centre of gravity of the load is, the greater will that weight be on the lower wheel on the fame declivity; and therefore a cart loaded with hay, ftraw, or wool, or any other bulky commodity, will be more injurious to a convex road, unlefs when on the middle of it, than the fame cart loaded with the fame weight of ftone, lead, or iron, or any other weighty commodity which lies low in a cart: and nothing can be more injurious on fuch roads, than a ftage-coach loaded with outfide paffengers. But the deftructive confequences of allowing carriages to heel much on any fort of road are even vifible, though in a fmall degree, he fuppofes, from the effect produced by a wheel going over a ftone, or any hard fubftance lying in one of the tracks or ruts, in which cafe there will foon be a deep hole formed by the wheel in the other track, directly oppofite to that ftone or fubftance which raifed the other wheel. Every precaution ought, therefore, to be ufed to prevent carriages heeling to one fide on any part of a road. And he fuggefts, that the inconvenience, and in many cafes the danger, of going on either fide of a convex road, makes all waggoners, carters, coachmen, &c. keep always on the middle, by which, on fuch roads, there is feldom any other part ufed by wheel carriages, however wide the road may be; confequently, by the carriages being always confined to the fame track, that part of the road foon gets out of repair, and requires a conftant outlay of money to keep it in proper order or condition for being travelled upon. It is alfo added, that the method of forming and making the convex roads, in the firft inftance, appears to him very abfurd. He fuppofes, that before any hard materials are laid on, the road is generally formed in fomewhat a hollow manner, rounded below, in which there are drains, or ditches, on each fide: alfo the footways or horfe roads when made high enough. Thefe are alfo fometimes called the fummer roads, on account, he fuppofes, of that being the only feafon they can in general be travelled upon. The road forms a convex line, about ten or twelve inches lower at the fides of it than the footway and fummer road. After being thus formed and prepared, the hard materials, moftly confifting of broken ftones, are laid on, which, it is fuppofed, will fill up that fpace which is the hollow in a convex line, and when finifhed, the whole furface, from one fide to the other, forms one convexity; the footways or horfe roads being made a continuation of the fame curve. And this is ftill with the idea, that all the water that falls on the road will run into the drains on each fide. But let any perfon, in wet weather, take a view of a road thus formed, and he will find, that, in general, however great the convexity may be, the water will ftand in every rut and every impreffion made upon it, efpecially if the road has been long travelled upon; that the ftones on the furface are pulverized by heavy wheel carriages, and the wet earth from below worked up among them. Alfo where the road is but newly made or repaired, and the materials are fufficiently porous to let through the water, it will then lodge on the convex furface, in every impreffion of a ftone or other uneven part, particularly at the fides, where it is dammed again by the footways, and thus the bed or foundation of the road is kept conftantly moift, and of courfe it will very foon go out of repair. By this continual moifture the ftones fink down into the foft earth, of which the bed of the road is compofed, and this earth works up through the harder materials, and occafions all that dirtinefs generally on the furface of roads in wet weather, although, perhaps, ten or twelve inches in thicknefs of thofe hard materials had been at firft laid over it. Sometimes, indeed, there are under-drains made through the footway, from the fide parts, at every ten or fifteen yards diftance, to convey the water into the ditches; but even this is not found to anfwer the purpofe intended, for the intermediate fpaces foon become fo impervious, that the water does not pafs through them to enter thefe drains, the wet earth being converted into a fort of puddle, refembling what is ufed, in aquatic works, for the purpofe of preventing the moifture from penetrating through, and confequently it lodges in all the ruts and hollows on the furface, without paffing off fo quickly as fhould always be the cafe in fuch inftances.

Befides this there is another manner of forming thefe convex roads advifed in the Bedfordfhire Agricultural Report, in which it is propofed to leave a hollow or vacuum, as it is called, in the middle, to depofit the hard materials in. The only difference that appears to be between this and the method defcribed above, is, that inftead of the bottom of this hollow being made convex, it is made flat, and alfo deeper. It is thought that this method is liable to the fame objection as the former, perhaps even in a ftronger degree; befides, it would require a much greater thicknefs of hard materials, which are very expenfive, and thofe materials would be deepeft or thickeft in the middle of the road, where the wheels of carriages hardly ever go, confequently that part is not fo liable to be cut up as the tracks in which wheels moft generally run, and produce their greateft effects. Mr. Marfhall feems, however, to think more favourably of this form of road, efpecially for wet weather, affuming it as a found pofition, that roads, in general, which are intended to be travelled in wet feafons, fhould be *convex* or *fhelving*, not flat or concave. It remains to determine the proper degree of convexity of the hard line of road; from the margin of which the dry-weather line ought to fhelve gently to the foot of the hedge-bank; fo that carriages may pafs freely, and fafely, from one line to the other; and in order that the rain-water which falls on that fide of the lane may find its way, eafily, into the channel prepared for it, which is, he conceives, for a wet-weather road, to be regulated by a variety of circumftances: as, firft, by the materials of which it is to be formed: foft materials are moft liable to be worn into ruts and hollows, and require to be laid up with a quicker defcent for rain water, than hard materials, which require lefs elevation or rotundity of furface; and leaft of all a firm even pavement. Secondly, that a convex road in the face of a fteep is to be laid up higher, with a given material, than one on more level ground, on which rain-water has no other tendency than to the fides; whereas in the face of a fteep, it it may have an equal or greater tendency along the line of road; and is liable to be caught by the flighteft impreffions of wheels; and thus to wear channels, as may too often be feen, from the top to the bottom of the hill. Even where the furface of the road is perfectly fmooth, it may have twice the diftance to run, before it reach the outer margin, that it has on a level. And thirdly, that the degree of convexity is to be determined, in part, by the width of the road; the materials and defcent being equal. A wide road requires to be formed with greater fideway defcent than a narrower one; which more readily frees itfelf from rain-water, inafmuch as the diftance is fhorter from the crown to the outfkirts of the road in fuch inftances.

But that the freeing of a road from rain-water is not the only object to be kept in view, with regard to its convexity: the eafe and fafety of carriages, and particularly thofe of burden, whofe loads, being of light materials, are laid up high, require to be confulted. A carriage moves moft freely, and with the leaft exertion of draft, when the load lies

lies evenly upon the wheels on either fide. In proportion as the weight is thrown on one fide or the other, the refiftance is increafed; efpecially on the road which is liable to impreffion. Hence the inconvenience of a highly convex road in the face of a fteep; and hence the utility of breaks in long afcents, or fuch roads as are formed in hilly fituations.

In fact, he conceives it evident in refpect to convexity, that every part of a road fhould be equally and duly convex, —fhould be equally fafe and eafy for carriages of every defcription; otherwife it becomes partially worn; the more level parts only are ufed; the fteeper being in a degree ufelefs. Hence a road of even and due convexity is not only eafy and fafe, but may be formed of a narrower width, than one whofe fteep fides are neither eafy nor fafe to be travelled; and whofe crown, only, is in ufe for paffing upon. And on meafuring different paffages of roads which appeared to lie in the moft defirable form, and taking their convexity, or the elevation of the crown or middle of the road above the bafe line, he has found that roads of twenty feet in width rife about ten inches: namely, one inch in every foot, on either fide. And he is of opinion that this refult may be taken as a general guide in forming roads: this middle degree of convexity being liable to be altered according to the width of the road, the nature of the materials, and other circumftances which have been ftated already.

And concerning the fecond or concave form of roads, Mr. Beatfon thinks that it is quite the reverfe of the common form, being loweft in the middle, where other roads are generally made higheft. By differing fo widely from the common practice, and the general opinion of road makers, one would at firft be almoft inclined to fuppofe, that fo fingular a practice in forming roads could only proceed from a defire or propenfity to differ from the reft of mankind: but when we are told that the late celebrated and ingenious Mr. Bakewell was an advocate for this form; that the road by his farm of Difhly, and that through Mefham, in the fame county, are both upon this principle, and in much better order than the roads found about them; likewife that the road through Bredon, made under the direction of Mr. Wilkes, is of the fame form, and is faid to be better now than ever remembered before, and kept in order at much lefs expence:—when we confider thefe well authenticated facts, fupported by fuch refpectable evidence, we naturally conclude that the reafons for adopting this uncommon form of road, are founded on fomething more fubftantial than mere whim and caprice; and confequently deferve to be more fully inveftigated. This writer ftates, that he has not been able to learn the manner of forming thefe kinds of roads before the hard materials are laid on, but, when completed, he underftands the form is fomething fimilar to that of a paved ftreet, with a drain for the water in the middle. The whole width of the road is divided into three equal parts, or nearly fo. The fides are made quite flat. The middle divifion has a gradual but fmall defcent, or concavity, from each fide to the middle part, which is the middle of the road. This concavity has alfo a fmall defcent lengthways, made on purpofe, if not declining naturally, fufficient to carry off the water to proper outlets. In the middle divifion the beft and hardeft materials are laid. The direction of Mr. Wilkes, as ftated in an ingenious paper, in the firft volume of Communications to the Board of Agriculture, is, that when the fall is one foot in 150 or 200 feet forward, the fall from the fides towards the middle ought to be 15 inches in 20 feet. When one foot in 100 to 150, to be 12 inches. One foot in 30 or lefs, to be even the whole breadth. Where the width of a road is 60 feet, one foot of fall to each 40 feet in length of the road. Twenty feet from the fides towards the middle, to have nine inches of fall.

The inner 20 feet to be flat.

And Mr. Bakewell's idea, he is informed, was, that water, where it can conveniently be applied, fhould frequently be let run upon this concave part, in order to wafh it quite clean; for it is always obferved, where a fmall ftream of water comes upon a road, that part, if the bottom is good, is generally firmeft, and hardly ever gives way. To have a command of water, therefore, to flood the road at pleafure, he thought would be of great advantage in keeping it in order. And the other ufeful properties attending a road of this form are the following: There are three parts of it on which wheel carriages may go, without heeling to either fide; on the fide divifions, and alfo on the middle divifion, when the horfes walk in the loweft part. This is certainly a material advantage, being much more eafy for the horfes and lefs injurious to the road. By carriages ufing indifcriminately thefe three tracks, all parts of the road will wear more equally and for a greater length of time; whereas in the convex roads, there being only one part, namely, the middle, on which carriages can go without heeling, that part only is moft generally ufed, and confequently fooneft gets out of repair, which is a great inconvenience in fuch roads.

With refpect to flat roads floping longitudinally, the advocates for them obferve with good reafon, that by being flat or level from fide to fide, the preffure of wheel carriages will be more equal, the friction lefs, and all parts of the road may be travelled on with the fame facility; confequently it will wear more equally, be eafier kept in repair, and require fewer materials for keeping it up. But notwithftanding fuch advantages are deferving of attention, it muft feem to thofe unaccuftomed to fuch a form of road, a difficult matter to keep it fufficiently dry, or free from the ftagnation of water upon it. But from its having been obferved that the ruts made by the wheels of carriages prevent the water running to the fides of convex roads, it is propofed that roads of this form fhould have in every level part gentle flopes, fufficient for water to run along, which, fuppofing them to be one foot in fifty, would hardly be perceptible. On thefe flopes, or inclined planes, the ruts made by the wheels of carriages would promote the water running off, by forming fo many little channels or conductors for it to run into the lower part of thefe flopes, from whence it muft be properly conveyed away. By this plan fuch roads will be much more eafily kept dry than the common roads ufually are or can be from the nature of their conftruction.

And farther, in regard to the wholly flat form of roads, the reafons given for them are nearly the fame as ftated in fupport of the laft, only that as there are few parts of a country fo perfectly level, for any confiderable diftance, that water will not run either one way or another, it is confequently unneceffary to be at the expence and trouble of forming thofe flopes or inclined planes recommended in the preceding form; but that proper outlets fhould always be kept clear at every hollow part, and if the road fhould in any place be quite level, a fhallow crofs drain, that will occafion no impediment to carriages at every 50 or 60 yards diftance, or nearer, will keep the road fufficiently dry.

And it is from thefe ftatements concluded by Mr. Beatfon, that the main objects fought after are, 1. To keep the road always as free from moifture as poffible: and 2. To conftruct it in fuch a manner, as to render the draft or communication eafieft, at the leaft expence. In thefe are

 compre-

comprehended all the requisites necessary to form a complete road. To attain them in the best manner is therefore the important point. Four different methods have been stated, each of which has its supporters. The arguments in favour of each have also been shortly mentioned, which will shew that their main object is the same, unless perhaps the idea of watering the concave road may be considered a deviation from one part of the general rule; but as that is proposed to be done only to wash the road occasionally, in case it becomes dirty or slushy, it cannot therefore be considered in that light in any respect whatever. But from these modes of constructing roads being in some measure unsatisfactory, he is induced to offer a new theory on the subject, which is founded on the knowledge of the stratified nature of the earth. It is however only given as theory, having never, he believes, been subjected to the test of actual practice. It is observed, that every person who has paid the least attention to the structure and formation of the different strata of the earth, must have seen that some of these strata are of so close a texture as to be impenetrable to moisture; others again are so porous, that water will easily run through them in any direction, till it meets with some obstacle, or finds a vent. Of the first sort some are less dense, and of the latter some less porous than others, consequently as they partake more or less of these qualities, the water or moisture will the more or less quickly penetrate through them. But in order to shew this more clearly, and apply the principle to the construction of roads, he supposes the section of a hill or eminence composed of a number of strata. If the upper stratum or surface soil is of a porous nature, it is evident that any water which falls upon it, will penetrate through to the stratum below, where, if it cannot go farther, it will glide along the surface till it finds a vent at the bottom of the hill; if the second stratum is hollow, and continues on towards any depression in it, the water will lodge in that hollow, and form a sort of pool or bog, as is sometimes observed on the tops of hills; but if in this hollow place there is a communication with the porous stratum, no water will lodge there, but it will penetrate through and glide along the upper part of the dense stratum below, till it finds a vent on the side or at the bottom of the hill, as before. And by the above it will also appear, that if the uppermost stratum is of a close texture or clay, any water falling upon it will not only lodge in the large hollow, but in the smaller ones, and in all the other irregularities or concavities that may happen to be upon the surface. Hence, also, it is evident that in order to keep dry the surface of any such piece of ground, it matters not of what shape or form that surface is, or whether it is convex or flat, provided there is a communication with some under stratum, sufficiently porous to carry off the water below; but it is of some consequence the form of the upper part of that stratum upon which the water is to run, for the smoother it is, the water will of course the more easily flow away, and be discharged from it.

It is easy, it is supposed, to apply these principles in the forming of roads in the following way: when a new road is to be formed, let it be done in the first instance nearly in the usual manner, with such materials as are on the spot, and the nearer the quality of these approaches to *clay*, so much the better. Instead, however, of forming it convex, as is generally done, let the lines on either side from the middle be quite straight, and meet in an angle or ridge at that part or the middle of the road, having a slope from thence to each side, of about an inch in a foot. There are to be made small drains for the more easily conducting away the water that may be collected at those places. The road, being thus formed, must be allowed to harden and settle for some time before any other materials are laid on, great care being taken, while in that state, to let no carriages or cattle upon it, and it should be rolled with a long wooden roller, that will reach at once from each of the sides to the middle. This roller should be loaded with a box of stones to make it sufficiently heavy, and that it may be the more portable when that box is taken off; and it may be so contrived, that by changing the horses from one side to the other, there will be no occasion to turn the roller, in order to make it roll the same space over again. Being rolled in this manner, will consolidate the materials composing the ridge of road, and prepare it for receiving those to come afterwards, for it is a most absurd practice to lay hard materials in the common way upon this first form or basis of a road, before it is sufficiently firm to bear them. When thus formed and properly settled, the next step to be taken is to imitate the works of nature in dry soils as nearly as possible, by forming a stratum penetrable by water, composed either of sand or sandy gravel, or any other substance easiest to be got, that is sufficiently porous to admit water to pass through it. This stratum should be laid quite level, and extending from one side of the road to the other, filling up the small drains also on the sides. Over this are to be laid the best materials that can be got for completing the road, consisting either of stones broken very small, or of the best gravel. This coat of hard materials need not exceed above six or seven inches in thickness, which being much less than is commonly used, will be a considerable saving; and it may even still be less, if the directions hereafter given are strictly attended to. If this covering consists of broken stones, they should afterwards be laid over with sand or fine gravel, when easily procured, so as to fill up all the cavities betwixt them. The sand or rubbish from a freestone quarry is excellent for this purpose, providing there is no mixture of earth in it, which should be carefully guarded against in every step taken after the road is first formed. These finishing materials being properly laid on and smoothed with a rake, the whole should now, before any carriages or horses are admitted upon it, be well rolled with a heavy iron roller, divided in three parts for the purpose, the two hind divisions of the roller being large, the front or middle division smaller, to the framing of which the shafts are fixed, and so contrived, that it turns in the manner of the fore-wheels of a waggon; there is a box for holding stones to increase the weight when necessary; but in adding this weight, it must be observed to lay about two-thirds of it over the two large parts, and only one-third over the other, otherwise the pressure will not be equal. Iron rollers are sometimes made in three parts, as above, but being all in a line, and close together, they are apt to be choaked by gravel and small stones, which cannot happen in the construction here recommended. It is contended, that if such a roller were generally used upon roads, especially when newly made, it would save a great deal of expence in repairing them; for it cannot be expected that any new road will immediately bear wheel-carriages, or continue long in repair, when composed entirely of loose materials, without the smallest pains being taken to consolidate them together. Frequent and heavy rolling would therefore produce the most beneficial effects, and would tend very much to keep the road free from deep ruts and holes; besides, there is nothing could contribute more effectually to promote and preserve firmness and solidity, two qualities without which it is impossible any road can, with propriety, be called a good one, or have the necessary degree of solidity and firmness.

The advantages that would result from this mode of construction ftruction would be various: by being level on the furface, every part of it is equally commodious for carriages, confequently it will all be equally travelled upon, and the deep ruts fo frequent in other roads, will almoft entirely be prevented. It will therefore be much eafier kept in repair, and, if properly managed at firft, will be made at lefs expence than the common roads, efpecially in a fandy foil, or where fand or gravel is eafily procured. The draft will be much eafier on fuch a road. And one very important advantage is, by having an under-ftratum through which the water can penetrate, and the cavities among the harder materials being filled with the fame porous fubftance, no water can ever lodge on the furface, nor can it ever become fo dirty as other roads are in wet weather; all the water that falls on the furface, unlefs perhaps in very heavy rains, being conducted away underneath and in every part. And it may be added, that from the fmall drains on each fide of the road, crofs-drains fhould be carried through the fences, provided the level of the ground will admit of it, at the diftance of every ten or fifteen yards. Thefe crofs-drains may be made of wood, with about an inch bore, or of ftone, if preferred.

It would be of great advantage to this fort of road, as well as to every other road where the ground is inclofed on each fide, that the fences fhould be funk towards the fields, and the water be conducted through to thefe funk fences, inftead of the common method of leaving large open ditches and drains on each fide of the road. It muft alfo be particularly attended to, that on all floping roads on a declivity, where the water is apt in heavy rains to run upon the furface, or at the fides, that it ought never to be allowed to run in the fame direction more than ten or fifteen yards, but at that diftance to be conducted away to a fide into the main drains. It will then do little or no harm, as it can never increafe beyond a very weak ftream; but if it is allowed to run one hundred or two hundred yards, it will probably be increafed to fuch a fize before it reaches the bottom, that it will wafh away a great deal of the materials, and may befides very much injure the road or fences on each fide of it, which would be highly difadvantageous in many refpects. Befides, it is fuggefted, that a road formed on this plan need not be quite fo wide as roads in general are made, for the whole furface of it will be in ufe from one fide to the other, and therefore from twenty to twenty-four feet wide is quite fufficient, unlefs near populous towns or extenfive works, where great numbers of carts or waggons are employed. And in the interior parts of the country, twenty feet in width will anfwer every purpofe required. He has obferved in feveral places, where the roads have not been above eighteen or twenty feet wide, and properly made from fide to fide, that they were in much better condition than the neighbouring roads, from thirty to forty or fifty feet wide. On thefe wide roads, formed in the ufual way, there is feldom more than eight or ten feet in the middle of them generally made ufe of; the remainder one on each fide being occupied by heaps of ftones, fcrapings, and other rubbifh, which, although they may partly be of ufe fometimes in repairing the roads, ought on no pretence to be allowed at all times, or at any time, to lie there; fuch rubbifh being not only difgraceful on the fides of a public highway, but even dangerous, particularly in the dark, for either carriages or horfes; befides having various other difadvantages arifing from the growth of weeds, and the diffemination of their feeds.

But in refpect to the moft proper and beft form of the roadway of narrow lanes, as thofe leading from village to village, in reclufe fituations; where bridle roads, or packways, have been fo far opened as to admit carriages; or though the whole width of the lane may not be more than eight or ten feet, it is remarked by the author of the treatife on "Landed Property," that on fuch a narrow fpace, a whole barrel, or convex road, cannot eafily be kept up. If raifed, it prefently wears into a middle track, and two wheel-ruts, with foul drains on either fide of them; and becomes, in wet weather, a dirty trough, which is unfit for either carriages or horfes, and in which a foot paffenger has not where to fet his foot. But that provided fuch a lane be thrown into a fhelving form, refembling half a barrelled or convex road, a greater width of travellable road for carriages and horfes will be obtained; ruts will not be fo liable to be formed; the whole of the water of rains will be thrown on one fide; while the other will afford a comfortable walking path at all feafons. And this, it is added, is now no longer merely a probable, but a tried improvement. Lanes, ten, twelve, or more feet wide, have been ftrikingly improved by it. And it is further fuggefted, that when water, in a wet feafon, is apt to ooze out of the banks on the upper fide of the lane, a narrow channel is to be cut, to prevent its overflowing the road: or, in forming the bed of the road, the inclination may in fome cafes be reverfed; fo as to throw the drain on that fide of the lane from whence the fpring water iffues: thus the fame drain will ferve for the fpring and the rain-waters. And it is added, in regard to this femi-convex form of road, that it is applicable, not only to narrow lanes, but to the fides of hills; where the road, as it generally ought, is conducted fidelong, not directly, up the flope. By this form of the road, the whole of the water which falls upon it will be got rid of, without inconveniency or expence. And the bed of the road, for this purpofe, may be made narrower than for a full convex road; a circumftance which, in fome cafes, may become a faving of much expence. The upper fide of a road in this form being nearly level, and firm to the foot of the fteep, would be chofen by afcending carriages; while the lower fide would acquire a loofenefs of furface, and be ufed by laden carriages going downward; and while a raifed foot-path, on the lower margin, would be a fecure guard, and a relief to the apprehenfions of timorous travellers.

But in relation to the width of public roads where a blank is given, it fhould be regulated, Mr. Marfhall fays, by their publicity, as it is compound folly to make a road wider than its ufe demands. He fuppofes that there are few roads, even near populous towns, that require a greater width than about thirty-three feet. But every public road, under common circumftances, fhould have a line which is travelable at any feafon, and of ample width to permit two carriages to pafs each other with freedom and fafety. This ample width let us fet down as one ftatute pole. In deep clayey diftricts, where hard materials are difficult to be procured, a fingle road, of half a pole in breadth, with dilations at proper diftances, to let carriages pafs each other, may, in many reclufe fituations, be advifable. This regards the breadth of the winter road, for carriages and animals of burden. But that the width of a public *lane* requires a more enlarged view. On the plan offered, it is to contain, not only a wet-weather road, for carriages and horfes; but a fummer road, and driftway; as well as a foot-path, which may be ufed in any feafon. He obferves, that in many parts of the greateft public roads acrofs the kingdom, the lane is not more than twenty feet wide. But this being filled with hard materials, from hedge-bank to hedge-bank, carriages alone feldom find any inconveniency in thefe narrow parts. But where carriages, and large droves of cattle or fheep meet in them, ftoppages are unavoidable, and great inconvenience is of courfe fuftained.

And

And it is thought, that the width of the *driftway* ought, like that of the hard materials, to be guided by the publicity of the given road. In a great public road, it ſhould certainly be wide enough to let two carriages paſs each other, or one pole in width. But in one of leſs publicity, or where the exiſting lane will not admit of that width, a ſingle carriage path may ſuffice; as this being a continuance of the width of the hard road, no difficulty in paſſing can be experienced, it is ſuppoſed, from it.

But the width of the *foot-path* and the ditch may vary from half a pole to ten feet.

It is therefore concluded, that on theſe premiſes, the width of the lane of a great public road, near a populous trading place, ought to be fifty-nine feet and a half; and that of a common market-road, thirty-three feet. And theſe widths, without any previous intention, come out nearly the ſame as thoſe directed by act of parliament, for the lanes of turnpike roads and highways. A great error in the act, however, is, that the lanes of all turnpike roads, ſhall be ſixty feet wide: thus incurring a ſerious waſte of land; and creating great nuiſances; which green lanes ever are to the occupiers of adjoining lands. He from this ſuggeſts, that where exiſting lanes are wider than all the deſired conveniencies require, ſlips ſhould be ſold off their ſides, and be laid to cottages, or to the adjoining incloſures; having receſſes here and there, in which to lodge materials. It has long appeared to his mind an evident poſition, that every part of a public lane ſhould be uſed; and conſequently that no part of it ought to be a nurſery for weeds, or an unprofitable common paſture for ſtarving ſtock. Still he remarks, that a wide lane has its advantages; eſpecially in a low cloſe ſituation. It gives freer admiſſion to the ſun and air than a narrow lane, and the road dries more quickly. And further, that by permitting a more forcible current of wind, the pulverized materials, or dirt of the road is, in dry ſeaſons, carried off in the ſtate of duſt; leaving the uſeful materials undiſturbed. And it is highly proper to place the principal line of road in the midway of the lane, that it may be the moſt effectually expoſed to the agency of the ſun and wind.

Mr. Beatſon even ſuſpects, that, in the whole kingdom, thouſands of acres of fertile lands are loſt to the public, merely by making the roads ſo much wider than there is any neceſſity for. In the vicinity of large towns, they ſhould have an ample width, as 30 or 40 feet; or, in ſome caſes, conſiderably more, as near the metropolis. But the practice of making them 40 or 50 feet wide, as is ſometimes the caſe, through a thinly inhabited part of the country, or near the moſt pitiful villages, where even 20 feet would be ſufficient, is, he contends, a mere waſte of ground for no purpoſe, and occaſions a very great additional expence in making ſuch roads, which certainly might be avoided. Suppoſing the medium neceſſary width of road to be 7 yards, or 21 feet, and that the medium width now made is 11 yards, or 33 feet; this is, upon that ſuppoſition, 4 yards wider than is neceſſary; which, in every mile, is a loſs of 1 acre 1 rood and 2 perches: and ſuppoſing there are 5000 miles of ſuch roads in the whole kingdom, there is a loſs of more than 6300 acres, which, if eſtimated the ſame as the improved value of the waſte lands, at 27*s. per* acre, and at 30 years' purchaſe, would produce 255,150*l.*; a ſum which, if laid out in improving the roads, and making eaſy communications through different parts of the kingdom, would be of the greateſt public advantage. And it is evident, that where they have the width ſtated as neceſſary by the firſt of the above writers, the loſs ſuſtained in this way muſt be ſtill greatly more conſiderable.

Mr. Marſhall thinks, that in the operation of forming roads of the public kind, the firſt buſineſs of the road-ſurveyor is to examine the lane, or other ſcite of the intended road, in every part, to aſcertain whether offenſive waters lodge beneath it, and whether quickſands or land-ſprings break out in a wet ſeaſon, in which this examination is requiſite to be made. If defects of this kind be found, effectual ſubdrains are to be run up to them from the ditches or ſide-drains of the lane, or other ſcite. And that the next operation is to adjuſt the ſurface of the ſcite; to ſtrike off the protuberances, and fill up the hollow parts; and thus, in ordinary caſes, to mould it to the firſt proper form, or according to ſome of the other forms that have been mentioned; the foot-path and the higher ſide of the ſoft road being raiſed with the earth which is required to be taken off the bed of the hard road, whoſe baſe or foundation ought to be formed with peculiar care. Every part is required to be firm and ſound; dry earth or hard materials being rammed into every hollow and yielding part. It is ſuggeſted that the firſt form is adapted to firm binding materials; to ſuch as acquire, by wear, a repellent ſurface, and ſhoot off the waters that fall upon it; not to thoſe which are looſe and incoheſive, yielding to preſſure, abſorbing rain-waters, and conveying them down to the baſe or bed of the road. Theſe require a flat or a convex bed, free from obſtructions on either ſide, ſo that the abſorbed waters may effect their eſcape at the baſe. And that on this firm and level bed the largeſt of the hard materials are to be laid; next, thoſe which are more finely and evenly broken; and, laſtly, a covering of ſtill finer materials: to aſſiſt the roller in giving ſufficient firmneſs to the ſurface, and to render it immediately capable of being travelled upon.

But in regard to the proper materials for conſtructing roads with, Mr. Marſhall thinks that although every diſtrict may be ſaid to have its own material, and often without choice or alternative, yet there may be inſtances in which uſeful materials are overlooked or diſregarded. And that in ſome parts, particularly in Lancaſhire, large paving ſtones are in common uſe; ſome of the more public roads being rough pavements, reſembling the ſtreets of ill-paved towns. But that in the northern, and ſome of the midland provinces, broken quarry ſtones are the ordinary road material; and that, taking the kingdom at large, they are the moſt common material. But in the ſouthern and weſtern counties, flints and other hard field ſtones, gathered off ley grounds, are in common uſe; and in the neighbourhood of the metropolis, and in other parts of the kingdom, ſharp flinty gravel is a favourite and valuable material. In many parts of England, ſmooth, water-worn, pebbly gravel, collected on the ſea-beach, and in river beds, is uſed; and if the pebbles are of a hard texture, and be properly broken, to make them bind, or unite firmly together, a good road may be made of this material. In ſome caſes, ſand and ſilt, or fine ſea-ſand, have been employed with ſucceſs.

It is likewiſe added, that the artificial materials of roads, which he has met with, in quantity, are the droſs and cinders of iron and copper works; and burnt clay, (burnt as bricks in heaps,) which in a clayey diſtrict, deſtitute of other materials, and where fuel is cheap, may be found a valuable ſubſtance for the purpoſe. It is ſuggeſted by Mr. Beatſon, that in a ſandy ſoil the roads may be made on the new conſtruction, he has already recommended, with the greateſt eaſe. In ſuch a ſoil, there will be nothing more to do than to level the ſurface properly, fill up all the hollow parts, roll it well with the long wooden roller, and lay on the materials intended to finiſh it with, in the manner directed,

rected, and then roll it with the heavy roller, as has been advifed above.

But in cafes where the foil confifts entirely of a deep loofe fand, the beft and eafieft way to make a lafting road is, to form it to the width intended for the hard materials, and then to let a channel be dug at leaft 18 inches in depth, and about the fame width; let thefe be again filled, and firmly built up with ftrong turf or clay, or any other folid fubftance that will prevent the materials to be laid on the road from fpreading to either fide; openings being left at every 10 or 15 yards, to let the water that falls on the middle part of the road more eafily through. Where the form of the ground requires making up, a little wall of the fame nature, inftead of digging a channel, may be built on each fide, nearly as high as the furface of the road is intended to be. Thefe will prevent the hard materials laid on from fpreading, which is the principal caufe of roads made in fuch foils giving way in fo fhort a time; and thefe materials will not be fo liable to fink into the fand, if it is properly rolled before they are laid on, as well as at different periods after it is finifhed. And if there be a fence on each fide of the road, and materials can be fpared to cover it from fide to fide, there will be the lefs occafion for the little walls; as thefe are only intended to keep the hard materials within the bounds prefcribed, in cafe it is not judged proper to lay them the whole breadth of the road. Where, however, thofe walls are thought requifite, the fpaces, by being covered with a little gravel or freeftone-fand, will make very good foot-ways or horfe-roads; but in a road finifhed in this way, there will be no occafion for horfe-roads diftinct from the main road, as the whole, if kept in proper order, will, he fuppofes, be fufficiently fmooth and fafe for horfes, or even foot paffengers, to go upon at any time. In fpeaking of the making of roads through a clayey foil, it is remarked that thofe formed in fuch diftricts are in common the moft unpleafant of any, chiefly on account of proper precautions not being taken to prevent the water lodging on the furface; fometimes, perhaps, owing to a want of proper materials, fuch as ftones or gravel: but he has often feen the very worft of clay roads, even where no fuch excufe could be given. And that it feems hardly ever to have occurred to thofe who had the direction of fuch roads, that fand, properly applied, would in a great meafure remedy all the defects complained of; and there are few parts of a country where fand of fome fort, or freeftone-rock, or fandy gravel, may not be obtained by fome means. In certain fituations it may, no doubt, be more expenfive and difficult to procure fuch materials than in others; but thefe are local advantages, which road-makers muft lay their account with. But the exceffive inconvenience of bad roads, the expence occafioned by the tear and wear of wheel-carriages and harnefs, the rifk of diflocating the limbs of horfes, together with many other difadvantages, ought to ftimulate all concerned to exert their utmoft endeavours to make roads good, and eafily paffable, be the difficulties what they may, that ftand in the way of them.

It is hinted, that in fuch places as where no hard materials can be got, if the road were formed nearly in the fame manner as that firft noticed, the evils complained of might probably foon be remedied. The clay fhould be excavated, fo as to form a ridge in the bottom of the excavation. There fhould be fmall openings or drains at every 10 or 15 yards, or at every hollow place, to conduct away the moifture into the main drains. If this excavation is then filled with fand, or any other porous matter eafieft to be got, and finifhed as formerly directed, there is no doubt but the road would foon become as good as could be wifhed for. Something fimilar to this he has known put in practice by a very ingenious gentleman in Chefhire, on whofe eftate, being a ftrong clay foil, the roads were fo exceffively bad as hardly to be paffable. He dug away the furface of the road to the depth of 12 or 14 inches, and having the command of plenty of fand, he filled up the excavation therewith, and covered the whole with gravel; by which means he has now made, fo far as completed in this manner, as pleafant a road as one could wifh to travel on. He is not certain if he left the bottom of the excavation with a ridge in the middle, as here directed; but he is clear this would be an advantage, as well as the outlets at certain diftances, to let away the water.

And in conftructing roads through boggy or moraffy foils, it is advifed, after proper fteps have been taken, to drain off as much of the water as poffible, by deep ditches or drains withinfide the fences, if inclofed, or intended to be inclofed, on each fide. Thefe drains fhould be caft at leaft a twelvemonth before any thing elfe is done towards making the road; for if the place is very boggy, it will be found to fubfide confiderably after the water is drained away; and fome parts will fubfide more than others, in proportion to the depth of the moffy foil, and to the quantity of water lodged there. Thofe parts will, therefore, be the better feen the fecond feafon than the firft. All hollows or irregularities fhould then be filled up and levelled, either by taking from the heights and filling up the hollows, or by fome other proper materials neareft at hand. In either cafe, the furface fods fhould, with a pufh-plough or paring fpade, be carefully pared off the heights to be lowered, and alfo off the hollows to be filled up. Thefe fods fhould be laid afide, till thofe places are brought to their proper level, and fhould then be laid on again. This will make the whole furface of an uniform toughnefs, which would not be the cafe where the fods are not laid on in this way. After this has been done, the breadth of the intended part for receiving the hard materials fhould be marked off; then let that part be covered with fand, or fuch porous fubftance, as before recommended, to the thicknefs of at leaft 10 or 12 inches. Then roll this, and finifh it as already directed; and there is no doubt but a road made in this manner may be as good through a mofs as in any other fituation. This he fpeaks of from experience, having feen the moft pleafant roads made in this manner, through moffes formerly thought impaffable. When the mofs is too foft to admit horfes upon it, the fandy ftratum may be rolled by men, the weight of the roller being regulated by the ftone box, according to their ftrength. Sometimes the rolling is altogether omitted; but it is much better to roll, when practicable. It is added, that there are other methods of making roads through moffes; as by laying a foundation of broom, furze, or heath, and then the hard materials above them. But fand is greatly preferable, where it can eafily be got, and when the track of the road is properly drained, as it always ought to be, before any thing is laid upon it with a view of making a road. Thefe principles and directions are, it is faid, equally applicable on all other forts of foil, with trifling variations, according to the peculiar circumftances of the cafes.

And it is fuppofed, that in the above cafes the roads were formed where the fcite or track was nearly level from one fide to the other; but there are other fituations, fuch as when cut or formed on the fides of hills, where fome other precautions become neceffary to be attended to. In thefe cafes it is obferved, that in making them it frequently happens that the excavation affords a fufficient quantity of materials for the purpofe; and the part cut out

of

of the solid very rarely requires any covering laid upon it. This, however, depends on the nature of the soil. If the whole breadth of the road is formed from the solid, and that is sufficiently hard, no extraneous materials will be necessary; but if the soil is a compound of clay, or of a soft nature, the above rules and regulations must be had recourse to. And that where the parts are made up from the excavation, they ought to be formed considerably higher at first than the other parts, as they will naturally subside for some time afterwards, and the hard materials should not be laid on till they have sufficient time for that purpose, which may be greatly expedited by rolling; and it should be observed, that it is much better to be obliged to lower those parts to their proper level before the materials are laid on, than to be under the necessity of making up any of them at the time. And further, that where the hill is of a considerable height above the road, a good deal of water will sometimes come down. In this case it is in general better to intercept that water at some little distance from the side of the road, than to allow it to run down the face of the bank. If allowed to run down this face, it will very soon moulder it away, especially in frosty weather, and will always choak up any drain that may be made, whether covered or open; for if covered, the earth that moulders down will in a short time become so close, that water will not get through it to the drain before it runs off upon the road; and if open, it would be extremely difficult and troublesome to keep it clear. In this case, by intercepting it about four or six feet from the brink, and conducting it away to the most convenient outlet, it would be much easier to keep the road dry. If the face of the bank be irregular, the water may still be conducted away, by making the drain recede from the brink at such places, and keeping the course always at a proper level, or it might, he supposes, be let off at every hollow place by small recesses faced up with stone, or by wooden spouts sunk upright in the bank at every such hollow; to conduct the water from the upper drain to a cross covered drain below the road, by which it may be carried away at the lower side, without any injury being done to the road. And it is advised, that in the forming and making of these, as well as all other roads, the preventing of any water running on them, except what falls from the clouds, should carefully be attended to. Where this cannot easily be done, and where it is necessary to allow a stream to run along the side of a road, the drains or ditches which, as before observed, should be withinside the fences, should be made of a proper size accordingly, as the small drains filled with sand or gravel, as already recommended, are only meant for such roads as can have no extra water coming upon them in this way.

But in respect to *private* roads, the nature and manner of laying them out has been already noticed. And in respect to the method of forming them, Mr. Marshall says, it is the same where strong cohesive binding materials are made use of, whether in a lane, or across open ground. The mode he advises is to form a receptacle for such hard materials, twelve or more inches deep; either by digging to this depth beneath the natural surface, and carrying off the excavated soil; or to half the depth, disposing of the soil raised in the operation on each side of the receptacle; so as to elevate the general surface of the road above that of the adjacent ground. And in this receptacle deposit the materials; leaving the surface either in a convex or a semi-convex form, as the turn of the surface of the ground to be travelled over may direct: the margin or margins of the road, at which the rain-water is to be collected, being left a few inches beneath the adjoining sward. But that in forming roads of every description with sand, loose gravel, or other incohesive absorbent materials, which imbibe the rain-waters that fall on them, a receptacle of that kind is altogether improper. Such materials ought to be laid on a level or an elevated surface; and a shallow drain to be open on either side, for the absorbent waters to filter into; thus preventing a surcharge, and freeing the surface entirely from collected moisture, which would be highly injurious to it. And it is here added, that the surface of a road which is formed of well-broken stones, binding gravel, or other firmly cohesive materials, and which is much used, presently becomes repellent of the water which falls upon it; no matter as to the basis on which they are deposited; provided it is sound and firm enough to support them. And that where the situation is low and the land of a moist retentive nature, a deep drain on one or on each side may be proper to give due firmness and stability to the base. Such drain, however, is not to be sunk close along the margin of the hard materials, to deter horsemen and carriage-drivers from coming near it, but a few feet distant from it; so that every inch of the hard road may be used with equal pleasure and safety, and a commodious driving and walking path be formed between the road and the drain; proper channels being cut across it, in order that it may be kept properly dry. And further that in a dry situation, as across a gravelly or stony height, little more is frequently required than to remove the surface mould, and lay bare the rock or the bed of gravel beneath it; and then to give the indurate base a round or a shelving form, as the lying of the ground may require. In this way a travellable road may be made, and kept up at one-tenth of the expence incurred by the ordinary practice in this case; which is to gather up the surface soil into a ridge, and on this soft spongy bed to lay coat after coat of some hard materials, fetched perhaps from a distance! at much expence for the purpose.

But in addition to the above sorts of roads there are still others, which require some art to form and keep them up in particular situations; these have the denomination of carriage and horse-tracks, and are described under these different heads.

Methods of Repairing Roads.—It is noticed by the author of the "Landed Property of England," that this is a business that incurs a heavy expence on landed property, and of course requires the peculiar attention of the proprietors and managers of land. And in the paper mentioned above it is observed, that where the funds of the parish will admit, which would generally be a saving, that proper persons should be appointed in them, or have the charge of a certain extent of road to see where any part is giving way or getting out of order, and to direct their immediate repairs. Also to take care that no water stands in the hollows or ruts upon them. And, that the summer season is the best not only for making, but for repairing roads, nor ought they on any account to be touched in winter, unless to give a temporary aid to some sudden breach that is perhaps almost impassable, or to let off any standing water. Yet nothing is more common than to see a number of labourers employed on the highways in winter, when the days are short, and but a few hours labour can be obtained of them. Indeed so little attention is there often paid to repairing the highways, that sometimes old infirm people are employed for the purpose, as if repairing roads were a sort of trifling bye job, merely for the employment of paupers, or lame, miserable objects, who can get no other means of subsistence. And Mr.

Marſhall thinks, that in this ſort of work, the beſt ſervice of the ſurveyor is to keep their ſurfaces ſmooth and even; ſo that rain-water may find a free and ready paſſage to its proper drain. Ruts and hollow parts are to be filled up, level, or even with the general ſurface, as often as they are formed, and perfectly free from water. This attention is more eſpecially requiſite to a new made road, whoſe bed and foundation are not yet fully confirmed. But in every caſe, and at all times, a ſolicitous regard is due to this moſt important, yet moſt neglected part of road ſurveying. Much expence of materials and labour may thereby be ſaved, and the great end of road-making be fully obtained: namely, that of rendering the road in all ſeaſons eaſy, ſafe, and pleaſant to the traveller, as well as eaſy in the conveyance of all ſorts of articles. Beſides, he conceives, that in this operation, as well as that of making new roads, very much depends on breaking the materials *evenly*. For, by doing this, the wear of the road becomes regular. Where the heads of large ſtones riſe above the general ſurface, they become obſtacles to carriages, and ſtumbling blocks to horſes; beſide their tending, by the jolting motion which they give to carriages, to indent the ſurface on either ſide of them, and thus to increaſe the roughneſs, and haſten the decay of the road. It is added, that by the law of gravitation and the action of wheel-carriages, a pit or hollow place in the ſurface of a road is made deeper every time the wheel of a carriage paſſes through it. The periphery of the wheel acts as a chiſſel, and in falling into the hollow receives an impetus or acquired force in addition to the actual weight it is loaded with; and, in addition to this, an undue proportion of the general load is, by placing it out of its upright poſture, taken from the upper and thrown upon the lower wheel. Likewiſe hard protuberances, beſide being dangerous or diſagreeable to travellers, whether on horſeback or in carriages, are injurious to a road, as being the cauſes of pits and hollow places in its ſurface. Every hard protuberance, as the point of a ſtone ſtanding above the general ſurface of the road, or a large ſtone lying looſe upon it, is productive of four impreſſions: namely, two, by throwing additional weight upon the oppoſite wheels (going both ways), and two more by the impetus or acquired force of the wheels (paſſing both ways) in falling on the ſurface of the road. He therefore conſiders it to be the firſt duty of the ſurveyor, not only to fill up the ruts and hollows, from time to time, but to pick out or to cruſh with a heavy hammer the ſtones, whoſe tops riſe above the general ſurface; as well as to gather off thoſe which lie looſe upon the road; the latter being an operation that is readily performed, yet frequently neglected, and in ſome places to a ſhameful degree, eſpecially in the northern parts of the iſland.

And in reſpect to the ſizes moſt proper for road-ſtones it requires much latitude. Not only the intended uſe of the road, but the nature of the material is to be conſidered. A road for broad-wheeled carriages of burden, only, may be made of larger ſtones than one for narrow wheels. And hard ſtones require to be broken ſmaller than thoſe which more readily wear down, and form a travellable ſurface. For when once the ſurface of the materials becomes united and cemented together, and its rock-like texture eſtabliſhed, the ſtones that are cruſhed, and the ſmaller fragments which are ſplintered on, in wear, ſerve, he ſuppoſes, to incruſt and bind together the ſtratum of ſtones which lie next, in ſucceſſion, beneath: eſpecially if proper attention be paid to the irregularities of wear, and to bring back the ſurface, wherever it is requiſite, to its original evenneſs of convexity where that form is adopted:—ſo that it may, in every part, act as an arch, and may be able to reſiſt, with the greateſt firmneſs, the weight with which it may be impreſſed. It is, however, to be obſerved, that, in forming and repairing roads with ſtones of ſize, a conſiderable ſhare of the expence ariſes from the labour of reducing the materials; and, in conſequence, the ſmaller they are broken the greater becomes the expence. This, on ordinary occaſions, is a ſerious conſideration. Hence, in conſtructing and repairing common roads, it is adviſable, inſtead of reducing the ſurface ſtones to ſmall fragments with the hammer at a great coſt, to cover them with materials that are already reduced; as the rubbiſh of ſtone quarries, ſoft ſtones, or gravel, or the ſcrapings of the road to be repaired. Such cementing materials being waſhed and worked down by rains, and the action of carriages, and the feet of travelling animals, among the ſurface ſtones, aſſiſt much in binding and fixing them in a firm cruſt; and in making the road immediately paſſable by horſes and light carriages; moſt particularly if the whole be compreſſed, and united together with a heavy roller (ſuitable to the purpoſe), repeatedly paſſed over the ſurface of it. And another good method of ſaving expence in this way, where materials are readily procured, is that of placing the coarſe unbroken ſtones or other hard materials in the bottom part or bed of the road, covering them over with gravel, or other ſorts of materials that are of a ſmall kind. However, where the hard materials are broken down ſmall and evenly the roads are found to wear the beſt.

The proper materials for repairing roads are in a great meaſure the ſame as thoſe which are uſed for the making of them in the firſt inſtance. The writer of the Agricultural Report of Middleſex thinks the rounded ſtony materials of the nature of flint, found in gravel pits and river bottoms, are in every reſpect more fit for roads than any other flinty matters. The materials for the ſupport of great public roads ſhould, it is ſuppoſed, be ſelected from among ſuch ſtony ſubſtances as are tough as well as hard; for this purpoſe, hornblende is believed to be particularly ſuitable, to which may be added whinſtone, baſalts, iron-ore, and all ſuch ſtones as contain iron, as well as the ſlag, or the refuſe of furnaces. The comparative weight which ſtones of ſimilar ſize and figure can ſupport without being broken, is, it is imagined, the criterion by which to try them for this uſe.

Mr. Beatſon thinks, that if the above directions were ſtrictly attended to, and every appearance of a breach or defect in a road at once repaired, the ſame materials, when diſplaced, would very often, if properly relaid, and fit for the purpoſe, repair the part beginning to fail; whereas, if neglected for ſome time, and allowed to get much out of repair, it will probably require a conſiderable additional quantity of materials, and thereby occaſion a great deal of expence that might have been ſaved. He alſo ſuggeſts, that during the time of hard froſt, it may be very proper to drive materials, and lay them down for the purpoſe of being at hand to repair the roads when the ſeaſon permits, but ſuch a time is the moſt improper of any for applying thoſe materials. And that in laying them down it is a very general practice to place them in ſmall heaps along the ſides of the road, and even encroaching ſometimes very much upon the ſpace allotted for travelling on. This ought on no account to be allowed (unleſs thoſe materials are to be immediately uſed), for reaſons ſo obvious, it is unneceſſary to mention them. It would be much better to have receſſes at certain convenient places, for the purpoſe of laying the materials in till wanted; by which means the inconveniencies attending the common way would be totally avoided;

avoided; and travellers might then, without interruption, uſe any part of the road they found beſt; and beſides, there would then be leſs occaſion for making the roads ſo wide as they are generally made, which would undoubtedly ſave a great deal of money in keeping them in repair, or proper condition.

It is ſtated, that rolling of roads with a heavy roller, as directed above, would be a very beneficial practice in keeping them in good repair, eſpecially if the hard materials, that are worked out of place by the wheels of carriages, are raked in again previous to the roller paſſing over them. This would be an eaſy and expeditious operation, and if taken in proper time, would, in many caſes, be all that is neceſſary to put the road in repair. It is, however, an implement that is very ſeldom made uſe of for this purpoſe by the overlookers of roads.

And the uſe of machinery has probably been hitherto too little attended to in the execution of this ſort of work; but from the increaſing price of hand-labour, it certainly at preſent demands the ſerious notice of the managers of this ſort of buſineſs. For dragging over roads, when much out of repair, in order to replace the ſtones or gravel diſturbed by wheel-carriages, a ſort of harrow has been invented by Mr. Harriott of Great Stanbridge, in Eſſex, for which he received a premium from the Society for the Encouragement of Arts, &c. and of which he gives the following account. "Being appointed ſurveyor of the roads at Michaelmas, 1786, and finding them very bad, I provided a ſufficient quantity of ſtones and gravel againſt the next ſummer, to cover the roads pretty thick; but when ſo done, I found the heavy loads of chalk, gravel, and corn, ſoon turned the ſtones out, and made almoſt as deep a rut or rake as ever. Stubbing the quarters in I found an endleſs job, as well as a great expence; I, therefore, contrived the road-harrow, and by the help of which I have, during the laſt ſummer, at a very trifling expence to the pariſh (after the ruts were again filled up with ſtones), kept the roads in extraordinary good condition. A man, a boy, and two horſes will do three miles in length in one day, completely harrowing down the quarters, and drawing the ſtones together, which, by means of the mould-boards, are dropped into the ruts, far better than a man can ſtub them in. Now, if a man was employed to ſtub, he could not do it for leſs than a penny *per* rod, of ſixteen feet and a half, (the moſt common is three halfpence, or two-pence *per* rod, if they ſtub the outſide as well as the inſide quarter,) which would amount to one pound ſix ſhillings and eight-pence for one mile in length, conſequently to four pounds for three miles, which the road-harrow will do in one day; and for which I charge the pariſh for man, boy, and horſes, only eight ſhillings." And it is further ſtated by him, that it does the work better, as well as cheaper; that ſeveral other pariſhes are uſing them, and he thinks the uſe of them will ſoon become general, eſpecially where roads are mended with gravel. The head of the harrow is three feet long, from outſide to outſide of the bars. The bars four inches ſquare, and the length of them five feet. The mould-boards extend eleven inches farther, which is neceſſary to draw the ſtones (which the teeth of the harrow work up to the top) nearer the middle of the road. The mould-boards are four feet two inches long, ten inches deep, and two inches thick; they are ſhod with a bar of iron, and lined about ſix inches high with an iron plate. The teeth (which ſhould be ſteeled at the points) are one foot in length, from the under ſide of the bars to their points; they are one inch and a quarter ſquare, and are fixed with ſtrong nuts and ſcrews, with collars both on the under and upper ſide of the bars. The bars are made to go lengthwiſe inſtead of acroſs, to prevent them from ſplitting. The harrow is drawn by two horſes abreaſt, a boy leads the outſide horſe on the outer quarter, the other horſe goes on the horſe-path, the man ſteadying the harrow by the handles. Of courſe they take one inſide, and one outſide quarter as they go, and the other two quarters as they come back. And as this harrow is certified, by ſeveral people in the pariſh where it is uſed, to do more work with one man, a boy, and two horſes, in one day, and in a much better manner than could be effected by twenty men in the ſame time in the uſual way, it muſt certainly produce a prodigious ſaving both of time and money, and having been found to anſwer the purpoſe ſo extremely well, renders it worthy of attention by thoſe engaged in this kind of work.

Mr. Beatſon ſuggeſts, that after the uſe of this harrow, the heavy roller, noticed already, would have a very good effect, or there might be a roller of a lighter conſtruction faſtened behind the harrow, to roll at the ſame time; although the heavy roller would certainly make the beſt work. And likewiſe that other implements, nearly on the ſame principle, have been conſtructed, particularly one of which he was ſhewn a model by a gentleman near Cheſter. Its ſhape is in form of an iſoſceles triangle, which is laid upon the road, and drawn by ſhafts at the baſe. The two ſides, by meeting in an angle oppoſite the baſe, are ſuppoſed to draw the looſe materials towards the middle of the road. It has two ſmall wheels near the baſe or front, and one at the angle in the rear, with different contrivances for fixing the whole frame higher or lower as required.

It is alſo ſuggeſted that a machine for the more eaſily breaking ſtones to repair roads in the common way would be of very great uſe, as at preſent this is a tedious and laborious taſk. Under the article Machine, a very ingenious contrivance for removing the mud and dirt from roads has been deſcribed. But, although ſeveral contrivances have at different times been propoſed for facilitating the repair of roads, and leſſening the expence, yet that expence, Mr. Beatſon ſays, is no doubt very great, eſpecially in thoſe places where many heavy-loaded carriages are continually paſſing. The ruts made by the wheels ſoon become ſo deep, and the materials of the road are thereby ſo much torn up, that it is almoſt an impoſſibility, however hard the materials, to keep the road for any conſiderable time in proper condition, or ſtate of repair. It is, therefore, ſuggeſted, that theſe effects ſhould be attempted to be remedied by ſome means or other, as by a ſort of roller ſo fixed as to prevent the wheels from ſinking ſo as to form ruts.

It is evident that the principles and directions which have been given apply equally to private or parochial roads, which in general are in a worſe condition, from their being commonly worſe managed. The cauſes of their being in bad condition ſhould be attended to and removed, as much as poſſible, in the manner already ſuggeſted, as it is evident that they muſt have a great effect in promoting improvements in agriculture, by leſſening the expence of labour, and facilitating the means of conveyance of different articles. The effects of ſome ſorts of wheels have been more deſtructive to roads than others, and of courſe acts of parliament have been formed with the view of affording proper regulations in this reſpect. See Wheel and Waggon.

In ſpeaking of the draft from friction on the roads, Mr. Middleton, after conſidering what happens on thoſe made with gravel, and on iron railways, concludes, that, on gravelled roads, friction is not more than one-fifth part of the entire draft; the other four-fifths being occaſioned by the

the obſtacles of duſt, ſludge, looſe ſand and gravel. Hence it follows, he thinks, that by removing theſe obſtructing cauſes, and keeping the roads conſtantly clean and hard, the draft would be ſo much leſſened, as to render the preſent number of labouring horſes unneceſſary. It is ſuggeſted, that many of theſe inconveniencies may be got rid of; and the roads be in the way of getting more dry, clean, and hard, by removing the offending matter while in the ſtate of duſt, when it occupies the leaſt poſſible ſpace, and is in the moſt favourable condition for being taken away. A ſmall portion of duſt, it is ſaid, when drenched with rain, becomes a large quantity of ſludge, in which ſtate it requires much labour to clear it away; on which account it is very advantageous to get quit of it before rain falls. This is, it is ſuppoſed, beſt effected by means of buſh-harrows wrought every windy day. But ſome might be taken away after being ſcraped together by ſuitable machinery for the purpoſe.

It is intimated, that the time ſeems to be approaching, when iron muſt be made to contribute largely towards the public roads. It is thought that iron rails, or bars, may be laid along the preſent turnpike roads, in ſuch a manner as to afford the moſt convenient track for all heavily laden carriages; and that this may be done without any material inconvenience to thoſe of lighter weight and ſwifter ſpeed. The great original expence of making ſuch roads will, it is ſuppoſed, be ſufficiently counterbalanced by their much longer duration, and the trouble fully compenſated by the ſuperior pleaſure of travelling over them.

On the whole, it is ſuppoſed, that the keeping of roads in the moſt perfect repair is an object of high importance; for that until canals, or inland navigation, became general, the ſupply of the markets, and the price of every article, will be in proportion to the ſtate of the roads over which they have to paſs in their way to towns. Bad roads, it is ſaid, require a greater number of horſes to draw any given weight along them, than would be neceſſary for the conveyance of the ſame weight over good ones; which extra draft muſt be paid for by increaſing the price of the article to the conſumer. The ſame number of horſes which, along *bad roads*, could only bring a ſcanty ſupply of the produce of the country from a ſmall diſtance, can, on *good roads*, convey a more abundant ſupply, and from greater diſtances: which is calculated to lower the price of the neceſſaries of life in the metropolis and other large towns, rather than *advance* them in the diſtant counties, and have a happy tendency towards *equalizing* the prices between the towns and the country.

And the author of the paper already noticed, thinks it a matter of great conſequence to have proper regard to the nature of the fences on the ſides of roads, as on theſe the goodneſs of them, and the expence of upholding them, very much depend. Where the form of the ground and ſituation will admit of it, the ſunk fence from the road, that is, with the deepeſt part towards the field, is by far the beſt. A fence of this ſort, in the form of a ditch or drain, may be made of any depth without the leaſt danger or inconvenience, which is not the caſe when open to the road; and the deeper it is made, the better effect it will have in keeping dry the foundation of the road, if properly conſtructed; nor will the road require to be ſo wide as uſual, at the ſame time there will be fully more room to travel on; for if the fences are of this kind, the whole width of the road may with ſafety be occupied, but when open to the road a conſiderable ſpace is loſt, by the fear or danger of approaching too near them. And the fences on the ſides may either be of ſtone, ſod, or a hedge or paling; but ought not to be more than eighteen inches, or two feet above the level of the road (except a paling), and the top of them, if broad enough, may, in ſome places, be made to ſerve as a foot-path. Neverthelefs, the fence towards the field may be ſix feet in height, or as high as the purpoſe of it requires. The road will thus receive the whole benefit of the ſun, which is very eſſential towards keeping it dry, as well as the depth of the drains or ditches withinſide the field, to which there muſt be proper openings at certain diſtances, as before recommended; and in winter, after heavy falls of ſnow, there will be little chance of a road fenced in this manner ever being blocked up, for it will be obſerved, when a ſtorm of ſnow is attended with a high wind, that the drifted ſnow lodges chiefly about the fences, or where it meets with an obſtacle to occaſion an *eddy;* for where high fences are on the ſides of roads, they are almoſt to a certainty in ſuch caſes blocked up, to the great inconvenience of the whole neighbouring country or diſtrict in which it happens. The planting of trees on the ſides of roads ſhould always be avoided as much as poſſible; but where rows of them are to be put in, it ſhould never be done at leſs than ten or twelve feet diſtance from the fences, and not leſs than forty or fifty feet from each other, being conſtantly ſo ſituated as not to produce much ſhade on the road in the middle of the day.

Road, in *Ornamental Gardening*, that ſort of carriage-way which is peculiar to reſidences of the country kind. They are of many different ſorts, according to the nature, circumſtances, and ſituations of the different places. But when properly laid out and formed, they have moſtly one of the effects of building, at leaſt, in a partial manner, which is that of giving force and ſpirit to ſcenes of verdure and cultivation. They ſhould be laid out according to the nature of the ſituations; their directions and widths being provided by their conveniences, propriety, and utility. The methods of making and repairing of them are much the ſame as thoſe employed for other kinds of roads; but in the finiſhing, their ſurfaces ſhould be laid over with a finer and better coloured material of the gravel or ſome other ſort, and they ſhould be kept more perfectly rolled down and level; as the colours of ſuch ſurface materials and the margins of ſuch roads are principally what concerns picturesque effect, or that which is to be produced by them. In ſituations where the ſcene is avowedly of the artificial kind, the margins of them, according to the author of the work on "Country Reſidences," ſhould be parallel to each other, and correctly defined; as in that part of an approach-road, which comes within the parapet or fence which incloſes the manſion, or in thoſe roads which are within the bounds of the other more adorned parts of the ground. But in ſituations where the roads are not in theſe ſcenes, but are either in pictureſque or natural pleaſure-grounds, paſture-fields, parks, foreſts, dingles, or other ſimilar places, the edges ſhould be irregular, and more or leſs rough or ſmooth, blending or ragged, as is ſeen to take place in roads or tracks through ſimilar ſcenery in wild nature. The excellent effects and ſuperior advantages which reſult from the adoption of theſe principles in the formation and conſtruction of roads of this nature, may often, it is ſaid, be ſeen in thoſe parts of much frequented approach-roads of reſidences, which are not thought proper or neceſſary to be ſubjected to the operation of the paring-iron, and the formal trimming of the gardener. And indeed, that one of the moſt ſtriking deformities in pictureſque ſcenery, is that of the formal, ſtiff, and harſh edges of made roads, as they highly diſguſt the ſpectator, and prevent the true effect which ſhould be produced.

All roads of this ſort ſhould, therefore, be laid out, and formed

formed in fuch a manner as to harmonife as perfectly as poffible with the nature, circumftances, fituations, and fcenery of the particular places in which they are to be had recourfe to. See WALK.

ROAD, *Approach*, that variety of this fort of road which is peculiar to refidences, manfions, or houfes of the country kind, and which leads or conducts to their principal or other entrances. In their manner of being laid out, they fhould in their directions neither be too affectedly graceful, have too much waving in their appearance, be too much befet and intercepted with trees; or be too vulgarly formed in the rectilineal and direct manner, or be too abrupt in their nature. There is a certain kind of dignity, propriety, and fitnefs requifite in them, which is not eafily defcribed, but which, in given fituations and circumftances, readily prefents itfelf to the mind of the defigner; and in confequence of the whole of the operations, both of conceiving and defigning them, being fo fimple, they are, for the moft part, marked out upon the ground with great facility,—eafily improved upon, and, in their execution, the work is merely that of road-making.

The accompanying circumftances which appertain to roads of this nature have been already pointed out in fpeaking of them in general, and they ought to be well attended to, as much of their beauty and effect arife from them.

The only proper approach-roads to caftles, Mr. Loudon fays, have been fuppofed thofe of the avenue kind, but that there feems no reafon in nature for fuch a rule; and the arguments drawn from antiquity are wholly infufficient to juftify their conftant introduction in fuch cafes. However, wherever they exift with good effect, they fhould, it is faid, be carefully preferved; and even, in fome fituations, avenue roads to manfions, ftraight private roads through monotonous cultivated countries, or public roads paffing along eminencies, may be created and formed with great advantage and effect, as is the cafe in many places. Roads of this kind fhould always be fo contrived as to afford the beft effect, and to produce the greateft harmony, which the places are capable of admitting.

ROAD, *Drive*, another defcription of road belongingto refidences of the rural fort, which is chiefly defigned to fhew and difplay the beauties of the places, or of the furrounding country, or of both at the fame time. They are principally had recourfe to in refidences of the more extenfive and elegant kind, being moftly contrived without any great difficulty. The main circumftance to be attended to in this bufinefs, is that of only fhewing one fort of rural character at one time, but to difplay the whole, in fucceffion, as much as poffible. They are commonly formed, as to the road part, without much labour or trouble, being often fimply made by levelling, and the materials upon the fpot; they may, however, be conftructed in the fame manner as the other roads in fuch fituations.

The leading, or ftriking characters of the fpot, are here to be particularly regarded.

ROAD-*Gage*, a contrivance for the purpofe of breaking road ftones, or other hard materials, by. A ring, or an oval, of iron, of the proper fize for the intended ufe, with a fhort handle fixed to it, will anfwer this intention very well. Thefe gages are of great ufe in breaking ftones by the load, or in other ways, before they are laid upon roads; and fhould always be known to the workmen previous to their undertaking the bufinefs. See ROAD *Stones*.

ROAD-*Harrow*, an implement of the harrow kind, contrived for the purpofe of forcing in the fides of the ruts. One reprefented in the Effex Agricultural Survey levels the ruts and combs very expeditioufly. It was invented by Mr. Pattefon, and cofts 5*l*. See ROADS.

ROAD-*Horfe*, fuch a one as is employed in the teams on the road, and which in general performs the moft laborious work. Under this defcription comes the greater part of all the horfes in conftant ufe, as it includes carriage horfes of every kind, roadfters, and hacks. Road-horfes of every denomination are, from their conftant hard work, entitled to a proportionable degree of care and attention with the beft horfes in the kingdom; and fhould undergo the ufeful part of ftable management, that fo much contributes to the prefervation of health in horfes of a fuperior defcription. Thofe which have inceffant labour, or which travel poft, muft be fupplied with at leaft from one to two pecks of corn a day. Large and ftrong carriage horfes, in perpetual work, require confiderably more, or they will become apt to lofe flefh by frequent perfpiration. Thefe rules, however, offer only a kind of general ftandard.

ROAD-*Materials*, all fuch fubftances as are employed, or made ufe of, in the making and repairing of roads; as thofe of ftony matters of different kinds and qualities, various forts of gravel, fand, and a variety of other articles. They fhould, in every cafe, be reduced as much as poffible to the fame fizes, as the regular wear of roads depends very much upon it. See ROAD.

ROAD-*Pick*, an ufeful implement of this kind with three points. It has much refemblance to the common pick-axe, only differing from it in having the flat edge-like end of that tool occupied by three ftrong tines, about fix inches in length, and ftanding about fix inches in width from the outfide to the outfide of them. It thus forms a fort of fmall trident, which is borne on the fhank of the implement, and ftands about fix or eight inches from the focket and handle.

It is a very convenient tool in ftriking off the protuberances, and filling in the ruts of hard roads; as well as to level aud adjuft the furface with, in forming and repairing ftone roads. The fingle end is likewife capable of being employed for letting off water from fhallow ruts, or hollow places, as well as for many other ufes of the common pick. See PICK.

ROAD-*Plough*, an inftrument of the plough kind, invented and made by the late Mr. Brand, an ingenious blackfmith, in the county of Effex, at Lawford, near Maningtree. It is formed all of iron, and reprefented in the Agricultural Survey of that diftrict. Its length is that of a common plough, with two fmall wheels, one before and the other behind; and the coulter part is ftrongly fecured.

ROAD-*Roller*, a heavy kind of iron roller, formed in three feparate parts, ufed for rolling down the loofe materials on roads. It is drawn by a horfe or horfes in fhafts, fomewhat as in the common roller. See ROADS.

ROAD *Scraping Machine*, a contrivance made for the purpofe of cleanfing roads from dirt, &c. Thefe machines are conftructed in feveral different ways, by different makers; but a very ufeful one may be feen under the head *Machine*; which fee. See alfo ROAD.

ROAD-*Stones*, all kinds of ftones, whether of the field, quarry, or other forts, that are employed in the forming and mending of roads. For fome ufes of this nature, the ftones fhould be confiderably reduced, even in conftructing or repairing ordinary roads. Mr. Marfhall has fuggefted, that by dropping road-ftones through circular gages of different fizes, it will be found that, for repairing fmall breaches, thofe which pafs freely through a ring, $2\frac{1}{2}$ inches in diameter, may be confidered as of a middle fize; and that

that for new forming or fresh covering the surface of a road, none ought to exceed 4 inches; $3\frac{1}{2}$ inches being, for these purposes, the middle size: that 2 inches and 4 inches may, as a matter of general information, be set down as the extremities of size of road-stones of a middle quality, for the above purposes. See ROAD-*Gage*.

ROAD-*Surveyor*, a person who has the care and management of a road, whether in the making or repairing of it. All such persons as are employed in this way should be well acquainted with the nature of laying out, forming, and keeping them in order. Each of the different methods, which are in common practice, ought to be well understood, as well as those had recourse to in particular districts or places. And, besides, he should be well informed with regard to every thing of a local nature that has any relation to them, and be a man of exertion and ingenuity.

ROAD-*Team*, any sort of team that is employed on the road, whether in carts, waggons, or other kinds of carriages. All teams of this nature should in general be well kept. See TEAM.

ROAD-*Work*, all such kind of work as is done upon the road, either by the labour of men or animals. It is also sometimes applied to the business of making and repairing of roads.

ROAD, in *Navigation*, denotes a place of anchorage at some distance from shore, and sheltered from the winds, where vessels usually moor to wait for a wind or tide proper to carry them into harbour, or to set sail.

When the bottom is clear of rocks, and the hold firm, and the place well covered from the wind, the road is said to be good. An open road is one which has but little land on any side.

The roads within his majesty's dominions are free to all merchant vessels, either of his subjects or allies. Captains and masters of ships who are forced by storms, &c. to cut their cables, and leave their anchors in the roads, are obliged to fix up marks or buoys, on pain of forfeiture of their anchors, &c.

The masters of ships, coming to moor in a road, must cast anchor at such a distance as that the cables, &c. may not mix, on pain of answering the damages. When there are several vessels in the same road, the outermost to the seaward is obliged to keep a light in his lantern in the night-time, to apprise vessels coming in from sea. See PORT.

ROAD *Aqueduct*, is an arch under a canal, through which a road passes.

ROAD *Bridge*, a bridge over a canal for the use of a road, instead of private use. See OCCUPATION *Bridges*.

ROAD, *Cock*. See COCKROAD.

ROAD-*Goose*, in *Zoology*, the name of a small species of wild goose. See *Anser* under DUCK.

ROADER, a vessel riding at anchor in a road, bay, or river.

ROADING, a term used on the Fen rivers, for cutting off the weeds at their bottom.

ROADING, in *Agriculture*, a provincial term used to signify the striving of teams for the lead on the roads. It was formerly much in use in Norfolk, but is at present nearly laid aside, probably from the danger that attended it.

ROADSTER, among *Horses*, a term frequently applied to such as are used for the purpose of riding.

ROAITHA, or ROUAITHA, in *Geography*, a town of Arabia, in Yemen; 56 miles S. of Medina.

ROAK, a provincial word, signifying a mist or fog.

ROAN, in *Geography*, a small island in the North sea, near the north of Scotland. N. lat. 58° 35′. W. long. 4° 11′.

ROAN, in the *Manege*. A roan horse is one of a bay, sorrel, or black colour, with grey or white spots interspersed very thick. When this party-coloured coat is accompanied with a black head and black extremities, he is called a roan with a black-a-moor's head; and if the same mixture is predominant upon a deep sorrel, it is called claret-roan.

ROANCARRICK ROCKS, in *Geography*, rocks in Bantry bay, on the S. coast of Ireland; 3 miles N.E. of Beat island.

ROANE, a county of America, in the district of East Tennessee, containing 5581 inhabitants.

ROANE-*Tree*, in *Botany*. See SERVICE-*Tree*.

ROANNE, in *Geography*, a town of France, and principal place of a district, in the department of the Loire, which here becomes navigable, and renders it a convenient staple for all goods conveyed from Lyons to Paris, Orleans, Nantes, &c. The place contains 6992, and the canton 14,790 inhabitants, on a territory of 225 kiliometres, in 13 communes. N. lat. 46° 2′. E. long. 4° 10′.

ROANOKE, an island in the Atlantic, on the coast of North Carolina, at the entrance into Albemarle sound, with a town of the same name. The north point of the island is about 7 miles W. of Roanoke inlet. N. lat. 35° 50′. W. long. 76°.—Also, a long and rapid river, formed by two principal branches, *viz.* Staunton, which rises in Virginia, and Dan, which rises in North Carolina. It empties itself into Albemarle sound, about N. lat. 35° 58′. W. long. 76° 56′. This river is navigable for sea-vessels nearly 30 miles; but for boats of 30 or 40 tons, to the falls. Above the falls, boats of 5 tons ascend about 200 miles. The planters on the banks of this river are supposed to be the wealthiest in North Carolina.

ROANOKE, *Little*, a river which discharges itself into the Staunton, about 15 miles above the junction of the Dan and Staunton.

ROANOKE *Inlet*, a channel on the coast of North Carolina, which leads into Albemarle sound. N. lat. 35° 56′. W. long. 76° 14′.

ROANPOUR, a town of Bengal; 17 miles S.S.E. of Mauldah.

ROARAGUR, a town of Hindoostan, in Visiapour; 22 miles N. of Sottarah.

ROARING BULL *Island*, an island in the North Atlantic ocean, near the east coast of Nova Scotia. N. lat. 45° 17′. W. long. 60° 44′.

ROARING *River*, a river of America, in the state of Tennessee, which runs N.W. into Cumberland river, 12 miles S.W. of the mouth of Obas river.

ROARING *Water Bay*, a bay on the S. coast of Ireland, in which is a number of small islands; 6 miles S.W. of Skibbereen. N. lat. 51° 28′. W. long. 9° 22′.

ROARING *Water*, a river of Ireland, which runs into the fore-mentioned bay, 5 miles W.S.W. of Skibbereen.

ROASCHIA, a town of France, in the department of the Stura; 8 miles S.W. of Coni.

ROASTING, in *Metallurgy* and *Chemical Manufacture*, is a process by which the volatile parts of metals and minerals are separated by the application of heat. The minerals are generally mixed with the fuel, and fired in heaps exposed to the open air. When the volatile substance is driven off with difficulty, the reverberatory furnace is sometimes employed.

This process is frequently, though improperly, called *calcining*, since the latter is confined to the oxydation of metals.

metals. In expelling the volatile parts from lime-ſtone and gypſum, the proceſs is termed *burning*, and in the latter ſometimes *boiling*. The term roaſting is principally confined to iron, and other ores abounding with ſulphur and arſenic.

The iron ores of this country are roaſted for the purpoſe of expelling ſulphur, water, and carbonic acid. The former would probably injure the quality of the iron in ſmelting; the latter would contribute to an expenditure of the heat of the furnace. The proceſs is conducted in the open air, by piling the iron-ſtone and ſmall coal in alternate ſtrata, allowing the maſs to burn till the coal is conſumed. The iron-ſtone, by this means, becomes of a red colour, and loſes much of its weight. In ſome iron-works the proceſs is performed in kilns, ſimilar to thoſe employed for burning lime-ſtone.

The ore from which zinc is obtained is generally blende, which is the ſulphuret of that metal. It is expoſed to the ſtrong heat of a reverberatory furnace, by which the ſulphur is expelled, and the metal oxydated.

When the metals or their oxyds are themſelves volatile, and are combined with ſulphur, roaſting is not practicable: recourſe muſt then be had to ſome other agent, which will combine with the ſulphur, and ſeparate the metal itſelf. Such is the caſe with *cinnabar* and *arſenic*. See the reſpective metals.

ROASTING, in *Domeſtic Economy*. When that change by heat which animal food undergoes to render it fit for digeſtion is brought about by a temperature capable of partially changing the ſurface, the proceſs has been termed roaſting; a ſimilar change in vegetable food, ſuch as bread, puddings, and pies, being termed baking. The moſt ancient method of roaſting, which is ſtill the general practice, is by turning the meat before the fire; and it is ſtill ſuppoſed, without any good reaſon, that meat cannot have its proper flavour when roaſted in any other way. It is true that *roaſters* or *ovens* of the common conſtruction are apt to give the meat a diſagreeable flavour, ariſing from the empyreumatic oil which is formed by the decompoſition of the fat, expoſed to the bottom of the oven. This evil has been completely remedied in two ways, firſt by providing againſt the evil of allowing the fat to burn, and ſecondly by carrying off by a ſtrong current of heated air the empyreumatic vapours.

The roaſter uſed in the Derby Infirmary, and in many private houſes in the neighbourhood, is not on any account objectionable, but it is particularly valuable in an economical point of view. This is principally effected by caſting the heat entirely upon the object of roaſting, inſtead of ſending three-fourths of the heat up a capacious chimney, and expending the greateſt part of the remainder upon the cook, and the walls and furniture of the kitchen.

The roaſter above alluded to is made of ſheet iron, of the ſtrength of about one pound to the ſquare foot: its form is that of a parallelepipedon, about twenty-five inches high, twenty-two long, and eighteen in breadth. The fire is put under it; but one courſe of bricks is placed immediately over the fire, and above this a cavity of five inches deep between the brick roof and the oven bottom. The flame of the fire paſſes a little to the right and left, and riſes perpendicularly up the ſides of the roaſter, freely communicating with the top of the ſame. By this means the flame and hot vapour will be the hotteſt at the top of the oven, becauſe of its greater levity, and its not being allowed to eſcape at this point, according to the common practice. After the hot vapour has beſtowed its heat on the ſuperior part, it now deſcends and enters on each ſide the cavity under the oven, from whence it paſſes up the back of the ſame, which back forms one ſide of the ſmoke chimney. This arrangement is ſufficient for diſtributing all the diſpoſable heat equally on every ſide of the roaſter. We ſhall next point out the contrivance for diſpoſing of the ſmell above alluded to. The door of the oven is caſed with wood, a piece of thick paper, ſteeped in a ſolution of alum, and ſmeared with clay, being placed between the wood and the iron, to prevent the wood from being charred. The door extends below the bottom of the oven about three inches. This, when the door is open, expoſes a plate three inches deep, and the width of the oven, and which conſtitutes the front of the cavity under the oven. At one ſide of this plate is a hole at the entrance of the tube, which extends to the other end of the cavity, where it is bent, and returns on the other ſide of the cavity, and opens into another cavity formed by a double plate, which conſtitutes the iron part of the door. The firſt entrance of this tube correſponds with an opening at the bottom of the door, ſo that when the door is ſhut, cold air can enter the tube. In its paſſage it becomes heated, and then enters the oven at the top, from the cavity in the door. It now paſſes over the meat, and eſcapes through a tube in the back plate, which extends ſo high as to reach above the ſmoke damper. By this means the roaſter is conſtantly cleared of any diſagreeable vapour, by a force equal to the draft of the chimney.

A ſliding rake is made, ſo as to fit the top and ſides of the oven, that the whole ſurface becomes perfectly ſcraped by one motion.

ROATO, in *Geography*, a town of France, in the department of the Tanaro; ten miles N.W. of Aſti.

ROB, in *Pharmacy*, the inſpiſſated juice of any ſubſtance, uſually boiled up to the conſiſtence of honey.

There are robs made of quinces, ſloes, cherries, mulberries, elderberries, barberries, gooſeberries, and other fruits, for various diſeaſes. The juice of grapes, thus prepared, is more particularly called rob, or *ſapa ſimplex*; this is almoſt of the conſiſtence of honey.

When only one-third of the humidity is boiled away, it is called *defrutum*; and when only boiled to the conſiſtence of a ſoft electuary, a *reſin*.

The word *rob* is pure Arabic; and ſignifies originally a juice dried in the ſun, or over the fire, that it may keep the longer without damage.

Sometimes it alſo denotes a compoſition of ſome juice made up with honey or ſugar, in which ſenſe it is confounded with loche or lohoc.

The rob is a form now much out of uſe, though there are ſeveral directed in the college diſpenſatory; as robs of black cherries, of ſloes, of quinces, of elder, &c.

It is poſſible that great improvements might be made, by introducing the uſe of this form among the malt-diſtillers. The great inconvenience attending that art being, that the malt being of a large bulk, in proportion to its ſaccharine part, and requiring a larger proportion of water to extract that ſaccharine part, many large veſſels, ſuch as maſh-tubs, coolers, fermenting backs, &c. are neceſſary; and the neceſſary labour on the ſubject is increaſed, and the commodity rendered dearer. The remedy of this ſhould ſeem the introducing a new art ſubſervient to that of the malt-diſtiller, and confining itſelf to the boiling down of malt-wort to a rob, ſo as to ſupply the malt-ſtiller with his ſubject, in the ſame manner as the fine-ſtillers are ſupplied with treacle from the ſugar-baker. By this means the buſineſs of the malt-ſtiller would be reduced to a great degree of ſimplicity, and the ſpirit produced would be alſo much finer than at preſent, becauſe the ſubject would come tolerably refined to his hands, and purged of its groſs, mealy, and huſky matter, which

which yields a diſagreeable oil in diſtillation, and is alſo apt to burn to the ſtill, and ſpoil the ſpirit. It is poſſible that a ſpirit purer and finer than that from treacle might this way be procured from malt, prudently managed. Shaw's Lect. p. 219.

ROBALI, in *Geography*, a town of Abyſſinia; 75 miles S. of Miné.

ROBALO, in *Ichthyology*, a name by which ſome have called the *camuri*.

ROBARES, in *Geography*, rocks near the S. coaſt of Ireland; three miles S.E. of Gally Head. N. lat. 51° 31′. W. long. 8° 50′.

ROBASOME, a town of France, in the government of the Po; eight miles N.N.W. of Turin.

ROBBEN, or Seal, *Iſland*, an iſland on the coaſt of Africa, near the Cape of Good Hope, at the entrance into Falſe bay, about ſix miles in circumference. It ſerves as a place of exile for criminals ſent from the Cape or the Indies, who are compelled to labour, and are guarded by twenty-four ſoldiers under the command of a ſerjeant. No women are permitted to live upon the iſland. Within this iſland and the continent there is excellent anchorage, where ſhips driven out by the S.E. winds, which blow from September to the end of April, the ſeaſon when all ſhips bound for the Cape reſort to Table Bay, uſually bring up. Here, too, ſhips intending to come into Table Bay uſually wait the abatement of the S.E. wind, if it ſhould happen to be too ſtrong for their working up againſt it. This iſland is too ſmall, and at too great a diſtance, to afford the leaſt ſhelter to Table Bay in the N.W. winds that blow in the winter months. S. lat. 33° 40′. E. long. 18° 20′.

ROBBERY, Robberia, or *Roberia*, in *Law*, a felonious and forcible taking away another man's goods or money, from his perſon, preſence, or eſtate, by putting him in fear, &c. 1 Hawk. P. C. 95.

A mere attempt to rob was held to be felony, ſo late as Henry the Fourth's time (1 Hal. P. C. 532.); and afterwards it was only a miſdemeanor, and puniſhable with fine and impriſonment, till the ſtat. 7 Geo. II. cap. 21. which makes it a felony, tranſportable for ſeven years, unlawfully and maliciouſly to aſſault another, with any offenſive weapon or inſtrument, or by menaces, or by other forcible or violent manner, to demand any money or goods, with a felonious intent to rob. If the thief, having once taken a purſe, returns it, ſtill it is a robbery. The previous putting in fear is the criterion that diſtinguiſhes robbery from other larcenies; and yet this putting in fear does not imply any great degree of terror or affright in the party robbed; it is ſufficient that ſo much force, or threatening by word or geſture, be uſed, as might create an apprehenſion of danger, or oblige a man to part with his property without or againſt his conſent. (Foſt. 128.) Thus, if a man be knocked down without previous warning, and ſtripped of his property while ſenſeleſs, though ſtrictly he cannot be ſaid to be *put in fear*, yet this is undoubtedly a robbery; or, if a perſon with a ſword drawn beg an alms, and I give it him through miſtruſt and apprehenſion of violence, this is a felonious robbery. 1 Hawk. P. C. 96.

This is ſometimes alſo called *violent theft*, and its puniſhment, be the value of the thing taken ever ſo ſmall, is death.

This ſpecies of larceny is debarred of the benefit of clergy by 23 Hen. VIII. cap. 1. and other ſubſequent ſtatutes; not indeed in general, but only when committed in or near the king's highway. A robbery, therefore, in a diſtant field or foot-path, was not puniſhed with death (1 Hal. P. C. 535.), but was open to the benefit of clergy, till the ſtat. 3 & 4 W. & M. cap. 9. which takes away clergy from robbery whereſoever committed.

The word is ſaid to have taken its riſe hence, that anciently robbers only took away the *robes* or clothes from travellers. Though lord Coke, in the third of his Inſtitutes, takes the name to have had its riſe from Robin Hood, who lived under Richard I. in the borders of England and Scotland, by robbery, burning houſes, rape, and ſpoil. Hence, alſo,

Robbers-men, or *roberds-men*, mentioned in ſeveral ſtatutes for great thieves.

ROBBING. See House-*Robbing*.

ROBBINS, or Robands, *i. e. rope-bands*, in a *Ship*, ſmall lines, or braided cordage, which make the upper edges of the great ſails faſt to their reſpective yards, being reeved into eyelet-holes in the head of the ſail under the head-rope for that purpoſe. They are generally of a ſufficient length to paſs two or three times about the ſaid yard. The word is, *make faſt the robbins;* for at ſea they do not ſay, *tie*, but *make faſt*.

ROBE, Roba. See Gown.

Robes, *Maſter of the*, is an officer of the houſehold, with an appointment of 500*l.* a-year, who has the ordering of all his majeſty's robes. See Master *of the Wardrobe.*

He has ſeveral officers under him, as a clerk of the robes, a yeoman, three grooms, a page, a bruſher, furrier, ſempſtreſs, laundreſs, ſtarcher, and ſtanding wardrobe-keepers at St. James's, Windſor caſtle, Hampton-court, &c. There is alſo in the eſtabliſhment of his majeſty's houſehold a miſtreſs of the robes, with an appointment of 500*l.* a-year, and two keepers of the robes. See Wardrobe.

Robes *to Minſtrels*. Innumerable bands of tumblers, buffoons, rope-dancers, muſicians, players on inſtruments, and actors, were formerly retained in the courts of princes, who, by their gambols, farces, ſports, and ſongs, diverted the company. Theſe were called in Tuſcany *Giullare* and *Giocolari*, and, by thoſe who mentioned them in Latin, *Joculares* and *Joculatores*. Theſe fabricators of amuſement never departed without being well rewarded. But what appears the moſt extraordinary and different from our preſent cuſtoms is, that the coſtly and gorgeous robes, which it was uſual for princes to receive from other great perſonages who viſited their courts at feaſts, or upon their marriage, as marks of their friendſhip and reſpect, were beſtowed on theſe people. Benvenuto Aliprando, an old ruſtic poet, in his Chronicle, deſcribes a marriage at the great court of Mantua, in the year 1340, while under the dominion of the Gonzaga family. "At that time," ſays he, "the different princes and nobles of Italy, whoſe names he mentions, preſented the Gonzaghi with a variety of rich and precious veſtments, which were called *robe*, robes, and which were afterwards given to muſicians and buffoons," as the old poet informs us in the following lines:

> "Tutte le robe ſopra nominate,
> Furon in tutto trent' otto e trecento,
> A buffoni e ſonatori donate."

> "And all theſe coſtly robes of ſtates,
> In all three hundred thirty-eight,
> To fidlers and buffoons were given."

The family of Gonzaga, in return, reciprocally exerciſed munificence towards the nobles who viſited them, as the ſame old poet informs us in the following rude verſes:

> "Otto giorno la corte ſi durare
> Torni eri, gioſtri, bagordi facia,

Bellar,

Bellar, cantar', e fonar facean fare,
Quattro cento fonator fi dicia
Con buffoni alla corte fi trovoe.
Roba e danar donar lor fi facia.
Ciafcun molto contento fi chiamoe, &c."

" Eight days thefe fports were held, where valiant knights
In tilts and tournaments their prowefs fhow,
And minftrels, full four hundred, crown the rites,
While dance and fong teach ev'ry heart to glow.
To thefe and each buffoon who here was found,
Or gold was given, or robes of coftly fort;
And all, fo well their fpritely arts were crown'd,
Depart contented from the fplendid court."

With what magnificence the princes of the houfe of Vifconti fupported their court at Milan, during the fame century, is frequently defcribed by Corio the hiftorian; but he particularly excites our wonder by his account of the folemn pomp with which the nuptials of Lionel, duke of Clarence, fon of Edward III. king of England, was celebrated in 1368, with Violante, the daughter of Galeazzo Vifconti, duke of Milan. This event is circumftantially related by feveral other ancient hiftorians of Italy; and Aliprando of Mantua tells us, that Lionel gave five hundred fuperb dreffes to the minftrels, muficians, and buffoons, who were then affembled at Milan; that Galeazzo prefented them with many more; and Bernabo, his brother, rewarded them munificently with money on the occafion.

The fplendid robes and gorgeous attire of bards and minftrels at all times are upon record. The flowing veft of Orpheus, in the triple capacity of prieft, legiflator, and mufician, is fpecified by Virgil; Arion is related by Herodotus to have leaped into the fea, in the rich veftments he ufually wore in public; Suidas fpeaks of the faffron robe and Milefian flippers worn by Antigenides; and the performers in the tragic chorus, which ufed to be furnifhed at the expence of fome wealthy citizen of Athens, wore alfo a fplendid and coftly uniform.

In France the *Jongleurs*, and in Provence the *Troubadours*, or minftrels, during the middle ages, had frequent prefents of coftly robes from their patrons. In the "Fabliau Conte," or Tale of the red Rofe, a female complains to a *vavaffor*, or yeoman, of his having taken from her a robe, to give to the minftrels.

" Bien doit eftre vavaffor vis,
Qu'il vuet devenir meneftrier;
Miez voudroi que fuffiez rez, (rafé)
Sans aigue (eau) la tefte & le coul,
Que ia n'y remanfift chevoul,
S'apartient à ces jongleours,
Et à ces autres chanteours,
Qu'ils ayent de ces chevaliers,
Les robes, car c'eft lor meftiers."
Fabliau de la Rofe vermeille.

" I would not own the wretch for kin,
Who wou'd the minftrel trade purfue,
He'd better *dry* fhave head and chin,
And, with the hair, cut off the fkin,
Than herd with fuch a worthlefs crew.
Let fplendid knights with ufual pride,
On fidlers lavifh fuch rewards,
But 'tis to meaner fools denied
To ftrip themfelves for vagrant bards."

The cuftom of prefenting muficians with fuperb and expenfive dreffes during the 14th century, in the manner already related, feems to have travelled into England, and to have continued here till after the eftablifhment of the king's band of four-and-twenty performers; part of their prefent falary being ftill paid at the wardrobe office, as an equivalent for the annual drefs with which they ufed to be furnifhed at his majefty's expence. To this we may add, that the *waits*, or muficians who attend on the mayor and aldermen, in moft of our incorporate cities and towns, are furnifhed with fplendid cloaks.

ROBE, in *Geography*, a river of Ireland, which, rifing in the eaftern part of the county of Mayo, flows weftward by the town of Ballinrobe; a few miles weft of which it difcharges itfelf into Lough Mafk.

ROBEC, a river of France, which runs into the Seine, a little below Rouen.

ROBEK, a river of France, which runs into the Meufe, near Stevenfwaert.—Alfo, a river of France, formed by the union of the Clarence and the Nevee, which, after a fhort courfe, runs into the Lys, 2 miles E. of St. Venant.

ROBEK, or *Robeque*, a town of France, in the department of the Straits of Calais; 3 miles S. of St. Venant.

ROBEL, a town of the duchy of Mecklenburg; 9 miles S. of Wehrau. N. lat. 53° 10'. E. long. 12° 45'.

ROBER, a river of France, which runs into the Mofelle, at Treves.

ROBERDSMEN. See ROBBERY.

ROBERGIA, in *Botany*, received that appellation from Profeffor Schreber, in memory of Laurence Roberg, profeffor of phyfic in the univerfity of Upfal, who was born in 1664, and died in 1742. His moft curious, though very compendious and fuperficial publication, entitled *Grundvahl til Plantekjænningen*, is an anonymous introduction to botany, on Tournefort's plan, of 20 duodecimo pages, with as many rude wooden cuts of flowers, to illuftrate the principal claffes. Of the fifteen various inaugural differtations, publifhed under the prefidency of Roberg, only two are botanical; one being that of John Olaus Rudbeck, on the *Sceptrum Carolinum* (fee RUDBECK); and the other by Lofsberg on the Generation of Plants.—Schreb. Gen. 309. Willd. Sp. Pl. v. 1. 752. Mart. Mill. Dict. v. 4. (Rourea; Aubl. Guian. v. 1. 467. Juff. 369.)—Clafs and order, *Decandria Pentagynia*. Nat. Ord. *Terebintaceæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five deep, roundifh, concave fegments, permanent. *Cor.* of five roundifh petals, the length of the calyx. *Stam.* Filaments ten, inferted into the receptacle, the length of the corolla; anthers roundifh. *Pift.* Germen fuperior, roundifh, villous; ftyles five, capillary; ftigmas rather thick, furrowed. *Peric.* Drupa ovate, moft convex on one fide, flightly hollowed out at the other. *Seed.* Nut the fhape of the drupa, of one cell, with a bivalve fhell.

Eff. Ch. Calyx in five deep fegments. Petals five. Drupa fuperior, of one cell. Nut with a bivalve fhell, and fingle kernel.

1. R. *frutefcens.* Willd. n. 1. (Rourea frutefcens; Aubl. Guian. v. 1. 467. t. 187.)—Native of woods in Guiana, belonging to the parifh of Aroura, flowering in Auguft. The *ftem* is fhrubby, fupporting itfelf by branching over the neighbouring trees. *Leaves* alternate, pinnate, of three or four pair, with an odd one, of ftalked, elliptical, pointed, entire leaflets, from an inch and a half to three inches long; fmooth above; downy and whitifh beneath. *Flowers* in axillary, branched panicles, white, with a fcent fweeter than that of lilac. *Fruit* black, with a greenifh kernel.

ROBERT, in *Biography*, emperor of Germany, furnamed the *Short*, born in 1352, was count palatine at the time of the depofition of Wenceflaus; and Frederic, duke of Brunfwick, who was firft elected by the German princes to fupply the vacancy, having been affaffinated, Robert was chofen in his ftead in 1400. Wenceflaus had fold the dukedom of Milan to John Galeazzo, who had withdrawn his ftate from the fovereignty of the empire, and by force of arms had annexed to it feveral neighbouring towns and diftricts. Robert, therefore, invited by the pope and Florentines, led an army into Italy, and entered the duchy of Milan; but he was fo much harafled, as to be obliged to march back to Germany, without having effected any thing. On his return he was involved in fome petty wars with princes and ftates, who difputed his authority; and a confederation was formed againft him, which fubfifted during the whole of his reign. The moft inveterate of his opponents was the elector of Mentz, who began to build a caftle at Hochft, in defiance of him. Robert affembled troops to reduce him to obedience; but having advanced to Oppenheim, was feized with a fever, which proved fatal to him in 1410, at the age of 58. He was a prince of more prudence than enterprize, but poffeffed qualities which would have rendered his reign happy in lefs turbulent times. He was juft, clement, and pious, an enlightened politician, and a lover of learning, as he manifefted by founding the univerfity of Heidelberg.

ROBERT, king of France, fon of Hugh Capet, was affociated by his father to the crown in 988, and fucceeded him in 997, being then in his 27th year, and highly efteemed for his qualities both of body and mind. He had married Bertha, daughter of Conrad, king of Burgundy, and widow of Eudes, count of Blois. As he was diftantly related to his queen, and had alfo ftood god-father to one of her children by her former hufband, his marriage was confidered as invalid by Gregory V.; the parties were commanded to quit each other, and to fubmit to feven years' penance, on pain of excommunication. The king refufing to comply with this mandate, the fentence was iffued againft him, and the greater part of his own bifhops joined in it. The effects of this excommunication are a ftriking example of the fuperftition of the age. The lords of his court broke off all intercourfe with him, and the fervants, who remained to wait upon him, fhewed their horror of his fituation by throwing to the dogs all the relics of food touched by the king or queen, and burning the veffels they had ufed. It was even reported that the queen was delivered of a monfter. At length the king gave way, and parting with Bertha, by whom he had no iffue, efpoufed Conftance, daughter of the count of Arles, a beautiful woman, but violent and capricious, who difquieted all the remainder of his life.

The death of the duke of Burgundy, the king's uncle, without lawful heirs, in 1002, caufed that rich inheritance to fall to the crown of France; and after a war carried on for fome years with another claimant, Robert obtained poffeffion of the country, with which he invefted his fecond fon, Henry. The termination of this war gave much fatisfaction to the king, who was more inclined to the arts of peace than to military exploits; and he occupied himfelf in cares for the regulation of his court and houfehold, and the cultivation of letters and religion among his people. He built and repaired many magnificent religious edifices, and merited the title of the devout. By the perfuafion of the queen, he affociated his eldeft fon, Hugh, in the government, in his 18th year. This prince, difgufted with the haughtinefs and avarice of his mother, withdrew from court, and was guilty of fome diforders; but by the mild treatment of his father, he was brought back to his duty. In 1022, Robert difplayed his attachment to orthodoxy, by caufing a council to affemble at Orleans, for the purpofe of inquiring into a herefy introduced from Italy, which had been embraced even by fome diftinguifhed ecclefiaftics. Several of the culprits were burnt alive, in the prefence of the king and queen; the latter of whom manifefted the fury of her zeal, by thrufting out an eye of one who had been her confeffor, as he was led to execution. On the death of the emperor Henry II., in 1024, an Italian party offered the imperial crown and kingdom of Italy to Robert, or his fon; but the king had too much wifdom to involve himfelf in a war on fuch a project. In 1026 he loft his eldeft fon Hugh; on which event, he affociated in the crown his next fon, Henry, notwithftanding the oppofition of Conftance, who preferred her fon Robert. He died at Melun, in 1030, or 1031, about the age of 60, after a reign of 33 years. This prince was extremely beloved by his fubjects, on account of his mildnefs, juftice, and piety.

Robert was contemporary with Guido d'Arezzo. He was a great mufician, and a good poet: he wrote feveral hymns for the church, and fet them to mufic. They have been preferved among the ecclefiaftical chants, and are ftill the moft agreeable in its fervice. Conftance, his fecond wife, preffed him to write a hymn in her praife; and he made her believe that the hymn "Conftantia Martyrum" had been written for her, and fhe was fatisfied.

Trithemius writes, that Robert made a pilgrimage to Rome, and depofited on the altar himfelf, at St. Peter's, his hymns, in the prefence of the pope.

One of his beft hymns is "Veni, Sancte Spiritus." To him is likewife afcribed "Chorus Novæ Jerufalem;" the "Profe on the Afcenfion;" "Rex omnipotens Die odierna;" "Sancti Spiritûs adfit nobis Gratiâ." Laborde.

ROBERT I., king of Scotland, of the family of Bruce, memorable as the reftorer of the independence of his country, was grandfon of that Robert Bruce who was the unfuccefsful competitor with John Baliol for the crown of Scotland. But the death of his father, who left him heir to his eftates and pretenfions, with that of John Baliol, whofe fon was a captive with the Englifh, infpired him with high defigns both for himfelf and his country, which was then in a ftate of fubjection to Edward; and having left the Englifh court, to which, it is faid, his purpofes had been betrayed, he arrived in Scotland about the clofe of 1305, with the refolution of declaring himfelf. The Scottifh writers mention Comyn as the perfon who had given information againft him; but whether this were the fact, or fome other caufe of quarrel rofe between them, it is certain that at an interview at Dumfries, in February 1306, Bruce with his dagger ftabbed Comyn, who was afterwards difpatched by one of his affociates. This deed of violence could be juftified only by greater daring; and Bruce immediately proceeded to feize the caftle of Dumfries, to confine the Englifh judges affembled there, to affert his claim to the crown, and to fummon all the friends of his family to his affiftance. He was foon at the head of a body of troops, with which he penetrated as far as Perth, the Englifh every where flying before him; and in March he was folemnly crowned at Scone, in prefence of fome bifhops and nobles, and a great number of gentlemen. The king of England, highly enraged at the news of thefe events, ordered all the forces of the northern counties to enter Scotland, and join the family of Comyn, in order to take vengeance on the rebel, as he was termed. The earl of Pembroke marched to Perth, where he furprifed and defeated Bruce's troops at Methven, in June, their leader himfelf efcaping with difficulty. The broken remnant of his army was again routed by lord Lorn, the

the nephew of Comyn; and Bruce, difmiffing his few followers, was conftrained to take refuge in an unfrequented ifle of the Hebrides.

Neither friends nor foes were acquainted with the fate of Bruce, when he fuddenly appeared at his eftate of Carrick, at the head of a fmall but refolute band, with which he furprifed an Englifh lord, who had obtained a grant of that property; but on the approach of a detachment from the Englifh army, he retreated to the Highlands. In the mean time, Edward was preparing for an expedition into Scotland with a force which was to reduce it to entire fubmiffion. He was foon after delivered from the moft formidable of his foes, by the death of Edward I. near Carlifle, as he was juft upon the point of entering Scotland with a great army. His fon, Edward II., though he obeyed his father's dying injunction of marching into Scotland, yet purfued the war with no vigour, and foon returned to England to join his favourite Gavefton. Robert, who had reduced the weftern counties, left them in charge of his gallant friend, fir James Douglas, and proceeded againft his enemies in the north. He afterwards made himfelf mafter of Invernefs, and the northern diftricts; and at length, having taken the caftle of Forfar and the town of Perth, he brought the whole of Scotland, except a few fortreffes, to acknowledge his authority. In the beginning of 1314, there remained in Scotland only the caftles of Stirling, Dunbar, and Berwick, in the hands of the Englifh. Edward had now, after the death of Gavefton, reconciled himfelf with his difcontented barons; and it was refolved that he fhould make an attempt to recover Scotland, with fuch a force as might overcome all refiftance. At the head of the greateft army that had ever entered that country from England, he moved from Berwick in June 1314, and marched for Stirling, to relieve its caftle, then befieged by Robert in perfon. The Scotch army, much inferior in number to the Englifh, but compofed of veteran troops, awaited the approach of the enemy on the banks of the rivulet of Bannock, in the road to Stirling. In a fkirmifh of cavalry preceding the engagement, Robert difplayed his ftrength and prowefs by cleaving down to the chin, with his battle-axe, an oppofite commander, of the family of Bohun. This was an omen of the fuccefs of the great battle of Bannockburn, in which, through the able difpofition and conduct of Robert, the Scotch obtained the moft decifive victory over the Englifh that their annals boaft, and eftablifhed the independence of their country. Edward himfelf narrowly efcaped; and the number of noble prifoners was fuch as to enable Robert to recover, by exchange, his wife, daughter, and fifter, with feveral men of rank, who had been the captives of Edward I. The king of Scotland followed up his fuccefs by an invafion of England, in which he ravaged the northern counties without oppofition. He now thought himfelf ftrong enough to give the Englifh government moleftation in another quarter; and in 1315 he fent his brother, Edward, over with a body of troops to the north of Ireland, to affift the natives in freeing themfelves from the dominion of England. Robert himfelf followed with a large reinforcement in 1316, but was compelled by famine to return; and his brother, after experiencing a variety of fortune, was defeated and flain in an engagement with the Englifh near Dundalk.

The depofition and death of Edward II., in 1327, gave occafion to a breach of the truce on the part of the king of Scotland, who feems not to have confidered himfelf as bound to the new government. In reality, however, he was tempted by the difordered ftate of England to renew hoftilities, for which he had been fome time preparing. Young Edward III. was not a prince to fuffer an infult without refiftance and retaliation; and learning that the Scotch under Douglas and Murray, were making dreadful ravages in Northumberland, he affembled a powerful army, and went in fearch of them. They, however, eluded all his attempts to bring them to action, and retired to their own country. Edward difmiffed his army, and in the fame year a peace was agreed upon between the two nations, by an article of which the king of England renounced all claim to fuperiority over the kings or kingdom of Scotland; and thus the great object of Robert's reign, the independence of his country, was finally eftablifhed. At the fame time, his only fon David, then five years of age, was contracted to Joan, Edward's fifter. Robert was now nearly worn out with the cares and fatigues of his active life; and in 1329, at his caftle of Cardrofs, he expired, in the 54th year of his age and the 24th of his reign, leaving a name memorable in the annals of his country, which he refcued by his courage and wifdom from a foreign yoke, and reftored to its rank among nations. Hume. Henry. Univ. Hift.

Robert, king of Naples, fon of Charles II., by the fifter of Ladiflaus, king of Hungary, born in 1279, was duke of Calabria at the time of his father's death, in 1309. The fucceffion was difputed between him and the fon of his elder brother, Carobert, king of Hungary; but the college of cardinals (Naples being then confidered as a fief of the holy fee) decided in Robert's favour. He was crowned at Avignon, and, in gratitude to the pope, exerted himfelf to oppofe the Ghibelline or imperial party in Italy. At this time the crown of Sicily was in poffeffion of Frederic III. of Arragon, who, for his defence againft the king of Naples, formed an alliance with the emperor. Robert was ambitious to extend his dominion, and almoft the whole of his reign was fpent in fruitlefs attempts to conquer the ifland of Sicily. He alfo, during his contefts with the Imperialifts, aggrandized himfelf in Lombardy, and for fome time he held the fovereignty of great part of Romagna, Florence, Lucca, Ferrara, Genoa, and feveral other places in Piedmont. He was the moft potent prince in Italy of his age; but it is lefs on account of his political and military fucceffes that he deferves commemoration, than becaufe he was the greateft royal proficient in fcience and letters, and the moft munificent patron of them, in the century in which he lived. Many of the early writers give their teftimony to his merits in this refpect; and Petrarch, in particular, in feveral parts of his writings, is profufe in his praife. Robert, however, is faid, when a child, to have been fo flow of comprehenfion, that it was with the greateft difficulty he could be taught the elements of grammar; and it was not till his preceptor had interefted him in Æfop's Fables, that he exhibited any fondnefs for learning. The private character of the king was highly amiable, and the only fault with which he is taxed was a difpofition to avarice, that grew upon him with his years. He had the misfortune of lofing his only fon, Charles, at the age of 31, on which occafion he exclaimed that the crown was fallen from his head. He died in January 1343, in the 64th year of his age, and 34th of his reign.

Robert, Claude, a French ecclefiaftic and chronologift of fome celebrity, was born at Cheflay, a village between Bar-fur-Seine and Tonnerre, on the borders of Burgundy, in the year 1564. From fome feminary in the province juft mentioned, he went to purfue his academical ftudies at Paris, where he obtained an exhibition in the college of Cambray. As foon as he had been admitted to the degree of licentiate in canon law, he accompanied his pupil into Burgundy, where, in 1590, he was prefented to a canonry of the Chapel-au-Riche at Dijon. Afterwards he travelled with his pupil through

through France, Flanders, Germany, and Italy. At Rome he was introduced to persons of the greatest distinction, and received several marks of esteem from the cardinals Bellarmine and Baronius. It was in this city that he first conceived the plan of his "Gallia Christiana." He was afterwards nominated bishop of Chalons-sur-Saone; upon which event this prelate conferred a canonry of his cathedral upon his preceptor, and made him his archdeacon and grand vicar. The bishop was desirous of expressing his regard for our author, by collating him to other benefices; but M. Robert constantly refused any additional preferment. He discharged the duties of his appointments with the strictest fidelity, and died in the episcopal palace at Chalons in 1637, when about 73 years of age. The most considerable of his production is entitled "Gallia Christiana," &c. published at Paris in 1626, in folio, with an appendix, preface, and chronological tables of the popes and anti-popes, the Eastern and Western emperors, the kings of France and England, the councils of France, the indictions, &c. He left behind him materials for a second edition of this work, which were made use of by M. St. Marthe, whose new collections increased the work to three volumes folio. It was afterwards extended by the Benedictines to twelve volumes folio.

Robert de Vaugondy, a French geographer, was born at Paris in the year 1688. Little is known of his private history, but he became geographer to the king, and died at Paris in 1766. His works are "An Introduction to Sanson's Geography," 1743; "An Abridgment of the different Systems of the World," 1745; "Sacred Geography," 1746; "A Treatise on the Use of the Globes;" "A Portable Atlas;" and above all "Atlas Universel," published in 1756, consisting of 108 maps, upon a large scale, engraved with neatness and accuracy. He had a son, who for some time was the assiduous companion of his labours, and who assisted him in the "Atlas Universel," to which work is prefixed an historical preface, in six chapters, treating of the origin, progress, and present state of geography.

Robert de Brienne, harper to Edward I. previous to his ascending the throne. The harp for many ages seems to have been the favourite instrument of the inhabitants of this island, whether under British, Saxon, Danish, or Norman kings. Many disgraceful circumstances are blazoned of the poor minstrels; it is therefore but just to relate those that redounded to their honour, and the Chronicle of Walter Heming furnishes an incident that well deserves to be recorded.

Edward I., according to this historian, about the year 1271, a short time before he ascended the throne, took his harper with him to the Holy Land; and this musician must have been a close and constant attendant on his master, for when Edward was wounded with a poisoned knife at Ptolemais, the harper, *citharœda suus*, hearing the struggle, rushed into the royal apartment, and killed the assassin. This signal service from his bard did not, however, incline the monarch, afterwards, to spare his brethren in Wales. See Grey's Ode, "Ruin seize thee, ruthless king!"

Robert, *Herb*, in *Botany*. See Geranium.

Robert *Bay*, in *Geography*, a bay on the E. coast of Newfoundland.

Robert *Bay*. See Cul *de Sac Robert*.

Roberts's *Island*, a small island on the Florida stream. N. lat. 24° 42′. W. long. 81° 33′.

Roberts's *Islands*, a cluster of small islands in the Pacific ocean, the largest being eight miles long and from two to three wide, four others being very small; discovered in the year 1792 by lieutenant Herget, commander of the Dædalus store-ship. S. lat. 7° 53′. E. long. 219° 50′.

ROBERTI, John, in *Biography*, a celebrated professor of divinity among the Jesuits, was born in the year 1569. He commenced his academical studies at Liege, and continued them at Cologne, where, when he was twenty-two years of age, he entered into the society of Jesus. His proficiency in various branches of learning is highly commended, particularly in the belles-lettres, the several departments of theological learning, and ecclesiastical history. He was made professor of divinity, and created doctor of that faculty, at Mentz, discharging the duties of his post with great reputation, during a long succession of years, in that city, at Doway, at Treves, and at Wurzburg. He died at Namur in 1651, in the 82d year of his age. He was author of many works on theological subjects, of which the most important, and that which proves how deeply he was versed in scripture criticism, was entitled "Mysticæ Ezekielis Quadrigæ, hoc est, Evangelia Historiarum et Temporum Serie vinculata Gr. et Lat."

ROBERTON, in *Geography*, a township of Washington county, Pennsylvania, containing 899 inhabitants.

ROBERTSON, William, in *Biography*, was born at Dublin in 1705, and received his grammar-learning under Dr. Francis Hutcheson, afterwards the celebrated professor of moral philosophy in the university of Glasgow. In the year 1722 young Robertson removed to that university, where he continued till the year 1725, when he was admitted to the degree of M. A. During this year there was a dispute between Mr. Sterling, the principal of the university, and the students, about the right of choosing the rector, in which Mr. Robertson took an active part, being selected by his fellow students to read their protest against the person, and his authority, who had been chosen rector in opposition to their wishes. Thus distinguished, he excited against himself the indignation of the principal, Mr. Sterling, and his rector, and was the only one of more than fourscore petitioners against whom they instituted proceedings. He was cited before the faculty, and after a trial which lasted several days a sentence of expulsion was pronounced. Mr. Robertson was satisfied of the justice of his cause, and presented a memorial on the subject to the duke of Argyle, through whose influence an appeal was made to the king, who appointed a commission to visit the university of Glasgow, with full powers to examine into and rectify all existing abuses. As a result of this enquiry, the right of electing their rector was restored to the students: the visitors on this occasion also, among whom was the earl of Hay, called the principal to a severe account for the public money which he had embezzled, and ascertained the right of the university to send two gentlemen, upon handsome exhibitions, to Baliol college in Oxford: they moreover annulled the expulsion of Mr. Robertson, and ordered that measure particularly to be recorded in the proceedings of the commission; declared the election of the rector, who had been named by the principal, to be void; and assembled the students, who immediately chose the son of lord Ross to be their rector.

While the visitors were exercising their powers, Mr. Robertson remained at London, and on the return of lord Hay he introduced Mr. Robertson to Dr. Hoadly, the bishop of Winchester, who made him known to Dr. Wake, archbishop of Canterbury; and he was entertained with much civility by both these prelates. He had, from a thorough conviction of its importance, devoted himself to the clerical profession; but at present being too young to be admitted into orders, he employed himself, while in London, in visiting public libraries, attending lectures, and improving himself himfelf as opportunity offered. As foon as he was old enough to receive ordination, he was nominated by Dr. Hoadly to the cure of Tallow, in the county of Carlow. Here he continued till he was of age for prieft's orders, to which he was admitted on the 10th of November 1729, and on the next day he was prefented by lord Carteret, then lord lieutenant of Ireland, to the rectory of Ravilly, in the county of Carlow, and to another rectory in the county of Wicklow. In 1728 he married Elizabeth, the daughter of major William Baxter, by whom he had twenty-one children.

Mr. Robertfon firft appeared as an author about the year 1738, by a pamphlet entitled "A Scheme for utterly abolifhing the prefent heavy and vexatious Tax of Tythes:" the object of this work was to pay the clergy and impropriators a tax upon land in lieu of tythes, and it excited fo much attention, that feveral editions of it were called for in a fhort fpace of time. In 1739 Mr. Robertfon received from lord Cathcart a deputation to be his chaplain; and in the year 1743 he obtained leave from his diocefan to nominate a curate at Ravilly, and to refide fome time in Dublin for the education of his children. Immediately on his fettlement in this city he was invited to the cure of St. Luke's parifh, which he retained about five years, when he returned to Ravilly. While in that city he formed a fcheme, jointly with Mr. Kane Percival, to raife a fund for the fupport of the widows and children of clergymen within the diocefe of Dublin, which has fince produced very happy effects. In 1758 he met with a fevere affliction in the death of his wife, to whom he was moft tenderly attached, but he fuftained the lofs with exemplary refignation to the will of God. Soon after this he found a new patron in Dr. Richard Robinfon, who had been tranflated from the fee of Killala to that of Ferns, and who prefented to Mr. Robertfon the firft benefice which became vacant in his lordfhip's prefentation. Before, however, he could be collated to it, he, for the firft time, had the "Free and Candid Difquifitions relating to the Church of England, &c." put into his hands; and, by the perufal, he was led to entertain fuch doubts refpecting fome points to which he would be required to declare his affent, as made him defer his attendance on the bifhop. At length he received a letter from his lordfhip, calling upon him to come immediately for inftitution. Upon this he wrote a very affecting letter to the prelate, in which he returned the moft grateful thanks for his kindnefs, but faid he could no longer confcientioufly comply with the terms required by law to qualify him for fuch preferment. "In debating this matter with myfelf," fays he, "befides the arguments directly to the purpofe, feveral ftrong collateral confiderations came in upon the pofitive fide of the queftion. The ftraightnefs of my circumftances preffed me clofe; a numerous family, quite unprovided for, pleaded with the moft pathetic and moving eloquence. And the infirmities and wants of age now coming faft upon me were urged feelingly. But one fingle confideration prevailed over all thefe—that the Creator and Governor of the univerfe, whom it is my firft duty to worfhip and adore, being the God of truth, it muft be difagreeable to him to profefs, fubfcribe, or declare, in any matter relating to his worfhip and fervice, what is not believed ftrictly and fimply to be true."

Mr. Robertfon, though he refufed to fubfcribe for the fake of preferment, did not feel it neceffary to quit the church, and continued to perform the duties of parifh prieft; but from this time he omitted the reading of the Athanafian creed, and fome other parts of the public fervice which appeared to him to countenance unfcriptural tenets. Finding, however, that this mode of conduct gave offence to fome perfons, he refigned his benefices in 1764, and in 1766 he publifhed, by way of apology to his friends for what he had done, his learned and ingenious little work, entitled "An Attempt to explain the Words Reafon, Subftance, Perfon, Creeds, Orthodox, &c." to which he fubjoined the letter written to his bifhop, of which an extract has been given above. He now came to London, where he met with a very cordial and liberal reception from many excellent men, who generoufly contributed to his fupport. In the following year he prefented a copy of his "Attempt, &c." to the univerfity of Glafgow, and, in return, received a moft obliging letter, accompanied with the diploma of D.D. In 1768 he was nominated to the mafterfhip of the free grammar-fchool at Wolverhampton, in Staffordfhire, by the company of Merchant Taylors; which, though honourable to the patrons, was not lucrative to the doctor, the falary being only 70*l.* *per ann.*, and this was, for fome years, diminifhed by a penfion of 40*l.* to a fuperannuated predeceffor. Dr. Robertfon was, however, fatisfied, and through the kindnefs of his friends was prevented from wanting what was neceffary to his fupport. At one time he received from an unknown hand a prefent of 500*l.*, and from various perfons ftated affiftance was fent him. In 1772 he was chofen one of the committee of the fociety of clergymen, &c. employed to draw up, and prefent to the houfe of commons, a petition praying for relief from the obligation of fubfcription to the 39 articles. In the courfe of a few years he had the misfortune to lofe all his children one after another; and he himfelf died in May 1783, in the 79th year of his age. Dr. Robertfon was poffeffed of great learning and an excellent judgment; he had a fine imagination, and a temper regulated by the mild and amiable fpirit of Chrift; and in his addrefs and manners he was at all times eafy and cheerful. When he quitted the church he was probably of the Arian fchool, but in the latter years of his life he became a firm believer in the fimple humanity of Chrift. He was mentioned by Mr. Lindfey, a few months before his death, as "the aged and venerable father of Unitarian nonconformity of our own days;" and in another work the fame writer fays, "the example of an excellent perfon now living at Wolverhampton, Dr. Robertfon, has been a fecret reproach to me ever fince I heard of it." See Lindfey's Apology for refigning the Vicarage of Catterick, his Hiftorical View of the Unitarian Doctrine, and Dr. Difney's Communications to the Gent. Mag. 1783.

Robertson, William, D. D., a celebrated hiftorian, was born in 1721, at Borthwick, in Mid Lothian, of which parifh his father was then minifter. He received the early part of his education at Dalkeith, under Mr. Leflie, a mafter of high repute. In 1733 he entered upon his academical ftudies at Edinburgh. After the completion of his courfe, he obtained a licence to preach in 1741, and in 1743 he was prefented, by the earl of Hopetoun, to the living of Gladfmuir, in Eaft Lothian. On this living, which was not more than 100*l.* *per ann.*, he contrived to educate his fix fifters and a brother, who, about this time, were left orphans by the death of both their parents. Here alfo he difplayed his zealous attachment to the caufe of liberty, by his efforts, in the year of the rebellion, in favour of the houfe of Brunfwick, which he carried fo far as to quit, for a feafon, his parochial charge, and join the volunteers of Edinburgh. He became, in a fhort time, diftinguifhed for his eloquence and good tafte as a preacher; and, in 1755, a fermon which he delivered before the Society for propagating Chriftian Knowledge, and which was the only compofition of that kind that he ever publifhed, raifed him very high as a pulpit orator. It paffed through five editions, and was tranflated

tranflated into the German language. He had, fome years previoufly to this, begun to take a part in the debates of the general affembly of the church of Scotland, and, as he poffeffed great talents for bufinefs, as well as the powers of a public fpeaker, he acquired an afcendancy in that body which, during a long period, gave him the lead in the ecclefiaftical politics of the country. In 1754 a "Select Society" had been eftablifhed in Edinburgh, among the firft members of which are found many names that, in procefs of time, became highly diftinguifhed in literature and public life. Among the number of thefe was that of Robertfon, who was moft affiduous in his attendance, and obtained from it an increafe of reputation. In the mean time he was deeply engaged in the ftudies neceffary for completing the plan of an hiftorical work which he had formed foon after his firft fettlement as a minifter, and having taken a journey to London for the purpofe of making arrangements for the publication, his "Hiftory of Scotland during the Reigns of Queen Mary, and King James VI." made its appearance in the year 1759, in two vols. 4to. He had, previoufly to this, as appears by the title-page of the volume, obtained the degree of D. D. It was received by the public with general approbation and applaufe. The celebrated Hume, fo far from betraying jealoufy or envy at the appearance of a competitor for the hiftoric palm, took the warmeft intereft in the fuccefs of the work.

The Hiftory of Scotland appears to have been the moft popular of the author's works, and it had paffed through fourteen editions during the life of the author. It had, in every refpect, a favourable influence on his fortune, fince the fame which he acquired by the publication was probably the caufe of his rapid promotion. He had removed to Edinburgh, in confequence of a prefentation to one of the churches of that city, while it was in the prefs; in the fame year he was nominated chaplain of Stirling-caftle; in 1761 he was appointed one of the king's chaplains in ordinary in Scotland, and in the following year he was elected principal of the univerfity of Edinburgh. Two years after this he was appointed to the poft of hiftoriographer royal of Scotland, with the falary of 200*l.* *per ann.*, fo that, at this period, he was the beft beneficed clergyman of his church. He was, moreover, the acknowledged head of the party which held the chief fway in a national church; and the period from his becoming principal of the univerfity of Edinburgh, to his retreat from public life, was commonly denominated "Dr. Robertfon's adminiftration."

In the midft of the numerous avocations which his feveral offices created, he proceeded to collect materials for his "Hiftory of the Reign of the Emperor Charles V.," which he publifhed in 1769, in three quarto volumes. This work was, like the former, received with high approbation; it increafed his reputation both on account of the greater maturity of ftyle to which he had attained, and of the more profound and varied refearch which the weight and copioufnefs of the theme led him to difplay. The introductory volume contained a view of the progrefs of fociety in Europe from the fubverfion of the Roman empire to the beginning of the fixteenth century, which was particularly admired, as prefenting a mafterly furvey of the gradations by which the focial inftitutions of antiquity have paffed, through the barbarifm of the dark ages, into all that characterizes the ftate of modern Europe. So highly pleafed was Catharine, the emprefs of Ruffia, with the Hiftory of Charles V., that fhe conveyed her acknowledgments to the author in a prefent of a rich fnuff-box fet with diamonds.

In the year 1777, Dr. Robertfon publifhed his "Hiftory of America," in two vols. 4to., which, from the new views of man and nature that it prefents, and the magnificence and variety of its fcenery, is perhaps the moft entertaining of his productions. Either gratitude for the communications obtained from the Spanifh court, or candour carried far beyond the bounds of moderation, led him to extenuate the cruelties that had been committed by that nation in their conquefts in the new world, to a degree that brought upon him cenfure. The work proved fo acceptable to the Spanifh nation, that the author was unanimoufly elected a member of the Royal Academy of Madrid. In 1791 Dr. Robertfon publifhed "An Hiftorical Difquifition concerning the Knowledge which the Ancients had of India, and the Progrefs of Trade with that Country, prior to the Difcovery of the Cape of Good Hope." After this, Dr. Robertfon's health began to decline, and in June 1793 he died at the age of 72. As an hiftorian his ftyle is pure, fweet, dignified without ftiffnefs, fingularly perfpicuous, and often eloquent; the arrangement of his materials is fkilful and luminous, his mode of narration is diftinct, and his defcriptions highly graphical; and he difplays a fagacity in the developement of caufes and effects, and in his judgment of public characters and tranfactions, which is very remarkable in one who was brought up in retirement. "If," fays one of his biographers, "there is lefs glow and ardour in his expreffions of moral and political feelings, than fome writers in a free country have manifefted; there is, on the other hand, all the candour and impartiality which belongs to a cool temper, when enlightened by knowledge and directed by principle." To his private and focial virtues the moft liberal teftimony has been given, even by thofe who were his opponents in church politics. See Dr. Dugald Stewart's Life of Principal Robertfon.

Robertson, Joseph, was born at Knipe, in Weftmoreland, in 1726, and educated at Appleby fchool, from which place, in 1746, he went to Queen's college, Oxford, where he took his degree of M. A., and, on entering holy orders, he was prefented to the vicarage of Hertford, in Hampfhire. In 1764 he became an author, by contributing largely to the Critical Review, an occupation in which he continued more than 20 years. In 1770 he was prefented to the rectory of Sutton, in Effex, and in 1779 to the vicarage of Horncaftle, in Lincolnfhire. In 1782 he publifhed what he entitled "An Introduction to Polite Literature," a very fmall volume, and which cannot certainly deferve fo high founding a title. It has been reprinted feveral times. It is a fort of fpelling-book or primer, with good rules for pronunciation. The author was, however, fo tenacious of his property, that he attacked, with much feverity, the late Dr. Paley, for copying a part of it without acknowledgment, into a little piece intended for the ufe of Sunday fchools. Dr. Paley's reply and defence is that of a gentleman and fcholar, and muft be quite fatisfactory to the candid reader. Mr. Robertfon's next piece, "An Effay on Punctuation," was publifhed in 1785; it is a work of confiderable merit, and has gone through feveral editions. In 1788 appeared his "Differtation on the Parian Chronicle." Mr. Robertfon publifhed, in 1795, a new "Tranflation of Telemachus;" and in 1798 "An Effay on the Education of Young Ladies," which was followed by an "Effay on the Nature of Englifh Verfe." He died in 1802. See Gent. Mag. vol. lxii. Monthly Mag. Meadley's Memoirs of Dr. Paley.

Robertson's *County*, in *Geography*, a county of America, in the diftrict of Weft Tenneffee, bordering N. on Kentucky, and containing 7270 inhabitants. It is watered by Cumberland and Red rivers.

ROBERVAL, Giles Personne de, in *Biography*, an excellent

excellent mathematician of the 17th century, was born at Roberval, a feignory belonging to his family, in the diocefe of Beauvais, in the year 1602. In the courfe of his education he difcovered a ftrong inclination towards the ftudy of the mathematics, with which he made himfelf very converfant. When he was 30 years of age he obtained the profefforfhip of mathematics in the college of Gervais, at Paris; and afterwards he contefted, with other candidates, the fucceffion to the vacant chair of Ramus, which he gained by the fuperiority of his powers in difputation. He fucceeded Morin as mathematical profeffor at the college-royal, the duties of which office he performed with high reputation fo long as he lived. He was chofen a member of the Royal Academy of Sciences in 1666, and communicated to that body fome curious experiments on the Torricellian vacuum, which he made in the years 1647 and 1648. He invented two new kinds of balances, one of which was adapted to the weighing of air. Roberval died in 1675, at the age of 73. His chief works are "A Treatife on Mechanics," inferted in Merfenne's "Univerfal Harmony." A treatife "On the Mundane Syftem," written in Latin, attributed to Ariftarchus of Samos, but generally believed to be his own production. Befides thefe he contributed feveral papers to the Memoirs of the Academy of Sciences: fuch as "Experiments concerning the Preffure of the Air;" "Obfervations on the Compofition of Motion, and on the Tangents of Curve Lines;" "The Geometrical Refolution of Plane and Cubic Equations;" "A Treatife on Indivifibles;" at the end of which he has explained a new method for the transformation of figures, to which Torricelli gave the name of "Robervallian Lines."

ROBERVALLIAN Lines, a name given to certain lines, ufed for the transformation of figures: thus called from their inventor M. de Roberval.

Thefe lines bound fpaces infinitely extended in length, which are neverthelefs equal to other fpaces terminated on all fides.

The abbot Gallois, in the Memoirs of the Royal Academy, anno 1693, obferves, that the method of transforming figures, explained at the latter end of M. de Roberval's Treatife of Indivifibles, is the fame with that fince publifhed by Mr. James Gregory, in his Univerfal Geometry, and afterwards by Barrow, in his Lectiones Geometricæ; and that, by a letter of Torricelli, it appears that Roberval was the inventor of this manner of transforming figures, by means of certain lines, which Torricelli therefore called *Robervallian lines.*

He adds, that it is highly probable, that J. Gregory firft learned the method in the journey he made to Padua in 1668; the method itfelf having been known in Italy from the year 1646, though the book was not publifhed till the year 1692.

This account Dr. David Gregory has endeavoured to refute, in vindication of his brother. His anfwer is inferted in the Phil. Tranf. an. 1694, and the abbot has rejoined in the French Memoirs of the Academy.

ROBESON, in *Geography*, a county of North Carolina, in Fayette diftrict, bounded S. by the ftate of South Carolina. It contains 7528 inhabitants. The chief town is Lamberton.—Alfo, a townfhip of Lancafter county, Pennfylvania; containing 1807 inhabitants.

ROBESPIERRE, Maximiliam Isidore, in *Biography*, was born at Arras in 1759. His father, a barrifter, having ruined himfelf by his prodigality, left France before the revolution, eftablifhed a fchool at Cologne, where, however, he did not remain long, and he went from thence into England, and afterwards to America. Deferted by his father, and his mother dying when he was only nine years old, he was taken under the patronage of the bifhop of Arras, M. de Conzie, who caufed him to be fent to the college of Louis le Grand, where he was taken on the foundation. From a very early age he was noticed for his love of independence; he was however timid, and in his temper gloomy and unfociable. He was extremely affiduous in his ftudies, and gave hopes of talent, that were not realized in after-life. In 1775, when Lewis XVI. made his entry into Paris, he was chofen by his fellow ftudents to prefent to that prince the homage of their gratitude. Becoming a barrifter in the council of Artois, he obtained a place in the academy of Arras. In the year 1789 he took an active part in all the revolutionary meetings, and was appointed a deputy from the province of Artois to the States-General. He manifefted but little talent as an orator or legiflator, but attached himfelf to Neckar, and then to Mirabeau, during the heights of their popularity; but when they became lefs careffed by the people, Robefpierre was the firft to notice the difference, and deferted them for fome other leader. The firft time that he made himfelf at all remarked in the conftituent affembly, was on the 20th of July 1789, when he oppofed the fcheme of martial law; and from that period, fays his biographer, "he endeavoured to legitimatize infurrection." By courting the people, and difplaying a determined hoftility to the royal prerogatives, he laid the foundation for future influence in the democratic party; and it has been confidered a very remarkable circumftance, in connection with his future conduct, that the moft frequent topic of his declamation was the injuftice of capital punifhment in any cafe.

After the diffolution of the conftituent affembly, followed by the election of the legiflative body, the members of which being all new, Robefpierre's chief theatre of action was the Jacobin club, at which he was the principal fpeaker. He alfo publifhed a weekly paper, entitled "Le Defenfeur de la Conftitution." He now took a decided part with the republicans, though it does not appear that he was an actor in the infurrection of the 10th of Auguft, or in the prifon-maffacres of September. In the new affembly, which met in September 1792, he was returned a member for the city of Paris, and he foon became the head of the party called the Mountain, which was oppofed to the followers of Briffot, who then poffeffed the minifterial power. He was now charged with the defire of making himfelf dictator, but his party in the fenate was too powerful for his accufer to carry the point, and the affembly paffed a decree to print and circulate the fpeech which he made in juftification of himfelf. By this he became ftill more popular, and his fubfequent exertions to bring the unfortunate king to trial, augmented his influence with the democratic part of the nation. Soon after the execution of Lewis, Robefpierre, affifted by Danton and Marat, gained a moft decided fupremacy in the national convention, and the period commenced which has been emphatically, but juftly, denominated the reign of terror. The Briffotines, to the number of twenty-one, were accufed, condemned, and guillotined. After them followed the queen, the duke of Orleans, and other members of the royal family. The fcaffold daily ftreamed with the blood of nobles, priefts, and all who by character and condition could be fufpected of being attached to the ancient government. In fome of the provinces, maffacres were perpetrated againft whole orders of men, without diftinction: the levelling principle was extended to all fuperiority of fcience and talent, and it feemed Robefpierre's object to bring back an age of barbarifm. At length his own confederates, Danton, Defmoulins, Fabre d'Eglantine, and others, were brought to the block.

block. In the midst of all these horrors he exhibited a festival, in which the existence of the Supreme Being was solemnly recognised; and as the restorer of religion, he appointed days for public worship.

The reign of terror was now become too intolerable to be endured. No man was safe from a tyrant whose bloody disposition seemed to grow with the acts of cruelty which it generated, and who had established such a system of domestic treachery, as destroyed the confidence of society, and subjected every individual to accusation. He lost his popularity, and a decree of the convention was passed against him: in the act of arresting him two pistols were fired, by which he was wounded in the head and the under-jaw. He endured in silence the pain of his wounds, and the upbraidings of his foes, and was carried to the same dungeon which he had made to many the passage to death. On the next day, after being taken, with his accomplices, before the revolutionary tribunal, he was led, July 28, 1794, to execution, amidst the acclamations and curses of thousands of spectators. Such was the well-merited end of Robespierre, in the 36th year of his age. Although a concurrence of circumstances enabled him to act a considerable part in the revolution, he was not one of the superior figures in point of abilities and force of character. Natural reserve, cunning, habitual dissimulation, and a total want of feeling, carried him through difficulties which might have overwhelmed a greater man; but as he never made a friend, and was unsupported by native courage, he sunk under the first serious opposition. He was regarded as incorruptible, and never accumulated money: nevertheless, he always took care to open the path of honour and wealth to his own creatures, and especially to his rivals, in order that he might have an additional method of ruining them. Upon the whole, he has left a name more the object of horror and detestation, than that of any other among the personages of the same awful drama.—Ann. Register. Lives of Remarkable Characters, who have distinguished themselves in the French Revolution. Biog. Anec. of the Founders of the Fr. Rev.

ROBIA HERBA, in *Botany*, a name given by Paulus Ægineta, and many others, to a plant used in dyeing.

The near resemblance of the name to the word *rubia*, has made many conclude that it was the *rubia*, or madder, which they have meant by it; but they have taken care in their writings to distinguish it from that plant, and it is plainly the *genistella tinctoria*, or dyer's weed, that they meant by the *robia herba*. They say it was used to dye yellow, and that it was also a custom to stain the hair with it.

These are the properties recorded of the *cymene* and *æcomenium* of the Greeks, and the *lutum*, or *lutea herba*, of the Latins, which were names of the *genistella tinctoria*. Pliny says, that the *lutum* had leaves like flax, and flowers like broom, which is exactly the case with the *genistella tinctoria*, but by no means agrees with the glastum or woad.

ROBIESSOU, in *Geography*, a town of Austrian Poland; 22 miles S. of Chelm.

ROBIGALIA, or RUBIGALIA, in *Antiquity*. See RUBIGALIA.

ROBILLANTE, in *Geography*, a town of France, in the department of the Stura; six miles S. of Coni.

ROBIN, or, as it is more usually called, *Robin red-breast*, *Rubecula*, in *Ornithology*. See RED-*breast*.

ROBIN, *Ragged*, in *Botany*. See CAMPION.

ROBIN, *Wake*. See WAKE *Robin*.

ROBINAL, in *Geography*, a town of Mexico, in the province of Vera Paz; containing 800 inhabitants; 40 miles S.S.W. of Vera Paz.

ROBIN-HOOD's BAY, a bay on the E. coast of Newfoundland, frequented by small vessels.

ROBINIA, in *Botany*, commemorates John Robin, botanist to Henry IV. and Louis XIII. of France, who published a catalogue of his own garden, which has gone through several editions. He also supplied descriptions to Vallet's figures. A popular French author, who calls himself M. de Vigneul-Marville, but whose real name was d'Argonne, in his *Melanges*, stigmatizes Robin for his greedy and selfish love of flowers, the more curious kinds of which he would rather destroy, than communicate to his friends. In allusion to this, and to a report of his being an eunuch, he was addressed in a bitter Latin satire, as by nature an enemy to all propagation. De Theis, nevertheless, speaks of Vespasian Robin as his son. They published conjointly a botanical *Enchiridion*, or manual, and one of them introduced into the French gardens, from American seeds, that species of *Robinia* called *Psedo-acacia* by Tournefort, who under that name founded the present genus.—Linn. Gen. 378. Schreb. 501. Willd. Sp. Pl. v. 3. 1131. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 323. Pursh v. 2. 487. Juss. 358. Lamarck Illustr. t. 606. Gærtn. t. 145. (Pseudoacacia; Tourn. t. 417. Caragana; Lamarck Dict. v. 1. 615. Illustr. t. 607. Juss. 358.)—Class and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminosæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, small, bell-shaped, four-cleft; the three lower teeth narrowest; the upper one twice as broad, with a broad shallow sinus; all of equal length. *Cor.* papilionaceous. Standard roundish, large, spreading, obtuse. Wings oblong-ovate, distinct, each with a very short blunt appendage. Keel nearly semiorbicular, compressed, obtuse, the length of the wings. *Stam.* Filaments diadelphous, one simple, the other nine combined, ascending towards the extremity; anthers roundish. *Pist.* Germen cylindrical, oblong; style thread shaped, bent upwards; stigma terminal. *Peric.* Legume large, long, gibbous, compressed. *Seeds* few, kidney-shaped.

Eff. Ch. Calyx four-cleft; the upper segment divided. Standard roundish, reflexed. Stamens in two distinct sets. Legume elongated, gibbous, of one cell, with many seeds.

Obs. Jussieu and Lamarck distinguish their genus *Caragana*, by its smooth abrupt stigma, and a somewhat cylindrical inflated legume. The former adds, that the leaves are abruptly pinnate, without the terminal leaflet seen in *Robinia*. Yet Lamarck's plates do not confirm all these distinctions. Linnæus describes the stigma as downy, and yet in his Syst. Veg. ranges *Robinia* among genera which want that character. In fact the style, rather than the stigma, is downy.

1. R. *Pseudoacacia*. Common Acacia, or Robinia. Linn. Sp. Pl. 1043. Willd. n. 1. Ait. n. 1. Pursh n. 1. "Schmidt Arb. t. 32." (Pseudoacacia; Duham. Arb. v. 2. 188. n. 1. t. 42.)—Partial stalks single-flowered. Leaves pinnate, with an odd leaflet. Stipulas spinous. Legumes smooth, compressed.—Native of dry fertile ridges, on the mountains of North America, from Canada to Carolina, flowering in May and June. *Pursh.* Cultivated here, by the elder Tradescant, before 1640. *Parkinson.* This is a large and handsome *tree*, of quick growth, beautiful in *foliage*, and highly ornamental, when laden in summer with bunches of white sweet-scented *flowers*, resembling those of the *laburnum* in size and position. The branches are liable to be shivered off by our autumnal storms. Mr. Pursh says, "the wood is almost incorruptible, and particularly calculated for posts of gates and fences." The *leaves* are deciduous

deciduous, a ſpan long, of a peculiarly pleaſant light green, conſiſting of many elliptical, oppoſite or alternate, ſtalked leaflets. The ſhort awl-ſhaped *ſtipulas* become rigid ſpines. *Legumes* pale, wavy, compreſſed, two or three inches long.

2. R. *viſcoſa.* Clammy Robinia. Willd. n. 2. Ait. n. 2. Purſh n. 2. Venten. Jard. de Cels, t. 4. (R. glutinoſa; Curt. Mag. t. 560. R. Pſeudoacaciæ var. Sm. in Abbot's Inſ. of Georgia, v. 1. 37. t. 19.)—Partial ſtalks ſingle-flowered. Leaves pinnate, with an odd leaflet. Branches and legumes clothed with viſcid glands.—Native of the banks of rivers in South Carolina, eſpecially the Savannah, flowering in June and July; and ſaid to have been introduced into our gardens, where it is quite hardy, by Mr. R. Whitley, in 1797. This ſpecies not being known to us when Abbot's Inſects of Georgia were publiſhed, was, in that work, miſtaken for a red-flowered variety of the foregoing. The whole *tree* is of a ſmaller ſize than that ſpecies, and diſtinguiſhed by its dark red viſcid *branches*. The *flowers* are variegated with pink and white. *Stipulas* forming ſtraighter ſpines. The creeping *roots* are ſaid, by Mr. Purſh, to be troubleſome in ſmall plantations. Hence, however, our gardeners propagate the tree the more eaſily by cuttings of the root, inſtead of grafting this ſpecies on the more brittle *Pſeudoacacia.*

3. R. *violacea.* Violet Robinia. Linn. Sp. Pl. 1044. Willd. n. 3. Ait. n. 3. Jacq. Amer. 210. t. 177. f. 49. —Partial ſtalks two-flowered. Calyx but ſlightly toothed. Leaves pinnate, with an odd leaflet. Branches without thorns.—Found by Jacquin in buſhy places about Carthagena in South America, flowering in July and Auguſt. Miller cultivated this plant, but it is now unknown in our ſtoves. Jacquin deſcribes it about twelve feet high, erect, with ſhining *leaves,* whoſe *leaflets* are about ſix pair, ſtalked, ovate, obtuſe, emarginate, two inches long. *Cluſters* axillary, half a foot in length; their partial ſtalks ſhort, numerous, each bearing two *flowers,* which reſemble our ſweet violet in ſcent as well as colour.

4. R. *ſtriata.* Striated-leaved Robinia. Willd. n. 4.—"Partial ſtalks ſingle-flowered. Leaves pinnate, with an odd leaflet; downy beneath. Branches without thorns." —Gathered by Bredemeyer, on open ſunny hills in the Caraccas. A large *ſhrub,* with pale, unarmed, warty *branches. Leaves* half a foot long, compoſed of from fifteen to twenty-five oblong, pointed *leaflets,* each an inch in length, ſtriated with veins; ſhining above; covered with cloſe-preſſed hairs beneath. *Stipulas* lanceolate, deciduous. *Cluſters* ſimple, ſhorter than the leaves, downy, as well as the *calyx. Bracteas* awl-ſhaped, very ſhort. *Corolla* yellow, *Willdenow.*

5. R. *hiſpida.* Hairy Robinia, or Roſe Acacia. Linn. Mant. 101; excluding the reference to Jacquin. Willd. n. 5. Ait. n. 4. Purſh n. 3. Curt. Mag. t. 311. (R. foliis impari-pinnatis; foliolis ovatis, ramis pedunculiſque hiſpidis; Mill. Ic. 163. t. 244. Pſeudoacacia hiſpida, floribus roſeis; Cateſb. Carol. v. 3. 20. t. 20.)—Branches, calyx, and flower-ſtalks hiſpid. Thorns none. Leaves pinnate, with an odd leaflet. Partial ſtalks ſingle-flowered.—Native of mountains in Virginia and Carolina. Hardy with us, flowering from May to September, being a very ornamental *ſhrub,* on account of its large pink copious *bloſſoms,* enhanced, like a moſs roſe, by the brown briſtly covering of the *ſtalks* and *calyx.* Purſh notices a taller and leſs hiſpid variety.

6. R. *ſepium.* Hedge Robinia. Willd. n. 6. Jacq. Amer. 221. t. 179. f. 101. Swartz Ind. Occ. v. 3. 1258. —Partial ſtalks moſtly two-flowered. Leaves pinnate, with an odd leaflet, pointed. Thorns none.—Native of the banks of rivers, in the receſſes of mountains of the Weſt Indies, flowering about March and April. A *tree* twenty or thirty feet high, with long, lax, ſpreading *branches.* The *leaflets* differ from thoſe of *violacea,* n. 3, in being pointed, not emarginate. *Cluſters* rather drooping, of numerous purple *flowers;* their *ſtalks* ſmooth.

7. R. *ſquamata.* Scaly-branched Robinia. Willd. n. 7. "Vahl Symb. v. 3. 88. t. 69."—Partial ſtalks ſingle-flowered. Leaves pinnate, with an odd leaflet, ſpinous-pointed. Stipulas ſpinous.—Native of the iſland of St. Thomas. *Branches* round, ſmooth, leafy towards the ends, ſcaly below the leaves; bearing ſmaller ones ſcarcely an inch long, clothed with four rows of imbricated, ovate, pointed ſcales. *Leaflets* about nine pair, oval or roundiſh, ſmooth and ſhining on both ſides, the midrib of each extended into a terminal ſpine. *Stipulas* permanent, hardening into thorns. *Cluſters* axillary, downy, of four or five diſtant *flowers. Bracteas* ſmall, linear. *Calyx* ſmooth, with lanceolate ſegments. *Legume* compreſſed, linear, occaſionally contracted here and there, as if jointed.

8. R. *uliginoſa.* Swamp Robinia. Willd. n. 8.—"Partial ſtalks three-flowered. Leaves ternate, oblong, pointed. Branches twining, without thorns."—Native of the Eaſt Indies; communicated to Willdenow by Dr. Roxburgh. The *branches* are deſcribed as round and ſmooth. *Leaflets* an inch and half long, pointed, ſmooth. *Cluſters* from the old branches, three inches in length. *Flowers* apparently white.

9. R. *ſcandens.* Climbing Robinia. Willd. n. 9. (R. Nicou; Aubl. Guian. v. 2. 771. t. 308.)—Partial ſtalks ſingle-flowered. Leaves pinnate, with an odd leaflet, oval, pointed, ſmooth. Branches twining, without thorns.—Native of the woods of Guiana, flowering in June. A twining *ſhrub,* of lofty growth, crowning the neighbouring trees with its leafy *branches,* and purple *bloſſoms.* The *leaflets* are uſually ſeven, each about four inches long. *Flowers* in axillary cluſters. *Legume* compreſſed, thick-edged, ſmooth, meaſuring about two inches. The natives of Guiana beat the water with freſh cut twigs of this ſhrub, by which means the fiſh are intoxicated, and floating inſenſible near the ſurface, are eaſily caught.

10. R. *tomentoſa.* Downy Robinia. Willd. n. 10. (R. Panacoco; Aubl. Guian. v. 2. 768. t. 307.)—Partial ſtalks ſingle-flowered. Leaves pinnate, with an odd leaflet, elliptical, pointed, coriaceous; ſomewhat downy beneath: their common ſtalk rough. Stem arboreous, without thorns. —Found by Aublet in the woods of Cayenne and Guiana, being one of the largeſt trees of thoſe countries. The *trunk* is 60 feet or upwards in height, and uſually a yard in diameter; its baſe ſubdivided above ground, ſo as to form cavities ſix or eight feet wide, affording ſhelter to wild beaſts. The head conſiſts of ſtrong and widely extended *branches,* which when young are clothed, like the main ſtalks of the *leaves,* with red or ruſty down. The *leaflets* are from eleven to fourteen, various in ſize, from three to eight inches long, veiny and wrinkled; ſmooth above; more or leſs hairy or downy beneath. *Stipulas* deciduous. *Cluſters* at the ends of the branches. *Flowers* reddiſh. *Legume* two inches long, half-lanceolate. The bark of the *tree,* when wounded, diſtils a copious reſinous balſam. The *wood* is almoſt incorruptible, Aublet having obſerved poſts, partly in the ground, which were quite ſound, though ſaid to be above 60 years old.

11. R. *florida.* Flowery Robinia. Willd. n. 11. "Vahl. Symb. v. 3. 89. t. 70."—Stalks ſimple, ſingle-flowered. Leaves abruptly pinnate, ſmooth; their common

 ſtalks

ſtalks unarmed. Stipulas lanceolate, permanent, flexible. Calyx nearly entire.—Native of the Weſt Indies. A very beautiful *ſhrub*, entirely covered with large purpliſh *flowers*, four or five from each bud, on ſimple capillary *ſtalks*, before the leaves appear. *Branches* round, ſmooth, dotted, purpliſh-grey. *Lower leaves* from the flowering buds of the preceding year, uſually two or three together, the length of the finger; *upper ones* on the young branches ſolitary, alternate, half as long again; leaflets ſtalked, oppoſite, oblong, ſmooth, veiny, pointed, the uppermoſt rather ſmalleſt: common footſtalk without any terminal ſpine. *Stipulas* lanceolate, ſmall, thin, flexible, permanent. *Calyx* cup-ſhaped, nearly entire, finely downy. *Corolla* large; its claws the length of the calyx. *Germen* ſmooth. *Vahl.*

12. R. *polyantha*. Many-flowered Robinia. Swartz Ind. Occ. v. 3. 1260.—Stalks ſimple, ſingle-flowered. Leaves abruptly pinnate; hoary beneath; their common ſtalks unarmed. Stipulas awl-ſhaped, cloſe-preſſed, permanent. Calyx with linear teeth.—Native of thickets on the mountains of Hiſpaniola. A *ſhrub*, about ſix feet high, erect, with copious *branches*, deſtitute of dots; greyiſh and downy when young. *Flowers* pale purple, three or four from each bud, appearing moſtly before the leaves, as in the laſt, from which this ſpecies chiefly differs in the ſmaller ſize of every part, and in the teeth of its *calyx*, which are nearly, if not entirely, wanting in *R. florida*. *Swartz.*

13. R. *Caragana*. Caragana Robinia, or Siberian Pea-tree. Linn. Sp. Pl. 1044. Willd. n. 12. Ait. n. 5. "Schmidt Arb. t. 33." (R. Altagana; Pall. Roſſ. v. 1. p. 1. 68. t. 42, the middle figure only.)—Stalks ſimple, ſingle-flowered, many together. Leaves abruptly pinnate, of about four pair of elliptical leaflets; their common ſtalks unarmed. Stipulas thorny. Legume cylindrical.—Native of Siberia. Cultivated by Miller in 1752. Hardy in our gardens, flowering in April and May. The *ſtem* forms a buſhy *ſhrub*, producing from each bud numerous large yellow *flowers*, on long ſimple ſtalks, accompanied by ſeveral abruptly pinnated, nearly ſmooth, *leaves*, which become alternate on the protruding *branches*. The *leaflets* are moſtly alternate, elliptical or obovate, hardly an inch long. The *ſtipulas* change into ſtraight awl-ſhaped thorns.

14. R. *Altagana*. Sand Robinia. Willd. n. 13. Ait. n. 6. L'Herit. Stirp. 159. t. 76. Pall. Roſſ. v. 1. p. 1. 69, the ſmall variety, t. 42, the lateral figures.—Stalks ſimple, ſingle-flowered, ſolitary. Leaves abruptly pinnate, of about eight pair of obovate, or inverſely heart-ſhaped, leaflets; their common ſtalks unarmed. Stipulas thorny. Legume compreſſed.—Native of ſandy ground in Siberia. Introduced into England by Mr. Bell, in 1789. Differs from the laſt, of which Pallas made it a variety, in its more humble ſize, emarginate, numerous, and hoary *leaflets*; ſolitary *flowers*; and eſpecially its compreſſed *legume*. Theſe two ſpecies, ſo nearly akin, prove the ſuppoſed generic diſtinction of the cylindrical and compreſſed *legumes*, aſſerted by Lamarck to be of no avail, in a natural point of view, for the purpoſe of dividing *Robinia* into two genera.

15. R. *jubata*. Bearded Robinia. Willd. n. 14. Ait. n. 7. "Pall. in Nov. Act. Petrop. v. 10. 370. t. 6."—Stalks ſimple, ſingle-flowered. Leaves abruptly pinnate, of numerous pairs of lanceolate, downy leaflets; their common ſtalks thread-ſhaped, ſpinous, permanent, reflexed. Branches villous.—Found near lake Baical in Siberia, from whence it was imported by Mr. Buſh, in 1796. This is a ſmall *ſhrub*, ſcarcely two feet high, with villous *branches*, aſſuming a very peculiar aſpect in conſequence of its numerous, reflexed, permanent, hardened and ſpinous *common footſtalks*. The *leaflets* are narrow. *Flowers* purpliſh. *Legumes* cylindrical, hard, reddiſh-brown.

16. R. *tragacanthoides*. Tragacanthine Robinia. Willd. n. 15. "Pall. in Nov. Act. Petrop. v. 10. 371. t. 7."—Stalks ſimple, ſingle-flowered. Leaves abruptly pinnate, of two pair of oblong-lanceolate, ſilky leaflets; their common ſtalks ſpinous and permanent, as well as the ſtipulas. Legume downy, ſomewhat compreſſed.—Native of granite rocks in Siberia, beyond lake Baical. A ſmall *ſhrub*, very much branched. *Branches* downy, armed with ſtrong, recurved, ſtipulaceous *ſpines*. *Leaflets* ſmall, tapering at each end, tipped with terminal, ſolitary thorns. *Flowers* yellow. *Legume* cylindrical, ſlightly compreſſed. *Willd.*

17. R. *ſpinoſa*. Thorny Robinia. Linn. Mant. 269. Willd. n. 16. Ait. n. 8. "Schmidt Arb. t. 36." (R. ferox; Pall. Roſſ. v. 1. p. 1. 70. t. 44.)—Stalks ſingle-flowered, very ſhort. Leaves abruptly pinnate, of about three pair of wedge-ſhaped ſmooth leaflets; their common ſtalks ſpinous and permanent, as well as the ſtipulas. Legume cylindrical. Native of moiſt gravelly vallies, as well as of dry ſandy hills, in Siberia. Hardy in our gardens, flowering in April and May. Pallas reports, that it is frequent about Pekin in China, where, being fixed with clay on the tops of walls, it ſerves to keep off intruders. The long ſtrong *thorns*, formed by the hardened *footſtalks*, render the buſhes of this ſpecies excellent for hedges. The *ſtems* are as tall as a man, much branched. *Leaflets* oblong-wedge-ſhaped, hardly an inch in length. *Flowers* yellow, axillary, either ſolitary or two or three together, each on a ſimple *ſtalk* not half the length of its *calyx*.

18. R. *Halodendron*. Salt-tree Robinia. Pall. It. v. 2. append. 741. t. W. Roſſ. v. 1. p. 1. 72. t. 46. Linn. Suppl. 330. Willd. n. 17. Ait. n. 9. Curt. Mag. t. 1016.—Stalks three-flowered. Leaves abruptly pinnate, of two pair of ſilky leaflets; their common ſtalks ſpinous and permanent. Legume inflated.—Found by Pallas, in dry ſalt fields, about the river Irtis, in Siberia. The late Dr. Pitcairn is mentioned as having firſt imported it in 1779. This *ſhrub* is hardy with us, but ſeldom bloſſoms, which is much to be regretted on account of its beauty. Its thorny habit nearly accords with the foregoing; but the *leaflets* are fewer, larger, and ſilky, of a glaucous hue. *Corolla* of a delicate roſe-colour. *Legume* ovate, inflated, an inch long, ſcarcely leſs different from the *Caragana* tribe, than from the original *Robinia*; yet no perſon who attends to natural genera could think of ſeparating this plant from the laſt.

19. R. *Chamlagu*. Shining Robinia. L'Herit. Stirp. 161. t. 77. Willd. n. 18. Ait. n. 10.—Stalks ſingle-flowered. Leaves abruptly pinnate, of two pair of obovate ſmooth leaflets; their common ſtalks ſpinous. Stipulas awl-ſhaped, ſpinous, permanent. Branches decumbent.—Suppoſed to be a native of China. It has long been cultivated in the French gardens, and was ſent to Kew, in 1773, by Monſ. Richard. The ſhrub is hardy, flowering in May and June. The *ſtem*, at firſt erect, throws out long decumbent *branches*. *Leaves* green, ſmooth and ſhining; each leaflet tipped with a ſmall briſtly point. *Flowers* large, on long, ſolitary, ſimple *ſtalks*, pendulous, yellow; the diſk of their *ſtandard* at firſt green, afterwards deep red. The young *legume* is cylindrical, but we have never ſeen it full-grown. The *footſtalks*, though ſpinous, are leſs hard and permanent than in many of the other ſpecies.

20. R. *fruteſcens*. Buſh Robinia. Linn. Sp. Pl. 1044. Willd. n. 19. Ait. n. 11. Pall. Roſſ. v. 1. p. 1. 69. t. 43.—Stalks ſingle-flowered. Leaves of four, obovate, ſmooth, briſtle-pointed, equal-ſtalked leaflets. Branches aſcending.—Native of hills in the temperate parts of Siberia. Cultivated

vated by Miller in 1752; flowering in the fpring. The *ftem* is branched, bufhy, and erect, various in height, from two to eight or nine feet. *Leaves* different from all the foregoing, confifting of four, nearly equal, obovate *leaflets*, each on its own fhort partial ftalk, at the fummit of a rigid, fpinous-tipped, *common footftalk*, not a quarter the length of the leaflets. *Stipulas* lanceolate, oblique, combined with the common footftalk, and at length hardened with it into a three-branched divaricated fpine. *Flowers* yellow, their fimple folitary ftalks longer than the leaves. The *foliage* varies greatly in luxuriance, according to circumftances. The *legume* is cylindrical.

21. R. *pygmæa*. Dwarf Robinia. Linn. Sp. Pl. 1044. Willd. n. 20. Ait. n. 12. Pall. Roff. v. 1. p. 1. 71. t. 45. (Afphalatus frutefcens minor anguftifolius, cortice aureo; Amm. Ruth. 204. t. 35.)—Stalks fingle-flowered. Leaves of four linear-lanceolate, fpinous-pointed, nearly feffile leaflets.—Native of rocky hills in many parts of Siberia. Cultivated by Miller in 1751; flowering in the fpring. This has much affinity to the laft, but the narrow *leaflets* and their fpinous points, as well as the more evident and pungent thorns of their fhort *common footftalk* and *ftipulas*, readily diftinguifh it. The *flowers* are yellow. *Leaves* often more or lefs filky or hairy.

R. *mitis*, Linn. Sp. Pl. 1044, is referred by Willdenow to *Dalbergia*, under the name of *arborea*; Sp. Pl. v. 3. 901. Ait. H. Kew. v. 4. 248. This is *Pongamia glabra*, Venten. Malmaif. t. 28; an Eaft Indian tree, of lofty growth, which has not yet bloffomed in our ftoves. Ventenat faw its flowers at the garden of Malmaifon. The *calyx* is purple; *petals* white. *Legume* ovate, pointed, thick and woody.

We are not acquainted with *R. amara* and *flava* of Loureiro, Cochinch. 455, 456, nor dare we adopt them without examination.

Robinia, in *Gardening*, comprifes plants of the hardy, deciduous, tree and fhrub forts, with tender kinds for the ftove. The fpecies cultivated are moftly thefe: the falfe or common acacia (R. pfeudo-acacia); the rofe acacia, or robinia (R. hifpida); the Siberian abrupt-leaved robinia (R. caragana); the fhrubby robinia (R. frutefcens); the dwarf robinia (R. pygmæa); the thorny robinia (R. fpinofa); the afh-leaved robinia (R. violacea); and the fmooth Indian robinia (R. mitis).

The firft fort grows very faft whilft young, fo that in a few years from feed, the plants rife to eight or ten feet high, and it is not uncommon to fee fhoots of this tree fix or eight feet long in one fummer; the branches are armed with ftrong crooked thorns. But there is a variety which has no thorns on the branches, but which is eafily known at firft fight by its peculiar appearance. And the echinated, or prickly-podded American falfe acacia, in which the pods are much fhorter, and clofely befet with fhort prickles, but in other refpects agrees with the common fort.

The fixth fpecies, on account of the length and toughnefs of the branches, and its large ftout thorns, is admirably adapted to form impenetrable hedges, and is fufficiently hardy to bear our climate.

Method of Culture.—The firft fix hardy forts are all capable of being raifed from feeds, cuttings, layers, and fuckers; but the feed method is faid to afford the beft plants.

The feeds fhould be fown about the end of March or beginning of the following month, on a bed of light mould, being covered to the depth of about half an inch. In the firft fort and varieties the plants moftly appear in the courfe of fix or eight weeks; but in the other kinds often not till the next fpring. They fhould be well weeded and watered, and when fufficiently ftrong, be fet out in the fpring or autumn in nurfery-rows, for two or three years, in order to remain, to have proper growth for final planting out. The cuttings fhould be made from the young fhoots, and be planted out in the beginning of autumn, in a fhady border, where the foil is mellow. They are moftly well rooted in the courfe of a twelvemonth, when they may be removed into nurfery-rows as above. The layers fhould be made from the young wood, being laid down in the autumn, when, in the courfe of the year, they moftly become well rooted, and may be taken off and planted out in nurfery-rows, as the feedling plants. And the fuckers, which are produced in plenty from the two firft forts, may be removed in the early autumn or fpring, and be planted out in nurfery-rows or in beds, to be afterwards removed into them.

The two laft, or tender forts, may likewife be raifed from feeds and cuttings, but they muft be fown and planted in pots filled with good mould, to have the affiftance of a hot-bed in the ftove, by being plunged in it. When the plants have attained a little growth, they fhould be fhaken out of the pots, and planted feparately in fmall pots, filled with the fame fort of earth, plunging them in the tan-bed, affording due fhade till well rooted, managing them afterwards as other tender ftove plants. And as the plants are moft tender while young, they fhould therefore be kept in the ftove tan-bed till they have acquired ftrength, when they may be preferved in the dry ftove, with a temperate heat in winter, and be expofed in the open air in fummer, in a warm fheltered fituation, when the weather is fine.

It may be noticed that the hardy forts have a fine effect in the border clumps and other parts of pleafure-grounds, and the tender kinds afford variety in the ftove-collections.

ROBINS, Benjamin, in *Biography*, a celebrated mathematician, was born at the city of Bath in the year 1707. His parents were in very low circumftances, and utterly unable to give their fon much education. His genius, however, ftrongly urged him to the purfuit of knowledge: he became his own inftructor, and made an early and furprifing progrefs in various branches of literature and fcience, particularly in the mathematics. He came to London under the patronage of Dr. Pemberton; and at the age of 20, he gave a demonftration of the laft propofition of Newton's Treatife on Quadratures, which was fo ably performed, that it was thought deferving a place in the Philofophical Tranfactions for the year 1727; and towards the clofe of the fame year he was admitted a member of the Royal Society. In the courfe of the following year he embraced an opportunity of offering to the public a fpecimen of his acquaintance with natural philofophy. The Royal Academy of Sciences at Paris, among their prize queftions in 1724 and 1726, had afked for a demonftration of the laws of motion in bodies impinging on one another. On this occafion, John Bernouilli appeared in the lift of candidates, but did not obtain the reward. He felt himfelf aggrieved, and appealed to the learned world, by publifhing his demonftration in 1727. In the following year, Mr. Robins publifhed a confutation of Bernouilli's performance, which was allowed to be unanfwerable. Mr. Robins, about this time, began to take pupils, profeffing to teach the mathematics only; yet he frequently affifted them with inftruction and advice on other fubjects, for which he was well qualified, by the rich ftores of knowledge with which his mind was furnifhed. After fome time he abandoned the laborious bufinefs of education, and devoted his attention to fubjects which required more exercife. Among other things, he made many experiments in gunnery, from a belief that the resistance of the air had a much greater effect on swift flying projectiles than was generally supposed. He likewise directed his attention to the mechanic arts, such as the construction of mills, the building of bridges, draining of fens, rendering rivers navigable, and the making of harbours. The art of fortification, likewise, very much engaged his thoughts: with this view he took pains to inspect all the principal strong places in Flanders, during some journies which he made on the continent with persons of distinction. On his return, he undertook a defence of the doctrine of fluxions, as laid down by sir Isaac Newton, in opposition to the objections brought against it by the learned bishop Berkeley. In 1735 Mr. Robins published "A Discourse concerning the Nature and Certainty of Sir Isaac Newton's Method of Fluxions and of prime and ultimate Ratios." On the same subject he wrote two or three other pieces.

In the year 1739 he published, without his name, three pamphlets on political topics, and on the popular side of the question; and so highly did they raise the author in the estimation of the patriotic party, that when a committee of the house of commons was appointed to examine into the conduct of sir Robert Walpole, he was chosen their secretary. In 1742 Mr. Robins published a small treatise, entitled "New Principles of Gunnery;" containing the result of many experiments, by which he discovered the force of gunpowder, and the difference in the resisting power of the air to swift and slow motions. From which it appeared, that the opposition of that medium to bullets and shells, discharged from cannon and mortars, far exceeded what was generally imagined; and that the track which their motion described differed from that of a parabolic line, to a degree unsuspected by any who had written expresly on the subject, from the time of Galileo. This publication was undertaken to demonstrate his own superiority, as a man of talents, over a successful competitor, Mr. Muller, for a situation in the Royal Military Academy at Woolwich. Some time after the publication of this work, a paper having been admitted into the Philosophical Transactions, containing experiments intended to invalidate some of Mr. Robins's opinions, he thought proper, in an account which he gave of his book in the same Transactions, to take some notice of those experiments. In consequence of this, several dissertations of his on the resistance of the air were read, and experiments to confirm his doctrine were exhibited before the Royal Society, in the year 1746-7; for which he was presented with the annual gold medal by that society. His reputation was now so high, that he was invited by the prince of Orange to assist in the defence of Bergen-op-Zoom, which was besieged by the French, and he actually crossed the sea with that view; but he had scarcely reached the Dutch camp, before the French, owing either to negligence or treachery in the garrison, unexpectedly became masters of the place.

In the year 1748, Anson's "Voyage round the World" was published, bearing the name of Walter in the title-page, though it was soon known to have been Mr. Robins's production. No work of the kind ever met with a more favourable reception: four large editions were sold within a year, and it has been since reprinted very frequently in all sizes. It was translated in almost all the European languages. He was next employed to draw up an apology for the unfortunate defeat of the king's troops by the rebels, at Preston-Pans in Scotland, which was prefixed to "The Report of the Proceedings and Opinion of the Board of General Officers, on their Examination into the Conduct of Lieutenant-General Sir John Cope," &c.

After this, Mr. Robins had opportunities, through the favour of lord Anson, of making further experiments in gunnery; an account of which, with other pieces, were published after his death. Through the interest of the same nobleman, he contributed to the improvement of the Royal Observatory of Greenwich, by procuring for it many valuable instruments. In the year 1749 he was made engineer-general to the East India Company; and with a complete set of astronomical instruments, for making observations and experiments, he arrived in India in the summer of 1750. He set about the business which he had undertaken immediately, with the utmost diligence, and soon formed plans for fort St. David and Madras; but he did not live to carry them into execution. The change of climate was more than he could endure, and he died at the early age of 44, in July 1751.

Mr. Robins was one of the most accurate and elegant mathematical writers of this country, and he made more real improvements in artillery, and on subjects relating to the resistance of the air to projectiles, than all the preceding authors on the subject. His "New Principles of Gunnery" were translated into various languages, and commented upon by several eminent mathematicians. Euler translated it into the German, and accompanied the version with a large and critical commentary. This again was published in England, with an English translation of the German commentary and notes, by Mr. Hugh Brown, in 1777. All Mr. Robins's mathematical and philosophical pieces were collected, and published in 2 vols. 8vo. 1761, by Dr. Wilson, with an account of the author, from which the foregoing article is chiefly extracted.

ROBINSON, Robert, born in October 1735, at Swaffham, in the county of Norfolk, was son of Mr. Michael Robinson, a native of North Britain, and Mary, the daughter of Mr. Robert Wilkin of Mildenhall, Suffolk, a man of great respectability in private life, and in possession of a moderate independence. Robert was the youngest of their three children: his elder brother was apprenticed to a painter, and his sister to a mantua-maker; he was sent to a Latin school at the age of six years, where he made a considerable proficiency, and discovered an uncommon capacity for learning. His father, in the course of his profession, was removed from Swaffham to Scarning, in the same county, where finding his situation very unpleasant, he left the place, his family returning home, and he shortly after died at Winchester. At Scarning young Robinson was sent to an endowed grammar-school, then under the care of the Rev. Joseph Brett. Several persons of eminence received the early parts of their education at the same school, among whom was the late lord Thurlow. At this school he gained a considerable knowledge of the French, as well as of the classical languages. At the age of 14 he was put apprentice to a hair-dresser, in Crutched-Friars, London. For this occupation his mind was very ill adapted, and he stole from the hours devoted to sleep no small portion of time for the improvement of his mind. During his apprenticeship he appears to have imbibed serious impressions of religion, which he encouraged, by attending the most celebrated preachers of the day among the Independents, the Baptists, and the clergy falsely named evangelical; for they dwell, in their pulpit discourses, upon all sorts of subjects, excepting only those contained in the four gospels. Dr. Guise and Gill among the dissenters, Romaine in the church, and Whitfield, the leader of the Calvinistical Methodists, were his chief favourites. At this period Robert Robinson had a considerable portion of enthusiasm in his constitution, which is not an undesireable quality in young people

people left much to themſelves, and liable to a thouſand temptations in corrupt and licentious cities and large towns. It is often the beſt preſervative of their morals, and will frequently grow into rational and energetic modes of thinking and acting.

About the age of 20, Robert Robinſon had his indentures given him up, at his own requeſt, feeling a great deſire to become a preacher. He had, previouſly to this, been in the habit of preaching for the hour together to himſelf, thinking that he ſhould thereby be better prepared to addreſs an audience aſſembled to hear his diſcourſes. His firſt ſermon was delivered to a very ſmall congregation at Mildenhall, in Suffolk; and his reception was ſuch as to juſtify the hope that he had taken that direction to which his talents naturally tended. He was ſoon after invited to preach at the Tabernacle in Norwich, and at ſeveral places in Norfolk and Cambridgeſhire. He continued to preach among the Methodiſts two years, during which period he appears to have turned his attention more particularly to the controverſy between the members of the eſtabliſhed church and the diſſenters, and to have determined, upon the fulleſt conviction, to take his lot with the latter. He had, however, according to Dr. Rees, who preached his funeral ſermon, a temptation to connect himſelf with the former, too powerful for any but a man of Chriſtian integrity to reſiſt. "A rich relation," ſays the doctor, "who had promiſed to provide liberally for him, and who had bequeathed him a conſiderable ſum of money in his will, threatened to deprive him of every advantage which he had been encouraged to expect, unleſs he quitted his connection with the diſſenters. But the rights of conſcience, and the approbation of God, were ſuperior in his regard to every worldly conſideration: he preſerved his integrity, ſteadily maintained his principles, and perſevered in his connection with the diſſenters; but forfeited the favour of his relation, and every advantage which, living or dying, he had in his power to beſtow."

He now attempted to incorporate the Methodiſts, among whom he miniſtered, into a regular church; but proving unſucceſsful, he determined to ſeparate from them. Having done ſo, he formed a ſmall *Independent* congregation at Norwich, and during his connection with them, he adminiſtered infant baptiſm; but on leaving this congregation, he renounced infant baptiſm, and adminiſtered this ordinance only to adults, and by immerſion.

In the ſpring of 1759 he was invited to preach to a ſmall congregation of Antepædobaptiſts at Cambridge. About the ſame time he married Miſs Ellen Payne; and in 1761 he accepted the paſtoral office in this church. When Mr. Robinſon firſt ſettled with this ſociety, it conſiſted only of 34 members, moſt of whom were very poor, ſo that he could look only for a ſalary of a few pounds at moſt; but it increaſed rapidly under him, and in a few years he had the ſatisfaction of ſeeing a new and more commodious place of worſhip, erected at the ſole expence of the congregation; and in 1774, the number of families connected with it was not leſs than 200, many of whom ranked among the moſt reſpectable in the town and neighbourhood. Mr. Robinſon preached twice or thrice on each Sunday, and uſually once on ſome other day in the week, at Cambridge. On ſome of the other mornings and evenings in the week, excepting in times of hay and corn-harveſt, he expounded the ſcriptures, or delivered religious and moral lectures, in the village where he lived, or in the neighbouring villages. To young perſons he rendered eſſential ſervice, by delivering lectures to them at his own houſe, or by private converſation. Theſe various employments of his time he rendered conſiſtent with his other numerous engagements, and cloſe application to ſtudy, by the excellent habit which he had acquired, when young, of riſing early in the morning, *viz.* at four or five o'clock; a practice that ought to be recommended to every ſtudent. "I wiſh," ſays the late Gilbert Wakefield, ſpeaking on the ſame ſubject, "my advice and imperfect experience of its benefits could perſuade every youth to engrave it, in impreſſions not to be effaced, on the tablet of his heart, and exemplify it in his daily practice."

" ———————— Ni
Poſces ante diem librum cum lumine; ſi non
Intendes animum ſtudiis et rebus honeſtis,
Invidiâ vel amore vigil torquebere."

" Riſe, light thy candle, ſee thy taſk begun,
E'er redd'ning ſtreaks proclaim the diſtant ſun;
Or luſt's fierce whirlwind will thy calm moleſt,
Or envy cloud the ſunſhine of thy breaſt."

Soon after the opening of the new meeting-houſe, the abilities of Mr. Robinſon as a preacher began to attract the notice of the academics, many of whom, from ſerious motives, became regular attendants; while others came to meeting only to indulge their curioſity, or perhaps to ridicule the miniſter. Of the latter deſcription were ſeveral under-graduates, who frequently diſturbed the devotion of the congregation by an indecency of behaviour. Complaints of their conduct had been repeatedly made to the magiſtrates of the univerſity, and the heads of the colleges, but without procuring redreſs. At length the rudeneſs of theſe young men required meaſures to be taken, which ſhould no longer be treated with contempt. A legal proceſs was began, which induced two of the worſt offenders to agree to aſk pardon in the public papers. The perſons aggrieved, however, remitted this puniſhment in the caſe of one of the delinquents, on account of his otherwiſe excellent character. The evil was, by this meaſure, well nigh cured, and Mr. Robinſon had little or no reaſon to complain afterwards of interruption from that quarter. From this period, many of the moſt reſpectable members of the univerſity ſolicited his acquaintance, and entertained a due reſpect for his worth, however they differed from him in opinion; and through their aid and influence, he obtained freedom and acceſs to the valuable libraries at Cambridge, and was permitted, in many caſes, the more important privilege of having books from them at his own houſe.

In the year 1773, Mr. Robinſon's family having become ſo numerous that his ſalary as a miniſter was found inadequate to his ſupport, he found it neceſſary to have recourſe to other means for making a proviſion for them. He accordingly removed to Cheſterton, near Cambridge, and commenced farmer, to which, in time, he added the buſineſs of a dealer in corn and coals. His farming and mercantile engagements, however, did not diminiſh his ardour for literary purſuits, as is evident from his various publications. The firſt work which contributed to make him known as an author, was publiſhed in 1774, under the title of "Arcana," or the Principles of the late Petitioners to Parliament for relief in Matters of Subſcription, in eight letters to a friend. The reception which this piece met with was extremely encouraging: it procured the author many valuable friends among the diſſenters. His next publication was an "Appendix" to "The Legal Degrees of Marriage, ſtated and conſidered by John Alleyne, Barriſter at Law," 2d edition, 1775. It conſiſts of a diſcuſſion of the queſtion, "Is it lawful and right for a man to marry the ſiſter of his deceaſed wife?" in which he maintained, in a very

very forcible manner, the affirmative ſide of the queſtion. In the ſame year he publiſhed an entire volume of " Sermons, from the original French of the late Rev. James Saurin, Paſtor of the French Church at the Hague," which was followed, at different periods, by four others. Introductory to theſe volumes are prefatory diſſertations, containing intereſting memoirs of the Reformation in France, and the life of Saurin, together with reflections on Deiſm, Chriſtian liberty, &c. The fame which Mr. Robinſon acquired by this publication, induced certain divines, and among them dignitaries of the eſtabliſhed church, to offer him liberal terms for original ſermons for their own uſe.

In the year 1776, the controverſy reſpecting the divinity of Chriſt, which had been carried on principally by members of the church of England, ſome of whom had reſigned their livings, much engaged the public attention. Mr. Robinſon appeared on the popular ſide of the queſtion, and publiſhed " A Plea for the Divinity of our Lord Jeſus Chriſt, &c." This piece is written with much ingenuity, and it procured the author a number of handſome compliments, not only from diſſenting miniſters, but alſo from ſeveral dignitaries of the eſtabliſhed church. Among the latter were Dr. Hinchliffe, biſhop of Peterborough, Dr. Hallifax, afterwards biſhop of Glouceſter, Dr. Beadon, afterwards biſhop of Bath and Wells, and Dr. Tucker, dean of Glouceſter. Some years after, Mr. Lindſey publiſhed, without his name, " An Examination of Mr. Robinſon's Plea for the Divinity of Chriſt;" in a ſecond edition, in 1789, Mr. Lindſey prefixed his name. Mr. Robinſon was frequently called upon to reply to Mr. Lindſey, but he declined. To his friends he ſaid, " The anonymous examiner has not touched my arguments, and his ſpirit is bitter and contemptuous. His faith ſtands on criticiſms; and my argument is, that if the doctrine requires critical proof, it is not popular, and therefore not divine." In 1777, Mr. Robinſon publiſhed a ſmall tract, entitled " The Hiſtory and Myſtery of Good Friday," that has paſſed through numerous large editions, and in which the evil and folly of church holidays is with equal humour, learning, and argument, unanſwerably demonſtrated. In 1778, Mr. Robinſon publiſhed " A Plan of Lectures on the Principles of Nonconformity, for the Inſtruction of Catechumens." This piece contains an outline of the whole controverſy of the diſſenters with the church of England, and of their hiſtory, from the period of the Reformation, to the year 1778. In the houſe of lords it was mentioned with due reſpect by the earl of Shelburne; and it was ably defended in the houſe of commons by Mr. Fox, in oppoſition to an illiberal attack upon the principles of diſſent, from the eloquent Mr. Burke, whoſe calumnies were confined to no people nor ſet of principles. Towards the cloſe of the ſame year, Mr. Robinſon publiſhed " An Eſſay on the Compoſition of a Sermon, tranſlated from the original French of the Rev. John Claude, with Notes," in 2 vols. 8vo. The preface to the firſt volume of the " Eſſay" conſiſts of memoirs of the life of the author.

In 1780, Mr. Robinſon paid a viſit to the univerſity of Oxford, and afterwards accompanied ſome friends in a tour into Scotland, where he was much gratified by civilities ſhewn him by ſome of the literati of Edinburgh; and he might have received the diploma of doctor of divinity, had he not thought proper to decline that compliment. Soon after his return to Cambridge, he publiſhed a little tract well calculated to produce a Catholic ſpirit among his brethren of the Baptiſt denomination, entitled " The General Doctrine of Toleration, applied to the particular Caſe of Free Communion." It was about this period he preached and publiſhed a ſermon, entitled " Slavery inconſiſtent with the Spirit of Chriſtianity," and he was the author of the admirable petition of the gentry, clergy, freeholders, and other inhabitants in the county of Cambridge, which was preſented to the houſe of commons. In the year 1781, Mr. Robinſon, at the deſire of his brethren, began to collect materials for the Hiſtory of the Engliſh Baptiſts. In his reſearches he was led to enter on a larger field than what had been originally propoſed to him, and inſtead of confining himſelf to the hiſtory of Engliſh Baptiſts, he was induced to trace the hiſtory of baptiſm from the earlieſt uſe of that rite, as well as that of Baptiſts in all ages.

In the year 1782, Mr. Robinſon publiſhed " A Political Catechiſm," intended to convey, in a familiar manner, juſt ideas of good civil government, and the Britiſh conſtitution. This tract was written at the time that the North adminiſtration was diſcarded from the councils of their ſovereign for that of the marquis of Rockingham. To ſupport the ſyſtem profeſſed by the latter—to diſſeminate ſafe political principles—to place public happineſs on its true baſis, were the motives which induced Mr. Robinſon to endeavour to attract the attention of youth to this ſubject. This work, as well as the preface to the " Plan of Lectures," and his ſermon, entitled " Chriſtian Submiſſion to Civil Government," afford ample evidence of the ſoundneſs of his principles as a friend to civil government in general, and to that form of civil government, the Britiſh conſtitution, in particular. It was in 1786 that Mr. Robinſon publiſhed " Sixteen Diſcourſes on ſeveral Texts of Scripture, addreſſed to Chriſtian Aſſemblies, in Villages near Cambridge; to which are added Six Morning Exerciſes." Theſe diſcourſes were delivered extempore to plain and illiterate audiences, in a ſimple but animated ſtyle; and they were afterwards written out, from memory, by the author, as nearly as he could recollect them. They are chiefly on practical ſubjects; but ſuch of them as touch on doctrinal ſubjects diſplay much candour and liberality. This ſpirit of liberality excited ſerious apprehenſions concerning the purity of his faith among many of his orthodox friends, who expoſtulated with him, both in perſon and by letter. Soon after this he afforded real ground for entertaining apprehenſions that his faith in the gloomy doctrines of Calviniſm was not ſo ſtrong as in the opinion of his brethren it ought to have been. Many of them attacked him in their pulpits, endeavouring to diminiſh his well-earned popularity, by ſtigmatizing him with the names of Arian and Socinian; but others, though themſelves zealouſly attached to thoſe doctrines, which he ſeemed inclined to abandon, continued his faithful and invariable friends. With his congregation at Cambridge he ſtill continued his miniſterial labours; he had been the miniſter of their choice, and remained high in their eſteem.

During the latter years of his life, the large field of enquiry upon which Mr. Robinſon had entered, led him to ſuch a courſe of intenſe application, as undermined the ſtrength of his conſtitution, before he had given the finiſhing hand to his labours, and brought on a gradual decay, attended with a great depreſſion of ſpirits. In theſe circumſtances, it was hoped by his family that a journey to Birmingham, and an interview with Dr. Prieſtley, which he had long wiſhed for, might prove beneficial to him. Having arrived at that town, he ventured to preach twice on the ſame Sunday for the benefit of the charity ſchools. His friends perceived that he was ill, but none of them ſuſpected his end was ſo near; he ſpent the evening of the following Tueſday in the cheerful ſociety of his friends, and retired to reft as ufual; but on the next morning he was found dead in his bed, where he appears to have expired exactly as he hoped it might be permitted him to leave the world, fuddenly—and alone, without feeling the agonies of death, or occafioning alarm or diftrefs to affectionate relatives and friends. He died June 8th, 1790, in the 55th year of his age.

Mr. Robinfon was a wonderful example of a man who rofe to confiderable eminence by his own exertions. To his great talents and extenfive learning his various writings bear the fulleft teftimony. He poffeffed an ardent love of truth, was laborious in the fearch after it, and at all times was a ftrenuous advocate for fuch principles as he had adopted upon deliberate conviction, while he ever exercifed candour and liberality toward thofe whofe opinions differed from his own. Of civil and religious liberty he was the enlightened, fteady, and zealous friend. In his domeftic relations he was attentive and affectionate; and to the poor a friend, comforter, and, as far as his limited means permitted, a generous benefactor. As a preacher, "there was always a variety, and often an originality, both in what he faid, and in his mode of faying it. It was his conftant aim to lead the attention of his hearers to the weightier matters of the law; to inform the judgment before he attempted to intereft the paffions; and, after inculcating juft notions of truth and duty, to enforce a correfponding practice. There have been few preachers who have done fo much to refcue the human mind from bondage; to correct prevailing errors; to promote a liberal fpirit of inquiry; to recommend mutual forbearance and candour among Chriftians of different opinions; to weaken their attachment to creeds and forms of human device and impofition, and to direct their chief attention to the principles and duties of piety, virtue, and univerfal charity. He had a manner of fupplanting rooted prejudices without occafioning alarm; of fapping inftead of ftorming the fortifications of error; of gaining affent to general principles, inconfiftent with the opinions which he wifhed to expofe: and of leading men to think, judge, and determine for themfelves, and to purfue thefe principles to their confequences, in which he wonderfully excelled, and which produced, in many inftances, the beft effects." See Dr. Rees's Sermon before referred to.

It has already been obferved, that Mr. Robinfon died before he had completed the great work to which his attention had been chiefly confined for feveral years. One part of his comprehenfive plan, however, was finifhed, and the whole, excepting a few fheets, printed off, and corrected by himfelf while paffing through the prefs. This was publifhed in the year 1790, under the title of "The Hiftory of Baptifm," which is one of the moft acute and ingenious defences of the diftinguifhing tenets of the Baptifts which has ever yet appeared, deduced not only from the records of hiftory, but from the relics of Chriftian antiquity, being illuftrated with engravings from ancient paintings and buildings, and from Danifh and Saxon remains in our Britifh churches. This part of the plan was to have been followed by a hiftory of the Baptifts, which was left in an incomplete ftate, but which was publifhed in 1792, under the title of "Ecclefiaftical Refearches." This work was carried through the prefs under the fuperintendance of Mr. Frend, who had long enjoyed the friendfhip of Mr. Robinfon. Befides much information which thefe refearches contain, that is not to be found in any other Englifh work on the fubject, and the interefting views of the progrefs of civil and religious liberty, together with well-drawn characters of its principal advocates, the reader will meet with a variety of important and excellent matter on other topics: the author has introduced into his narrative ingenious remarks, ufeful to elucidate the leading object of his inquiries, on the geography, government, laws, antiquities, commerce, productions, and cuftoms and manners of the inhabitants of the feveral countries treated of. Since the death of the author, Mr. Benjamin Flower has collected all Mr. Robinfon's works, with the exception of his "Hiftory of Baptifm," "Ecclefiaftical Refearches," "Claude's Effay on the Compofition of a Sermon," and his "Village Sermons," and publifhed them in four volumes, 8vo., to which we refer our readers, who will find, by looking them over, that we have in our enumeration of Mr. Robinfon's works omitted fome of minor importance. And in the year 1812, the fame perfon publifhed certain pofthumous pieces of our author in one volume octavo: thefe, on the whole, cannot be faid to add to the reputation of Mr. Robinfon; they confift of feven fermons, and three differtations, "On the Nature and Operations of the Human Mind, as relating more particularly to Theological Inquiries;" "Literary Precautions neceffary to the Study of Theology;" "On Predeftination; or, Moderate Calvinifm confidered as the fafe Path between Two Extremes." To thefe tracts are added "An Hiftorical Account of Proteftant Diffenting Churches in Cambridgefhire," and divers of Mr. Robinfon's letters. See Dr. Rees's Sermon on the Death of Mr. Robinfon; Dyer's Life of Robinfon, 1796; and Flower's Memoirs, prefixed to the firft vol. of the Mifcellaneous Works, 1807.

ROBINSON, RICHARD, archbifhop of Armagh, and baron Rokeby, was born in 1709. He was educated at Weftminfter fchool, from whence he was elected to Chrift-church, Oxford, after which he became chaplain to archbifhop Blackburne, of York, who gave him a prebend in his cathedral. He went with the duke of Dorfet to Ireland, and was preferred to the fee of Killala, from whence, in 1759, he was tranflated to Leighlin and Ferns, and in 1761 to Kildare. In 1765 he was advanced to the primacy of Ireland, and in 1777 he was created a peer. He built a palace in his diocefe of Armagh, with an obfervatory. (See the article OBSERVATORY.) He alfo founded a fchool, and built four new churches. He died in 1794. Europ. Mag.

ROBINSON, JOHN, organift of St. Laurence Jewry, of St. Magnus church, and of Weftminfter abbey. He was regarded as one of the beft performers on keyed inftruments of his time. As an organ-player he was attended by great crowds wherever he performed. He was educated in the chapel-royal, under Dr. Blow. His wife was the daughter of Dr. William Turner, and a public finger. She performed in Scarlatti's opera of Narciffus, brought on the ftage by Rofcingrave, in 1720; and to diftinguifh her from Mrs. Anaftafia Robinfon, who fung in the fame opera, fhe was called Mrs. Turner Robinfon. This celebrated organift died at an advanced age in 1762, and was fucceeded, in Weftminfter abbey, by Dr. Benjamin Cook.

ROBINSON, *Mifs*, daughter of the celebrated organift of Weftminfter abbey, who fung at concerts, and, one feafon, in Handel's oratorios. She was a coarfe finger, with an unpleafant toned voice; but that did not prevent her from becoming a great player on the harpfichord; particularly on a harpfichord made by Rucker, with pedals, of which fhe had acquired, by labour and perfeverance, a facility of execution equal to German organifts. The refult, however, was not equal to the great difficulty of ufing them. The pedals of an organ often produce fine effects in fuftaining notes with the feet, while both hands are at liberty to ramble about in the treble at their pleafure. But on a harpfichord with pedals to fhort-lived founds, the clatter of ftriking them fo often is abominable; it is not mufic, but noife.

ROBINSON, *Mrs.* ANASTASIA, a moft amiable and accomplifhed perfon, who performed as a finger in our firft Italian operas, from the year 1714 to 1724. This performer, defcended from a good family in Leicefterfhire, was the daughter of a portrait painter, who, having vifited Italy for improvement in his art, had made himfelf mafter of the Italian language, and acquired a good tafte in mufic. And finding that his daughter Anaftafia, during her childhood, had an ear for mufic, and a promifing voice, he had her taught by Dr. Crofts, at firft as an accomplifhment; but afterwards being afflicted with a diforder in his eyes, which terminated in a total lofs of fight; and this misfortune depriving him of the means of fupporting himfelf and family by his pencil, he was under the neceffity of availing himfelf of his daughter's difpofition for mufic, to turn it to account as a profeffion. She not only profecuted her mufical ftudies with great diligence, but by the affiftance of her father had acquired fuch a knowledge in the Italian tongue as enabled her to converfe in that language, and to read the beft poets in it with facility. And that her tafte in finging might approach nearer to that of the natives of Italy, fhe had vocal inftructions from Sandoni, at that time an eminent Italian finging mafter refident in London, and likewife from the opera finger called the Baronefs.

Her firft public exhibition was at the concerts in York-buildings, and at other places, where fhe ufually accompanied herfelf on the harpfichord. Her general education had been purfued with the utmoft care and attention to the improvement of her mind, as well as to ornamental and external accomplifhments; and thefe advantages, feconded by her own difpofition and amiable qualities, rendered her conduct ftrictly prudent and irreproachable. And what ftill entitled her to general favour, was a behaviour full of timidity and refpect to her fuperiors, and an undiffembled gentlenefs and affability to others, which, with a native cheerfulnefs that diffufed itfelf to all around her, gained her at all times fuch a reception from the public, as feemed to enfure her fuccefs in whatever fhe fhould undertake. Encouraged by the partiality of the public towards his daughter, and particularly by the countenance aud patronage of fome perfons of high rank of her own fex, Mr. Robinfon took a houfe in Golden-fquare, where he eftablifhed weekly concerts and affemblies in the manner of *converfazioni*, which were frequented by all fuch as had any pretenfions to politenefs and good tafte.

Thus qualified and encouraged, fhe was prevailed upon to accept of an engagement at the Opera, where fhe made her firft appearance in Crefo, and her fecond in the character of Ifmina, the principal female part in Arminio. From this period till the year 1724, fhe continued to perform a principal part at the Opera with increafing favour and applaufe. Her falary is faid to have been 1000*l.*, and her emoluments, by benefits and prefents, were eftimated at nearly as much more. When fhe quitted the ftage it was fuppofed to have been in confequence of her marriage with the gallant earl of Peterborough, the friend of Pope and Swift, who diftinguifhed himfelf fo heroically in Spain during the reign of queen Anne. Though the marriage was not publicly declared till the earl's death in 1735, yet it was then fpoken of as an event which had long taken place. And fuch was the purity of her conduct and character, that fhe was inftantly vifited at Fulham as the lady of the manfion, by perfons of the higheft rank. Here, and at Mount Bevis, the earl's feat near Southampton, fhe refided in an exalted ftation till the year of her deceafe, 1750, furviving her lord fifteen years; who, at the time of the connexion, muft have been confiderably beyond his prime, as he was arrived at his feventy-fifth year when he died.

The following anecdotes of Mrs. Anaftafia Robinfon having been communicated to us in 1787, by the late venerable Mrs. Delany, her contemporary and intimate acquaintance, they will doubtlefs be read with confidence and pleafure, not only by fuch as had the happinefs of knowing her perfonally, but by all thofe to whom rumour has conveyed a faithful account of her longevity, virtues, and accomplifhments; for this excellent perfon having been allowed by Providence to extend her exiftence to the great age of eighty-eight, in the conftant enjoyment of all the felicity which the friendfhip and admiration of rank, virtue, and talents could beftow; it feems as if, without hyperbole, fhe may be faid to have been "beloved by God and man."

"Mrs. Anaftafia Robinfon was of a middling ftature, not handfome, but of a pleafing, modeft countenance, with large blue eyes. Her deportment was eafy, unaffected, and graceful. Her manner and addrefs very engaging; and her behaviour, on all occafions, that of a gentlewoman, with perfect propriety. She was not only liked by all her acquaintance, but loved and careffed by perfons of the higheft rank, with whom fhe appeared always equal, without affuming. Her father's houfe, in Golden-fquare, was frequented by all the men of genius and refined tafte of the times; among the number of perfons of diftinction who frequented Mr. Robinfon's houfe, and feemed to diftinguifh his daughter in a particular manner, were the earl of Peterborough and general H——; the latter had fhewn a long attachment to her, and his attentions were fo remarkable, that they feemed more than the effects of common politenefs; and as he was a very agreeable man, and in good circumftances, he was favourably received, not doubting but that his intentions were honourable. A declaration of a very contrary nature was treated with the contempt it deferved, though Mrs. A. Robinfon was very much prepoffeffed in his favour.

"Soon after this, lord P. endeavoured to convince her of his partial regard for her; but, agreeable and artful as he was, fhe remained very much upon her guard, which rather increafed than diminifhed his admiration and paffion for her. Yet ftill his pride ftruggled with his inclination; for all this time fhe was engaged to fing in public, a circumftance very grievous to her, but urged by the beft of motives, fhe fubmitted to it, in order to affift her parents, whofe fortune was much reduced by Mr. Robinfon's lofs of fight, which deprived him of the benefit of his profeffion as a painter.

"At length lord P. made his declaration to her on honourable terms; he found it would be vain to make propofals on any other; and as he omitted no circumftance that could engage her efteem and gratitude, fhe accepted them, as fhe was fincerely attached to him. He earneftly requefted her keeping it a fecret till it was a more convenient time for him to make it known, to which fhe readily confented, having a perfect confidence in his honour. Among the perfons of diftinction that profeffed a friendfhip for Mrs. A. Robinfon, were the earl and countefs of Oxford, daughter-in-law to the lord-treafurer Oxford, who not only bore every public teftimony of their affection and efteem for Mrs. A. Robinfon, but lady Oxford attended her when fhe was privately married to the earl of P., and lady P. ever acknowledged her obligations with the warmeft gratitude; and after lady Oxford's death, fhe was particularly diftinguifhed by the duchefs of Portland, lady Oxford's daughter, and

and was always mentioned by her with the greatest kindness for the many friendly offices she used to do her in her childhood when in lady Oxford's family, which made a lasting impression upon the duchess of Portland's noble and generous heart.

"Mrs. A. Robinson had one sister, a very pretty accomplished woman, who married Dr. Arbuthnot's brother. After the death of Mr. Robinson, lord P. took a house near Fulham, in the neighbourhood of his own villa at Parson's-Green, where he settled Mrs. Robinson and her mother. They never lived under the same roof, till the earl, being seized with a violent fit of illness, solicited her to attend him at Mount Bevis, near Southampton, which she refused with firmness, but upon condition that, though still denied to take his name, she might be permitted to wear her wedding ring; to which, finding her inexorable, he at length consented.

"His haughty spirit was still reluctant to the making a declaration, that would have done justice to so worthy a character as the person to whom he was now united; and, indeed, his uncontrollable temper, and high opinion of his own actions, made him a very awful husband, ill suited to lady P—'s good sense, amiable temper, and delicate sentiments. She was a Roman Catholic, but never gave offence to those of a contrary opinion, though very strict in what she thought her duty. Her excellent principles and fortitude of mind supported her through many severe trials in her conjugal state. But at last he prevailed on himself to do her justice, instigated, it is supposed, by his bad state of health, which obliged him to seek another climate, and she absolutely refused to go with him unless he declared his marriage; her attendance upon him in his illness nearly cost her her life.

"He appointed a day for all his nearest relations to meet him at the apartment over the gate-way of St. James's palace, belonging to Mr. Pointz, who was married to lord Peterborough's niece, and at that time preceptor to prince William, afterwards duke of Cumberland. Lord P. also appointed lady P. to be there at the same time; when they were all assembled he began a most eloquent oration, enumerating all the virtues and perfections of Mrs. A. Robinson, and the rectitude of her conduct during his long acquaintance with her, for which he acknowledged his great obligations and sincere attachment, declaring he was determined to do her that justice which he ought to have done long ago, which was presenting her to all his family as his wife. He spoke this harangue with so much energy, and in parts so pathetically, that lady P. not being apprised of his intentions, was so affected that she fainted away in the midst of the company.

"After lord P—'s death she lived a very retired life, chiefly at Mount Bevis, and was seldom prevailed on to leave that habitation, but by the duchess of Portland, who was always happy to have her company at Bulstrode, when she could obtain it, and often visited her at her own house.

"Among lord P—'s papers she found his memoirs, written by himself, in which he declared he had been guilty of such actions as would have reflected very much upon his character. For which reason she burnt them; this, however, contributed to complete the excellency of her principles, though it did not fail giving offence to the curious enquirers after anecdotes of so remarkable a character as that of the earl of Peterborough."

ROBINSON'S *Island*, in *Geography*, a small island in the Florida streams. N. lat. 24° 45'. W. long. 81° 35'.

ROBINSON *Crusoe's Coat*, in *Botany*. See CACTUS.

ROBINSONIA, was so named by Scopoli, in his *Introductio ad historiam naturalem*, in honour of one, or all, of the four Robinsons, mentioned in Haller's *Bibliotheca Botanica*. The worthy author informed us, by word of mouth, that Haller's index was his usual resource for names to his new genera; any person mentioned there being, in his opinion, sufficiently worthy of this kind of commemoration. It is pity that Robinson Cruso was not in the list, or he might have shared a botanical crown with Cook and Bouganville. If we must seriously appropriate the above honour, it would be in favour of Dr. Tancred Robinson, a particular friend, and botanical associate, of Ray.—Schreb. 337. Willd. Sp. Pl. v. 2. 999. Mart. Mill. Dict. v. 4. (Touroulia; Aubl. Guian. v. 1. 492. Juss. 434. Lamarck Illustr. t. 424.)—Class and order, *Icosandria Monogynia*. Nat. Ord. uncertain, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, turbinate, with five acute teeth. *Cor.* Petals five, roundish, concave, spreading, inserted into the calyx. *Stam.* Filaments numerous, capillary, swelling upwards, inserted into the calyx beneath the petals; anthers of two oblong cells, divaricated at the base. *Pist.* Germen superior; style none; stigma oblong, striated. *Peric.* Berry globose, somewhat depressed, marked with numerous, contiguous, longitudinal furrows, fleshy, of seven cells, with membranous partitions. *Seeds* solitary, oblong, compressed, externally convex, hairy.

Ess. Ch. Calyx five-toothed. Petals five. Berry superior, striated, of seven cells. Seeds solitary, hairy.

1. R. *melianthifolia*. Willd. n. 1. (Touroulia guianensis; Aubl. Guian. v. 1. 492. t. 194.)—Found by Aublet in the forests of Guiana, where the inhabitants know it by the name of Touroulia. The flowers appear in November, and the fruit is ripened in May. A large and lofty *tree*, with a wrinkled bark, and red wood; the *branches* spreading, quadrangular. *Leaves* opposite, pinnate, of about four pair, with an odd one, of elliptic-oblong, pointed, smooth, serrated leaflets, whose lateral veins are numerous and parallel, and their serratures each tipped with a bristle. *Stipulas* acute. *Clusters* terminal, compound, with opposite branches. *Flowers* tufted, nearly sessile, yellow, small. *Berry* an inch in diameter, reddish, of a pleasant acid flavour. The *calyx* being certainly inferior, as Jussieu determined by examination, its teeth can hardly crown the fruit, though, by Aublet's description, its base seems confluent therewith.

ROBION, or ROUBION, in *Geography*, a river of France, which runs into the Rhone, a little below Montelimart.

ROBISON, JOHN, in *Biography*, an eminent Scotch mathematician and natural philosopher, was born at Boghall, in the county of Stirling, in the year 1739. He was sent to Glasgow to receive his education, and was soon distinguished for the rapid progress which he made in classical learning. He went, while very young, to the university, where he enjoyed the benefit of the instructions of professors Simson, Leechman, Moore, Smith, and others. He was led to attach himself particularly to the mathematics, by perceiving how successfully that science was applied to several branches of natural philosophy. Dr. Robert Simson was his tutor in mathematics, and in his class Mr. Robison was soon distinguished beyond any of his fellow students. Among other branches, Mr. Robison made himself well acquainted with the modes of algebra; but from professor Simson he derived a peculiar disposition to the study of geometry, assigning, for a reason, what others have often done, who are tolerably conversant with both subjects, that in the longest demonstration, the geometrician has clear and accurate ideas, which the most expert algebraist can very seldom have. Mr.

 Robison

Robifon had been defigned, by his father, for the clerical profeffion, but it appears he became diffatisfied with it on account of fome of the tenets in the eftablifhed creed. Accordingly, in 1757, he was candidate for the office of affiftant to Dr. Dick, in the profefforfhip of natural philofophy, but, being then only 19 years of age, he was deemed too young for the duties attached to that fituation, and in the following year he went to fea as mathematical tutor to Mr. Knowles, the eldeft fon of admiral Knowles. He embarked, with his pupil, on board the Neptune, of 90 guns, bound to Quebec; and, in the courfe of the voyage, Mr. Knowles being appointed lieutenant on board the Royal William, Mr. Robifon accompanied him into that fhip, and, at his own requeft, was rated as midfhipman. In this fhip he fpent three years, which he thought the happieft part of his life, and during this period he acquired that knowledge of the art of feamanfhip which qualified him to draw up the article on that fubject in the Encyclopædia Britannica, which was underftood to be his. While on board this veffel, in the river St. Lawrence, he noticed a connection between the aurora borealis and the direction of the magnetic needle, which he pointed out to the gentlemen on the quarter-deck. During the fiege of Quebec, Mr. Robifon was fent, with a party of feamen and petty officers, to reinforce the crew of the Sterling-Caftle, which was lying before the city, and was thus enabled to fee much fervice both on board and on fhore. He was likewife not unfrequently employed in taking furveys of different parts of the river. Upon the furrender of Quebec he returned to the Royal William, and fpent the whole of the following year in the Bay of Bifcay, and on the coafts of Spain and Portugal. In the year 1762, upon the expectation of future preferment from lord Anfon, then firft commiffioner of the admiralty, he went to Jamaica, for the purpofe of trying Harrifon's time-keeper, and on his return to England he received the painful intelligence that his beloved pupil had, with the whole crew of the Peregrine, of which he was commander, perifhed, by the veffel's foundering at fea. He now felt that his profpects of advancement in the navy were very flender, and determined to return to college. Very foon after, admiral fir Charles Knowles confided to him the inftruction of his younger fon. At Glafgow he renewed his ftudies with great ardour, and in the year 1767, when Dr. Black was called to Edinburgh, the fenate of the univerfity of Glafgow, on his recommendation, appointed Mr. Robifon his fucceffor, as lecturer in chemiftry. In the year 1770, fir Charles Knowles appointed him his official fecretary to the court of Peterfburgh, whither the gallant admiral was going to affift in improving the Ruffian navy. They fet out upon their journey over land, and paffing through Liege, they were invited to dine with the prince-bifhop: Mr. Robifon obferved, with fome degree of furprife, that all the guefts, and even the principal attendants, had about them the badges of free-mafonry; upon fome enquiries he was induced to become a member, and during his ftay in that city he paffed through all the degrees, till he attained the rank of Scotch mafter. At Peterfburgh he was appointed infpector-general of the corps of marine-cadets; an academy confifting of above four hundred young gentlemen and fcholars, under the tuition of about forty teachers. His duty, in this office, confifted in vifiting daily every clafs of the academy; in receiving weekly reports from each mafter, concerning the diligence and progrefs of every perfon in his clafs; and in advancing, twice in every year, the young gentlemen into higher claffes, according to their refpective merits. Of thefe he was conftituted the fole judge, and againft his decifion there was no appeal. At this period general Kutuzoff was military-head of the academy, and held the third place in the admiralty-college. This general approved all Mr. Robifon's plans, adopted all his meafures, and fupported his authority. While in this fituation, Mr. Robifon prefented to the admiralty-college a plan for rendering the magnificent docks at Cronftadt of fome ufe by means of a fteam-engine, which was adopted and executed with fuccefs after he had left Ruffia. Being attached, by his office, to that ifland, he found it, particularly in winter, to be a difmal folitude, where he was nearly cut off from all fociety. On this account, having held the appointment about four years, he determined to refign it, and to accept of an invitation from the magiftrates and town-council of Edinburgh, to be profeffor of natural philofophy in their univerfity. This fituation he filled with great honour to himfelf, as well as benefit to the ftudents of the univerfity, till his death, which happened in 1805.

Although Dr. Robifon laboured under a very diftreffing and painful diforder during the laft eighteeu years of his life, ftill in general his mind was active. He is well known to be author, not only of the article Seamanfhip, already mentioned, but of all the moft important mathematical and philofophical articles in the third edition of the Encyclopædia Britannica, and the fupplement to that work. They were probably the fubftance of his lectures delivered at college, and feveral of them were afterwards thrown into a different form, and publifhed under the title of "Elements of Mechanical Philofophy." In 1797 this gentleman publifhed a work, entitled "Proofs of a Confpiracy againft all the Religions and Governments of Europe, carried on in the Secret Meetings of Free-Mafons, Illuminati, and Reading Societies," a work full of declamation and abfurdity, but which, owing to the furor of the times, made a great impreffion, and rapidly paffed through feveral editions, but which, when reafon returned to the great mafs of the people, fell into deferved contempt. In 1803 Mr. Robifon performed a very acceptable fervice to the public, by giving them an edition of Dr. Black's lectures on the "Elements of Chemiftry," in two vols. 4to.

ROBLEDA, in *Geography*, a town of Spain, in the province of Leon; 22 miles S. of Civdad Rodrigo.

ROBLINTON, a townfhip of Wafhington county, in Pennfylvania, containing 770 inhabitants.

ROBO, a town of Arabia, in the province of Yemen; 12 miles E.N.E. of Zebid.

ROBOAN. See RUBIN.

ROBORANTIA, in *Medicine, ftrengtheners;* or fuch medicines as ftrengthen the parts, and give new vigour to the conftitution.

ROBORTELLO, FRANCESCO, in *Biography*, an Italian man of letters, born at Udine in 1516, was the fon of a notary and noble of that city. He was educated at Bologna, and about 1538 was invited to occupy the chair of eloquence at Lucca. In 1543 he removed to Pifa, where he held a fimilar profefforfhip. In 1552 he was called to Padua to fill the chair of Greek and Latin eloquence, vacant by the death of Lazzaro Buonamici. He quitted Padua for Bologna in 1557; whence, in 1560, he was recalled by the fenate of Venice to his chair at Padua. He died in 1567, in his 51ft year. The univerfity gave him a fplendid funeral, and the German nation erected a handfome monument to his memory in the church of St. Antonio. At moft of the places of his refidence he was involved in quarrels with his colleagues, and his writings are full of attacks upon his contemporaries. He publifhed numerous works, among which were, "Annotations on various Authors, Greek and Latin," 1543, republifhed in 1548, with feveral fmall treatifes;

treatises; a corrected edition of "Aristotle's Poetics," together with a paraphrase on "Horace's Art of Poetry;" an edition of the "Tragedies of Æschylus;" of "Ælian's Tactics," with a Latin version; and of "Longinus de Sublimitate," with annotations. He also published a valuable work "De Vita et Victu Populi Romani sub Imperatoribus Cæsaribus Augustis," with ten other dissertations on subjects of Roman antiquity.

ROBUR Carolinum, in *Astronomy*. See Royal *Oak*.

ROBUSTI, Giacopo, in *Biography*. See Tintoretto.

ROCA, or Rocca, in *Geography*, a cluster of islands in the Caribbean sea, near the coast of South America. N. lat. 12° 20′. W. long. 66° 6′.

Roca, *Cape*, a cape on the W. coast of Portugal, generally called by the English sailors the "Rock of Lisbon." N. lat. 38° 45′. W. long. 90° 34′.

Roca *Point*, a cape on the E. coast of England, in the county of Durham. N. lat. 55° 1′. W. long. 1° 21′.

ROCAB, a town of Arabia, in Hadramaut; 50 miles S.S.W. of Sahar.

ROCABERTI, John Thomas de, in *Biography*, a Spanish prelate in the seventeenth century, was descended from a noble family, and born at Peselada, on the frontiers of Catalonia, about the year 1624. He entered into the order of St. Dominic; was made provincial of Aragon in 1666; general of his order in 1670; archbishop of Valentia in 1676; inquisitor-general in Spain in 1695; and twice appointed viceroy of Valentia. By his authority as general, he selected from the mass of manuscripts belonging to his order, the most valuable unpublished labours of several of its members, which he directed to be printed, but at his own private expence. Besides some devotional tracts, he published a treatise "De Romani Pontificis Auctoritate," 1693, in three vols. folio. This work was very favourably received in Spain and in Italy; but the sale of it was prohibited in France, by a decree of the parliament of Paris. He spared no pains in procuring all the treatises which had been composed by different authors in defence of the pope's authority and infallibility, and made provision for their being printed in an uniform edition at Rome. This enormous collection is entitled "Bibliotheca Maxima Pontifica," &c., and consists of twenty-one folio volumes. The archbishop died in 1699.

ROCAIBA, in *Geography*, a town of Arabia, in the province of Hedsjas; 120 miles E.N.E. of Mecca.—Also, a town of Arabia, in the province of Nedsjed; 17 miles E. of Mecca.

ROCAMA, in *Botany*, an Arabian name, applied by Forskall, in his Fl. Ægypt-Arab. 71, to the Linnæan *Trianthema pentandra*, which he there establishes as a distinct genus. See Trianthema.

ROCAMADOUR, in *Geography*, a town of France, in the department of the Lot; 22 miles N. of Cahors. N. lat. 44° 48′. E. long. 1° 42′.

ROCAMBOLE, a mild sort of garlic, by some called Spanish garlic; being much of the nature of shalot; and well known in cookery, in quality of a sauce. See Allium.

ROCAPARTIDA, in *Geography*, an island in the North Pacific ocean. S. lat. 16°. W. long. 92° 14′.

ROCAS, a town of Arabia, in the province of Oman, near the sea; 30 miles W.N.W. of Oman.

ROCAVION, a town of France, in the department of the Stura; five miles S.S.W. of Coni.

ROCCA, Angelo, in *Biography*, a learned Italian monk and titular bishop, was a native of Rocca Contrata, a town in the marche of Ancona, and born in the year 1545. When young he took the habit among the hermits of St. Augustine, and pursued his studies at Rome, Venice, Perusia, and Padua. Having distinguished himself by his proficiency in the various branches of literature, sacred and profane, he was honoured with the degree of doctor of divinity by the university of Padua, and afterwards acquired much celebrity as a preacher at Venice. His general appointed him to several confidential and honourable employments, and at last made him secretary to his order. After he had retained this post some years, pope Sixtus V. placed him in the Vatican in 1585, and confided to his superintendance those editions of the bible, the councils, and the fathers, which issued from the apostolical press during his pontificate. In the year 1595, pope Clement VIII., by way of reward for these services, made him apostolical sacristan, and titular bishop of Tagasté in Numidia. He collected a very large and excellent library, which he left by his will to the Augustinian monastery at Rome; but upon the express condition, that it should be always open for the benefit of the public. This was the first library formed in that city to which the public had freedom of access, and it was properly called, after the name of its beneficent founder, the "Angelical Library." Rocca died in 1620, at the age of 75. He published "Bibliotheca Theologica et Scripturalis;" "Notæ in Novum Testamentum;" "De Patientia;" "De Cometis;" "Observationes in VI Libros Elegantiarum Laur. Vallæ;" "Observationes de Lingua Latina;" and other pieces which were collected together, and printed in two vols. folio, in the year 1719. From his manuscripts was also published, in 1745, a very curious collection, entitled "Thesaurus Pontificiarum Antiquitatum, necnon Rituum ac Cæremoniarum;" in two vols. folio.

Rocca, in *Geography*, a town of Istria; one mile N. of Monfalcone.—Also, a town of Naples, in Lavora; 19 miles N. of Sezza.—Also, a small island in the West Indies; 24 miles W. of Orchilla.—Also, a town of the Ligurian republic; nine miles S.E. of Genoa.—Also, a town of Italy, on the east bank of lake Maggiore; 30 miles N.W. of Milan.

Rocca, *La*, a town on the S.W. coast of the island of Canary; 15 miles S.W. of Civdad de los Palmas.

Rocca *Albegna*, a town of Etruria; 28 miles S. of Sienna.

Rocca *dell'Aspro*, a town of Naples, in Principato Citra; 15 miles W.S.W. of Cangiano.

Rocca *Bruno*, a town of France, in the department of the Maritime Alps, near the coast of the Mediterranean; three miles E.N.E. of Monaco.

Rocca *Contrada*, a town of the duchy of Urbino; 24 miles E.S.E. of Urbino.

Rocca *del Este*, a rocky islet among the Canaries; eight miles E. of Gratiosa.

Rocca *Gloriosa*, a town of Naples, in Principato Citra; seven miles W. of Policastro.

Rocca *Lanzone*, a town of the duchy of Parma; nine miles W.S.W. of Parma.

Rocca *del Marino*, a town of Italy, in the Trevisan; 16 miles N. of Trevigio.

Rocca *Minolfa*, a town of Naples, in the county of Molise; eight miles S. of Molise.

Rocca *Mensena*, a town of Naples, in Lavora; three miles N. of Sezza.

Rocca *di Neto*, a town of Naples, in Calabria Citra; four miles S.S.W. of Strongoli.

Rocca *del Oueste*, or *West Rock*, a rocky islet among the Canaries; six miles S.W. of Alegranza.

Rocca *Romana*, a town of Naples, in Lavora; six miles N. of Capua.

Rocca *Vallé Oscura*, a town of Naples, in Abruzzo Citra; five miles S. of Sulmona.

Rocca *Vecchia*, a town of Naples, in Lavora; 14 miles N.E. of Sezza.

Rocca *Voltraia*, a town of Etruria; three miles N.E. of Volterra.

ROCCABIANCA, a town of the duchy of Parma; 15 miles N.N.W. of Parma.

ROCCABILIERE, a town of France, in the department of the Maritime Alps, and chief place of a canton, in the district of Nice. The place contains 1143, and the canton 3631 inhabitants, on a territory of 455 kiliometres, in five communes.

ROCCALANA, a town of Italy, in the country of Friuli; 16 miles N.N.W. of Friuli.

ROCCARION, a town of France, in the department of the Stura; four miles S.W. of Coni.

ROCCELLA, in *Botany*, an Italian name for that species of *Lichen*, known to our dyers under the appellation of Argol, or Orchall; for which, in dyeing red or purple, the Scottish *Lichen tartareus* is but an inadequate substitute, the colours it affords being far less permanent. See Lichen, sect. 8. n. 115.

ROCCO Rodio, in *Biography*, an ancient Neapolitan contrapuntist and writer on music. Padre Martini (Hor. della Mus. vol. i. p. 447.) places Rocco Rodio at the head of the Neapolitan school, after Tinctor. But it is difficult to ascertain the exact period when Rocco Rodio flourished. We have, however, been so fortunate as to find an edition of his precepts, to which P. Martini alludes, that was printed at Naples 1609; but this date tells us nothing, as the work had certainly appeared much earlier in another form. Battista Olifante, the editor of this edition, seems not to give the rules of Rocco Rodio in his own words, but explanations of the doctrines and examples he had left. If this exposition of the rules established by Rocco Rodio was written by himself, he must have flourished late in the sixteenth century: as Adriano Willaert and Cipriano Rore are both mentioned in the text: and both these masters were living after the year 1550. The full title is the following: "Regole di Musica di Rocco Rodio, sotto brevissime risposte ad alcuni dubij propostogli da un Cavaliero, intorno alle varie opinioni de Contrapontisti. Con la Dimostratione di tutti i Canoni sopra il Canto-fermo, con li Contraponti doppij, e rivoltati, e loro regole. Aggiontavi un' altra breve Dimostratione de dodici Tuoni regolari, finti e trasportati. Et di nuovo da Don Batt. Olifante, Aggiontivi un Trattato di Proportioni necessario, á detto Libro, e ristampato. In Napoli, MDVIIII."

The rules and examples for composing canons of all kinds are remarkably short and clear in this tract, which is so scarce, that we have never seen it in any public library or catalogue of books; and P. Martini, who mentions the work, seems never to have been in possession of it. Our copy was purchased at the sale of the late Mr. Belway's collection of music, the admirable organist of St. Martin's church.

Rocco, in *Geography*, a town of the Ligurian republic; 11 miles S.E. of Genoa.

ROCELLA, a town of Naples, on the coast of Calabria Citra, near which is a celebrated coral fishery; 10 miles N.E. of Giarau.

ROCH, Cape, a cape on the E. coast of Majorca. N. lat. 39° 40′. E. long. 3° 5′.

ROCHDALE, a market-town and parish in the hundred of Salford, and county of Lancaster, England, is situated in a valley watered by the river Roch, at the distance of 46 miles S.E. from Lancaster, and 197 N.N.W. from London. In the town, besides the parish church, there are places of worship for Presbyterians, Baptists, and Methodists. Here is a free grammar-school, founded by archbishop Parker, also an English free-school, erected and endowed by Mrs. Hardman, and several Sunday-schools. The market days are Monday and Saturday; and there are fairs annually on the 14th of May, Whit-Tuesday, and the 7th of November. The petty sessions for Rochdale and Middleton division of the hundred of Salford are holden here. This town is situated in three townships, *viz.* Castleton, Spotland, and Wardleworth. The largest portion of it is within Wardleworth. The parish is of great extent, and is divided in seven districts, or townships, *viz.* Blackenworth, Butterworth, Todmorton, Wuerdale, and the three townships above-mentioned, all of which maintain their poor separately. According to the late parliamentary returns, these united districts contained 6552 houses, and 37,224 inhabitants. The vicarage here is superior in value to any other living of a similar description in the kingdom. In the reign of Henry VIII. it was rated as low as 11*l.* 4*s.* 9½*d.*, but it has since increased to nearly a hundred and fifty times that amount. It is in the gift of the archbishop of Canterbury, to whom the tithes belong, which are let for a term of years. Nine chapels of ease are attached to the church of Rochdale, *viz.* St. Mary's in the town, Littleborough, Milnrow, Todmorton, Whitworth, Friermeer, Lydgate, Saddleworth, and Dobcross: most of which are in the patronage of the vicar. Rochdale parish is rich in the mineral products of slate, stone, and coal. It is also, and has long been, distinguished for its trade. A branch of the woollen manufacture is its staple, of which the chief articles are bays, flannels, coatings, and broad cloths; but there is likewise a considerable cotton trade carried on both in the town and its vicinity. In the township of Whitworth formerly resided Messrs. John and George Taylor, better known by the name of the Whitworth Doctors. "The fame of these rustic artists," says Dr. Aikin, "is almost equal to that of the celebrated Swiss doctor mentioned by Mr. Coxe, and has spread not only over the more immediate neighbourhood, but to remote parts of the kingdom, and even to the metropolis itself. They were chiefly noted for setting broken and dislocated bones, and for the cure of cancerous and other tumours by caustics, properly termed by themselves *keen*." Lord Byron, the poet, is lord of the manor of Rochdale, and takes his seat as an English peer under the title of baron Byron of Rochdale. At his court-leet, the officers and constables for the civil government of the parish are annually appointed.

The principal seats in this vicinity are Belfield, which formerly belonged to the Knights Templars; Foxholes, the residence of the Entwisle family; and Studley, long the property of the Holts, a memorable name in this district of the country. The house appears to have been erected by Robert Holt, esq. in the reign of Henry VIII. and consists of a centre and two wings. Whitaker, in his History of Whalley, describes it as containing within "much carving in wood, particularly a rich and beautiful screen between the hall and the parlour, with a number of crests, cyphers, and cognizances

cognizances belonging to the Holts, with other neighbouring families. It was abandoned for the warmer and more fertile ſituation of Caſtleton by Robert Holt, eſq. about the year 1640."

The townſhip of Caſtleton derives its name from an ancient caſtle which formerly reared its embattled walls within its limits, on a ſpot where ſtill remains a lofty artificial mound of earth called the keep. Dr. Whitaker ſuppoſes that a caſtle ſtood here anterior to the Norman conqueſt, as in a record in the Harleian collection, apparently part of an inquiſition taken after the death of Thomas of Lancaſter, "it is deſcribed as the ſcite of an ancient caſtle long ſince gone to decay." A Deſcription of the Country from thirty to forty Miles round Mancheſter, by J. Aikin, M. D. 4to. London 1795. Whitaker's Hiſtory and Antiquities of the ancient Pariſh of Whalley, &c. 4to. 1806. Beauties of England and Wales, vol. ix. by John Britton, F. S. A.

ROCHDALE, a town of Pennſylvania, in Crawford county, containing 401 inhabitants.

ROCHE, a town of France, in the department of the Upper Rhine; two miles S. of Delmont.—Alſo, a river of America, which runs into lake Erie, N. lat. 42° 20'. W. long. 82° 53'.—Alſo, another which runs into the ſame lake, N. lat. 41° 48'. W. long. 81° 25'.

ROCHE, or *Stony River*, a river of America, which runs into the Miſſiſippi, N. lat. 40° 50'. W. long. 91° 42'.

ROCHE, *La*, a town of France, in the department of the Leman, and chief place of a canton, in the diſtrict of Bonneville; 12 miles N.E. of Annecy. The place contains 2447, and the canton 7685 inhabitants, on a territory of 150 kiliometres, in eight communes. The town is ſituated near the river Bonne, and is ſo called from a rock near it, and lies on the declivity of a hill, in a fertile country, diverſified with arable lands and meadows. It is ſurrounded by an ancient wall and defended with towers. The principal occupations of its inhabitants are tanning of leather and making of ſhoes. It contains, beſides a pariſh church, ſeveral religious houſes.—Alſo, a town of France, in the department of Mont Blanc; 10 miles S.E. of Monſtier.

ROCHE, *La*, or *Roche en Ardennes*, or *en Famine*, a town of France, in the department of the Sambre and Meuſe, belonging to the duchy of Luxemburg: formerly a well fortified town, with a caſtle commanding the town and ramparts, ſurrounded with the waters of the river Ourte, which paſſes through it. It is the capital of a comté, called "the comté of Ardennes," which comprehended 51 towns and villages. In 1703 it ſuffered very much from fire; 28 miles S. of Liege. N. lat. 50° 10'. E. long. 5° 33'.

ROCHE *l'Abeille*, *La*, a town of France, in the department of the Upper Vienne; 6 miles N. of St. Yriax.

ROCHE *des Arnauds*, *La*, a town of France, in the department of the Higher Alps; 6 miles W. of Gap.

ROCHE *Beaucourt*, *La*, a town of France, in the department of the Dordogne; 12 miles S.W. of Nontron.

ROCHE *Bernard*, *La*, a town of France, in the department of the Morbihan, and chief place of a canton, in the diſtrict of Vannes, ſituated on the Vilaine; 21 miles S.E. of Vannes. The place contains 6272, and the canton 10,959 inhabitants, on a territory of 212½ kiliometres, in 8 communes. N. lat. 47° 31'. W. long. 2° 12'.

ROCHE *les Beaupré*, a town of France, in the department of the Doubs; 5 miles N.E. of Beſançon.

ROCHE *Blanche*, *La*, a town of France, in the department of the Puy de Dôme; 5 miles S. of Clermont.

ROCHE *Bonnet*, a ſmall iſland, near the W. coaſt of France, in the bay of Bourg Neuf.

ROCHE *Canillac*, *La*, a town of France, in the department of the Correze, and chief place of a canton, in the diſtrict of Tulles; 9 miles S.E. of Tulles. The place contains 375, and the canton 6845 inhabitants, on a territory of 232½ kiliometres, in 11 communes.

ROCHE *Chalais*, *La*, a town of France, in the department of the Dordogne, on the Dronne; 15 miles S.W. of Riberac.

ROCHE *Darrien*, *La*, a town of France, in the department of the Northern Coaſts, and chief place of a canton, in the diſtrict of Lannion, ſituated on the river Treguier; 3 miles S. of Treguier. The place contains 1102, and the canton 10,329 inhabitants, on a territory of 112½ kiliometres, in 12 communes.

ROCHE *Guyon*, *La*, a town of France, in the department of the Seine and Oiſe, on the Seine; 8 miles N.N.W. of Mantes.

ROCHE *Melon*, *La*, a mountain of Piedmont, near Suza, ſuppoſed to be the higheſt in Italy, and to be that from the eminence of which Hannibal ſhewed to his army the fertile country which he thus animated them to conquer.

ROCHE *Milley*, *La*, a town of France, in the department of the Nièvre; 12 miles S.E. of Moulins.

ROCHE *Reigner*, *La*, a town of France, in the department of the Upper Loire; 12 miles N. of Le Puy.

ROCHE *Servière*, *La*, a town of France, in the department of the Vendée, and chief place of a canton, in the diſtrict of Montaign; 9 miles W.S.W. of Montaign. The place contains 425, and the canton 4542 inhabitants, on a territory of 165 kiliometres, in 8 communes.

ROCHE *ſur Yon*, *La*, a town of France, in the department of the Vendée, and chief place of a canton, in the diſtrict of Montaign, ſituated on the Yon; 30 miles N.W. of Fontenay le Comte. The place contains 631, and the canton 8515 inhabitants, on a territory of 275 kiliometres, in 11 communes. N. lat. 46° 44'. W. long. 1° 20'.

ROCHE, *Cape de la*, a cape on the N. coaſt of the iſland of Hiſpaniola. N. lat. 19° 42'. W. long. 70° 35'.

ROCHEA, in *Botany*, a genus of Decandolle's, in his *Plantes Graſſes*, n. 103, dedicated to the memory of Daniel de la Roche, a phyſician of Geneva, whoſe inaugural diſſertation, printed at Leyden in 1766, contains deſcriptions and plates of many plants of the natural order of *Enſatæ*, and is often cited by writers on the genera and ſpecies of that tribe. *De Theis*.

ROCHECHOUART, in *Geography*, a town of France, and principal place of a diſtrict, in the department of the Upper Vienne; 18 miles W. of Limoges. The place contains 1440, and the canton 7872 inhabitants, on a territory of 180 kiliometres, in 7 communes.

ROCHEFORT, WILLIAM DE, in *Biography*, a modern French writer, was born in 1730, at Lyons. He had a ſmall employment in the finances; but finding in himſelf a greater love to letters than to buſineſs, he went to Paris, and devoted himſelf to poetry and Greek literature. He compoſed three tragedies upon the Greek models, which had too much ſimplicity to pleaſe; and a comedy which was not more ſucceſsful. In proſe he publiſhed a "Refutation du Syſteme de la Nature;" a "Critical Hiſtory of the Opinions of the Ancients concerning Happineſs;" and a "Complete Tranſlation of the Plays of Sophocles;" the laſt named work gained him much credit by the elegance and fidelity of the verſion, and the judicious notes annexed to it. He then undertook the taſk of a complete tranſlation of Homer's Iliad and Odyſſey, of which the preliminary diſcourſes and the notes obtained more applauſe than the verſion itſelf, which, however, he had ſplendidly printed at the royal preſs, in 1781, in 4to. He was a member of the

Academy

Academy of Infcriptions and Belles Lettres, to which he contributed feveral learned memoirs. He died in 1788, highly efteemed for his private and focial virtues. Gen. Biog.

ROCHEFORT, in *Geography*, a town of the county of Neufchatel; 5 miles S.W. of Neufchatel.—Alfo, a town of France, in the department of the Puy de Dome, and chief place of a canton, in the diftrict of Clermont; 13 miles S.W. of Clermont. The place contains 110, and the canton 12,177 inhabitants, on a territory of 365 kiliometres, in 14 communes.—Alfo, a town of France, in the department of the Jura, and chief place of a canton, in the diftrict of Dole, feated on the Doubs; 4 miles E.N.E. of Dole. The place contains 562, and the canton 6395 inhabitants, on a territory of 107½ kiliometres, in 19 communes.—Alfo, a town of France, in the department of the Sambre and Meufe, and chief place of a canton, in the diftrict of Marche, furrounded by rocks, with an ancient caftle, faid to be of Roman conftruction. The place contains 878, and the canton 5148 inhabitants, on a territory of 237½ kiliometres, in 18 communes; 33 miles S.S.W. of Liege. N. lat. 50° 9′. E. long. 5° 5′.—Alfo, a fea-port town of France, and principal place of a diftrict, in the department of the Lower Charente, feated on the Charente. The place contains 15,000, and the canton 17,842 inhabitants, on a territory of 162½ kiliometres, in 8 communes. N. lat. 45° 56′. W. long. 0° 52′. This port has excellent docks for building, careening, and refitting veffels, and magazines well replenifhed with naval ftores. It has alfo a marine academy, and an hofpital for feamen; but the adjacent falt-marfhes injure its falubrity. In this refpect it has been improved by the drying of the marfhes by canals. The town was founded by Louis XIV. A.D. 1665; it is elegantly built and fortified, and contains feveral churches and convents. It has water fufficient, even at low water, to float large veffels, and they are fheltered from all hurricanes, and alfo fecured from all attacks of bomb-veffels. It is alfo faid, that the worm, which is fo deftructive to fhips' bottoms, does not affect them here. The approach to the town up the river is defended by feveral forts, and is about two leagues from the fea-coaft, five from the mouth of the river, and fix S.E. of Rochelle.

ROCHEFORT, *La*, a town of France, in the department of the Morbihan, and chief place of a canton, in the diftrict of the Vannes; 16 miles E. of Vannes. The place contains 628, and the canton 9837 inhabitants, on a territory of 187½ kiliometres, in 9 communes. N. lat. 47° 42′. W. long. 2° 15′.

ROCHEFORT, a town of France, in the department of the Seine and Oife; 4 miles N. of Dourdan.

ROCHEFORT *fur Loire*, a town of France, in the department of the Mayne and Loire, on the S. fide of the Loire; 13 miles S.S.W. of Angers.

ROCHEFORT *Samfon*, a town of France, in the department of the Drôme; 12 miles E.N.E. of Valence.

ROCHEFORTIA, in *Botany*, received that name from profeffor Swartz, in commemoration of a French writer, De Rochefort, of whom we know nothing but that he publifhed, in 1639, Hiftoire naturelle et morale des îles Antilles de l'Amerique, with plates; a work of which a fecond edition appeared at Rotterdam in 1665, and an Englifh tranflation, by J. Davies, at London in 1666.—Swartz Prodr. 4. Ind. Occ. v. 1. 551. t. 10. Schreb. 797. Willd. Sp. Pl. v. 1. 1328. Mart. Mill. Dict. v. 4.—Clafs and order, *Pentandria Digynia*. Nat. Ord. *Dumofæ*, Linn. *Rhamni*, Juff.

Gen. Ch. *Cal.* Perianth of one leaf, inferior, in five deep, ovate, obtufe fegments. *Cor.* of one petal; tube fhort, pervious; limb funnel-fhaped, in five deep, ovate-oblong, fpreading fegments. *Stam.* Filaments five, inferted into the mouth of the corolla between the fegments, awl-fhaped; anthers oblong. *Pift.* Germen fuperior, roundifh, compreffed; ftyles two, awl-fhaped; ftigmas fimple. *Peric.* Berry? nearly globofe, of two cells. *Seeds* few, angular.

Eff. Ch. Calyx inferior, in five deep fegments. Corolla funnel-fhaped, pervious at the mouth. Fruit of two cells, with feveral feeds.

1. R. *cuneata*. Wedge-leaved Rochefortia. Willd. n. 1. Swartz Ind. Occ. v. 1. 552.—Leaves wedge-fhaped, obovate, undivided.—Native of dry, ftony, mountainous places in Jamaica. *Stem* fhrubby, three or four feet high, erect, with round, zigzag, fubdivided, grey *branches*, armed with a folitary projecting thorn, near the infertion of each footftalk. *Leaves* about three, rarely more, together, in alternate tufts, ftalked, generally quite entire, fometimes emarginate, rather rigid, fmooth, and fomewhat fhining, on both fides, of a brownifh-green, flightly ribbed; paler beneath. *Footftalks* fhort. *Flowers* fmall, greenifh or whitifh, in denfe forked, cymofe, terminal or axillary, *clufters*, fhorter than the leaves. *Calyx* downy, as well as the *germen* and *ftigmas*. The *fruit* was only feen in an unripe ftate by Dr. Swartz, fo that he could not determine whether it were a berry or capfule.

2. R. *ovata*. Ovate-leaved Rochefortia. Willd. n. 2. Swartz Ind. Occ. v. 1. 554.—Leaves ovate, emarginate.—Native of bufhy ftony places in Jamaica. A *fhrub*, with round fmooth *branches*. Swartz makes no mention of *thorns*. The *leaves* are alternate, ftalked, ovate, emarginate at the fummit, but otherwife entire, flightly villous, veiny, an inch long. *Flower-ftalks* one-fifth only of the length of the leaves, each bearing many *flowers* in pairs. Unripe *fruit* like the foregoing.

ROCHEFOUCAULT, FRANCIS, duke of, prince of Marfillac, in *Biography*, a well-known writer in the age of Louis XIV. was born in 1613. He diftinguifhed himfelf as one of the moft brilliant young noblemen about the court, and formed a connection with the duchefs of Longueville, which involved him in the civil war of the Fronde. At the battle of St. Antoine, in Paris, he fignalized his courage, and received a mufket fhot, which for fome time deprived him of fight. When thefe troubles were terminated, he devoted himfelf to the pleafures of fociety and literature. His houfe was the refort of the beft company at Paris, in point of talents and underftanding, and his converfation was relifhed by Boileau, Racine, Sevigné, and La Fayette, and the other literary characters of France. Nor did he only fhine by his wit and vivacity; he difplayed great firmnefs of mind under domeftic loffes (having had one fon killed and another wounded at the paffage of the Rhine), and under the pain of the gout, with which he was afflicted in his latter years. Mad. de Sevigné fpeaks of him as "holding the firft rank in courage, merit, tendernefs, and good fenfe." In Mad. Maintenon's Letters is the following portrait of the duke. "He had a happy phyfiognomy, a grand air, much wit, and little learning. He was intriguing, fupple, and wary: I never knew a friend more folid, more open, or who gave better counfel. He loved to take the lead. Perfonal bravery appeared to him a folly, and fcarcely did he difguife this opinion; yet he was very brave. He preferved till death the vivacity of his difpofition, which was always very agreeable, though naturally ferious." The duke de Rochefoucault died with philofophical tranquillity at Paris in 1680, in his 68th year. He made himfelf famous by a work entitled "Reflexions et Maximes,"

Maximes," many times printed, and tranflated. Voltaire fpeaks thus of it: "This little collection, written with that delicacy and fineffe which render a ftyle fo captivating, had the rare merit of accuftoming readers to think, and to give a lively and precife expreffion to their thoughts." The fundamental principle of this work is, that felf-love is the motive of all our actions. It is therefore, perhaps, lefs the hiftory than the fatire of the human race: but it is a fatire which, fays a writer, pleafes, becaufe it flatters malignity, and becaufe it excufes men from the admiration of virtue, by giving it a principle in common with vice, and thereby ftripping it of the heroifm attributed to it. It feems allowed, fays Dr. Aikin, that the writer painted very exactly the world in which he lived, but a lover of mankind will fcarcely admit that world to have been a fair example of the fpecies. Mifanthropes have taken pleafure in his fentiments, and Swift has made one of his thoughts the bafis of his moft finifhed piece, the poem on his own death. The duke alfo wrote "Memoires de la Regence d'Anne d'Autriche," 2 vols. 12mo. 1713, an energetic and faithful reprefentation of that ftormy period, in which he was himfelf an actor. Gen. Biog.

Rochefoucault, *La*, in *Geography*, a town of France, in the department of the Charente, and chief place of a canton, in the diftrict of Angouleme; 12 miles N.E. of Angouleme. The place contains 2586, and the canton 14,574 inhabitants, on a territory of 252½ kiliometres, in 17 communes. N. lat. 45° 46′. E. long. 0° 28′.

ROCHELLE, La, a fea-port town of France, and principal place of a diftrict, in the department of the Lower Charente, with a good harbour. The place contains in the E. and W. divifions 18,000 inhabitants: the canton of the former has 14,636, on a territory of 77½ kiliometres, in 7 communes; and that of the latter 13,642 inhabitants, on a territory of 75 kiliometres, in 7 communes. In the middle age it was called Rupella and Portus Santonum: it was, before the revolution, the capital of Aunis, and a bifhop's fee. It was the birth-place of Reaumur, Defaguliers, &c. The town is confiderable, having an academy of fciences eftablifhed in 1732, an hofpital, and two fuburbs. It is regularly built in a marfhy fituation; the entrance of its harbour is narrow, and is defended by two towers. The circumference of its ramparts is about three miles. Its manufactures are delft ware, glafs, refining of fugar, &c. and its commerce, particularly to the French colonies in Africa and America, was, before the laft war, very confiderable. In 1361 Rochelle was given up to the Englifh. In the 16th century, the inhabitants joined in the reformation, fortified the town, and held out a fiege. In 1622 Louis XIII. in order to compel them to furrender, ordered Fort Louis to be conftructed at the entrance of the harbour, and in 1628 a mole was raifed which furrounded it, in order to prevent the town from receiving any fuccour by fea. The befieged were at length compelled by famine to furrender; in confequence of which it was deprived of its privileges and its fortifications demolifhed; but in the reign of Louis XIV. they were repaired by Vauban. N. lat. 46° 9′. W. long. 1° 3′.

Rochelle, *New*, a town of America, belonging to the ftate of New York, in Long ifland found; 6 miles N.N.E. of Weft Chefter. N. lat. 41° 54′. W. long. 73° 46′.

Rochelle *Salt*. See Rupellensis *Sal*.

ROCHEMAURE, in *Geography*, a town of France, in the department of the Ardeche, and chief place of a canton, in the diftrict of Privas; 9 miles S.E. of Privas. The place contains 1110, and the canton 4372 inhabitants, on a territory of 107½ kiliometres, in 8 communes.

ROCHESTER, a city in the hundred of Rochefter, lathe of Aylesford, and county of Kent, England, is fituated on an angle of land formed by the current of the river Medway, at the diftance of 8½ miles N. from Maidftone, and 29 miles E. by S. from London. According to the population cenfus of 1811, it contained, in conjunction with the adjoining town of Chatham, 3838 houfes, and 21,722 inhabitants.

Hiftorical Events.—Rochefter is faid to have been originally founded by the ancient Britons, who gave it the appellation of Dwr-bryf, which fignifies "a fwift ftream," in allufion to the rapidity of the Medway at this part of its courfe. When the Romans eftablifhed themfelves in Albion, it became one of their ftipendiary ftations, and was denominated by them Durobrivæ, or Durobrivis, afterwards contracted to Roibis. Thefe facts are evidenced by the Itinerary of Antoninus, as alfo by the Peutingerian Tables, and receive ftrong confirmation from the frequent difcoveries of Roman remains, which have been made at different periods within the area of the prefent city. During the government of that people, however, its hiftory is completely barren; nor did it attain any celebrity for more than a century after the arrival of the Saxons, who altered its name to Hrof-ceafter, whence its modern defignation is derived. Ethelbert, king of Kent, who was converted to the Chriftian faith A.D. 597, firft erected a church here, and conftituted the town a bifhop's fee. Still, however, it was regarded chiefly as a military ftation, and hence is ftyled by Bede "a caftle of the Kentifh men." In the year 676, Ethelred, king of Mercia, pillaged Rochefter, as did Ceadwalla, king of Weffex, within a few years of the fame period. The Danifh invaders likewife frequently plundered it, particularly in 839, when they facked the city and committed many cruelties. In 885 they befieged it again, but were effectually kept in check by the inhabitants, till the great Alfred arrived with his army, and drove them back to their fhips. About a century afterwards, Ethelred, king of Kent, met with a fimilar reception, and being fruftrated in his attempt upon the city, gratified his vengeance by laying wafte all the lands belonging to the fee. But thefe fieges were trivial to what the inhabitants fuffered from the Danes in 999, when the city was pillaged to the uttermoft, and all the inhabitants who remained in it were put to death. From that period Rochefter feems to have continued moftly in poffeffion of the Danes till the death of Canute the Great. In the time of Edward the Confeffor it belonged to the crown; and as part of the royal domains was feized by the Conqueror, by whom it was granted to his half-brother, Odo, bifhop of Baieux, on whofe difgrace, in 1083, it reverted to the monarch. Henry I. farmed it out to the citizens at the yearly rent of 20*l*., which was paid by the præpofitus or bailiff. He alfo granted to bifhop Gundulph, and to the church of Rochefter, an annual fair to be held on the eve and day of St. Paulinus, together with various rights and immunities. In the fame reign, on the 11th of May 1130, while Henry himfelf, the archbifhop of Canterbury, and other prelates, and many of the nobility were at Rochefter, moft of its buildings were confumed by fire. A fimilar misfortune befell it in the year 1137, and again in April 1379. Thefe feveral calamities retarded the profperity of the city; and the inteftine commotions happening foon afterwards, it did not regain any great degree of confequence till the reign of Henry III. This monarch repaired, or rebuilt, the city walls, and invefted it befides with a deep foffe. In 1251 the fame prince held a folemn tournament here, which was attended by moft of the Englifh nobility, and by a great concourfe of foreign knights. In the time of the wars between York and Lancaster, Rochester suffered much from the arms of the contending parties, and was more than once visited by the plague. Henry VIII. was twice here, once in company with the emperor Charles V. and again when he came hither to meet his consort, Ann of Cleves. During the reign of queen Mary several individuals suffered martyrdom here for their religious opinions. Queen Elizabeth, her successor, lodged upwards of a week at Rochester; and this was the first city in which Charles II. was publicly received, after his restoration to the throne in 1660. In 1665, Rochester was visited with the same plague, which committed such dreadful havock among the inhabitants of the metropolis. From that period nothing worthy of historical record has occurred.

Municipal Government.—Rochester probably possessed a corporate community even in the time of the Saxons, but its nature cannot now be precisely ascertained. The first Norman monarch who granted to the inhabitants any privileges by charter, was Henry II. This prince gave them the city "in fee, or perpetual ferm, for 20*l.* sterling *per annum*, to hold of him and his heirs for ever, with all the appurtenances, liberties, and free customs; and that they should have a guild merchant, and several other privileges and immunities." These advantages were still further increased by Richard I., who directed his writ to the bailiff, and the whole hundred of Rochester, ordaining, "that no one, except his servants, should purchase victuals in the city till the monks of St. Andrew had been first served." This right was afterwards so far extended, that even the servants of the monarch were forbidden to make a prior purchase; and the monks continued to enjoy the privilege thus given till the dissolution. Henry III. not only confirmed to the citizens all former grants, but remitted to them a portion of their annual fee-ferm, and declared they were to be "exempt from toll, lastage, stallage, and murage, throughout England and the sea-ports, and should have a free market within their city, and the return of all writs whatsoever." These privileges were renewed by Richard II. in 1378; by Henry VI. in 1438 and 1446; and by Edward IV., who further extended the bounds of the city, and ordained that the corporation should be styled "the mayor and citizens of Rochester." Henry VIII. was the next monarch who confirmed the privileges of Rochester; and his successors, to the time of Charles I., severally did the same. By the last mentioned monarch, the corporation was made to consist of "a mayor, twelve aldermen, (of which latter number the mayor was to be one,) twelve assistants, or common council-men, a recorder and town-clerk, two chamberlains, a principal serjeant at mace, a water-bailiff, and other inferior officers." Under this charter the city is now governed; and by virtue of it, the mayor is elected annually on the Monday previous to St. Matthew's day. The mayor and citizens hold a court of admiralty once a-year, for regulating the oyster-fishery in those creeks and branches of the river Medway which are within their jurisdiction. Here are also held the county assises, alternately with Maidstone; likewise the petty sessions for the north division of the lathe of Aylesford. The market-day is Friday, weekly; and there are two annual fairs, on the 30th of May and the 11th of December. Rochester sends two members to parliament, and has done so ever since the 23d year of Edward I. The right of election is vested in the freemen, who are about 630 in number. Many of the representatives have been naval officers, distinguished for brilliant achievements in the cause of their country.

Public Structures.—The buildings of a public description that chiefly demand attention, are the castle, the cathedral, the churches, the town-hall, and the bridge, each of which is entitled to separate notice.

The present castle of Rochester was one of those founded by William the Conqueror, to keep in awe his newly acquired subjects; but there seems every reason to believe that a prior one existed on the same scite, as frequent mention is made of the "Castrum Roffense" in the Saxon annals. The Conqueror, indeed, is said, by some historians, to have only repaired the former structure. Whatever it might be, however, he committed to Odo, bishop of Baieux, the execution of the new work, and the custody of the fortress; but that prelate proving unworthy of his trust, he was afterwards seized, and sent as a prisoner to the castle of Rouen, in Normandy, where he continued till the accession of William Rufus, who restored him to his dignities and possessions; a favour which he shortly after ungratefully repaid, by raising an insurrection in favour of the king's brother, Robert, duke of Normandy. Rufus, upon this, laid siege to Rochester castle, and having forced the garrison to surrender, banished the bishop from his dominions. During this siege the buildings sustained considerable injury, which the king enjoined bishop Gundulph and the prior of Rochester to repair, perhaps on account of their having shewn some attachment to the rebellious cause. Gundulph accordingly not only renovated the walls, but laid the foundation of the great square tower, which yet perpetuates his name, and entitles him to rank among the most eminent architects of Anglo-Norman times. About twenty years after this prelate's death, the custody of Rochester castle was granted to William Corboyl, then archbishop of Canterbury, and to his successors; but this grant was resumed by Henry II. on his quarrel with the celebrated Thomas à Becket. In the reign of king John, this fortress was seized and garrisoned by the rebellious barons, and having been besieged by the king, was taken, after a resistance of three months. Lewis, the dauphin of France, who came over to the assistance of the nobles, however, reduced it again in subjection to the barons, by whom it was held till the accession of Henry III., when it was surrendered to the crown, and granted for life to Hubert de Burgh, earl of Kent, and justiciary of England, who was commanded to repair the buildings. The king's favour afterwards declining, Hubert was dispossessed; and Stephen de Segrave, John de Cobham, Nicholas de Moels, William de Say, and Robert Waleran, were, in succession, appointed governors of the castles of Rochester and Canterbury. About the year 1264, after the king had occasioned much discontent among his barons, by his refusal to comply with the statutes of Oxford, he greatly strengthened the fortifications of this castle, and furnished it with every thing necessary to sustain a siege. Roger de Leybourne, who was constituted chief constable, had under him John, earl of Warren and Surrey, and other noblemen. Shortly afterwards, Simon de Montfort, chief of the associated barons, marched hither to besiege the castle, on which occasion several severe contests happened in this vicinity. Montfort succeeded in getting possession of the city, but failed in his attacks upon the castle, the siege of which he was eventually compelled to abandon. After this event, little more occurs in the history of this castle, than the names of those to whom its custody has been entrusted. Edward IV. was the last monarch who paid any attention to the state of its buildings, he having "repaired the walls, both of the castle and city, about the eleventh year of his reign." Since then they have been alike neglected, and have gradually fallen to their present state of decay. Several

veral estates in this county hold of Rochester castle by the ancient tenure of castle-guard. On St. Andrew's day, old style, a banner is hung out at the house of the receiver of rents; and every tenant who does not then discharge his arrears, is liable to have his rent doubled, on the return of every tide of the Medway, till the whole is discharged.

Rochester castle stands at the south-western angle of the city, on an eminence rising abruptly from the river Medway, which preserves it from attack on the west, whilst its south, east, and north sides are defended by a broad and deep ditch. The outward walls, which formed an irregular parellelogram, 300 feet in length, were strengthened by several square and round towers; but these, as well as the walls themselves, are now verging to a state of ruin. The most perfect are on the east side, and at the south-east angle; that at the angle was semicircular, and rose boldly from the ditch, which is now almost filled up. The principal entrance was on the north-east, and was defended by a tower-gateway, with outworks at the sides. The keep, or great tower, already mentioned as founded by bishop Gundulph, occupies the south-east portion of the castle area. It is of a quadrangular form, 70 feet square at the base, and is so planned, that its angles correspond with the four cardinal points of the compass. The walls on the outside are built inclining inwards from the base, and in general measure twelve or thirteen feet thick. Near the centre, on each side, is a pilaster buttress, ascending from the base to the roof; and at the angles are projecting towers, three of them square, and the fourth semi-circular, which rise twelve feet above the roof. The entrance to this part of the castle was most difficult and intricate, and displayed much architectural ingenuity. "The first ascent was by a flight of twelve steps, leading to an arched gate and covered way; beneath which a flight of seven steps led forward to a draw-bridge, that connected with the arched gateway of the entrance tower; this opened into a vestibule, between which and the keep there were no other avenues of communication than by a third arched passage in the thickness of the wall. This latter, being the immediate inlet to the body of the keep, was defended by a massive gate and portcullis, the hinges and grooves of which yet remain; and in the roof are openings for the purpose of showering down destruction on the assailants."

The interior of the keep is divided into two nearly equal parts by a strong wall, with arched door-ways of communication on each floor. In the centre of this wall is a circular hole for a well of considerable depth, neatly wrought, and open from the bottom to the very top of the keep. This tower consisted of three floors, independent of the basement story; but these floors were removed when the castle was dismantled in the reign of James I. The lowest apartments were two dark and gloomy rooms, in which the garrison stores were probably deposited. At the north-east angle is a circular winding staircase, which ascends to the summit; and near it is a small arched doorway, leading to a narrow vaulted apartment underneath the little tower, supposed to have been a dungeon for criminals. The first floor appears to have been allotted for the accommodation of servants and inferior attendants; the second floor contained the state apartments; and the third was designed for a chapel, and for bed-rooms for the family. The roof of the keep is now entirely destroyed; but it most probably consisted of a platform on a level with the top of the wall within the parapet; the latter was about five feet high, and had embrasures about two feet wide. The four towers at the angles were raised another story, and had also small platforms, with parapets and embrasures. These, as well as the first-mentioned platform, commanded a very extensive view over the whole city, the river Medway, and the adjacent country; so that no enemy could approach within the distance of several miles without being discovered.

Cathedral and Priory.—The see of Rochester, though one of the smallest in England, derives considerable consequence from its antiquity. It was established, and a church built, as early as the year 600, by Ethelbert, king of Kent; who, at the same time, attached to the church a priory for secular canons, and dedicated it to the honour of St. Andrew. The first prelate of this see was Justus, a man of eminent learning and integrity, who had been sent from Rome to assist in the conversion of the Saxons to Christianity. He was installed by St. Augustine, the apostle of Britain, and first archbishop of Canterbury, in the year 604, from which period the episcopal dignity of Rochester has been held in succession by ninety-four bishops, many of whom were eminent for their talents, piety, benevolence, and extensive acquirements. Paulinus, the third bishop, was reputed a saint, and his memory was held in high estimation during several centuries. Ithamar, the fourth bishop, was the first Englishman who held a prelacy in Britain. Tobias, the ninth bishop, is highly extolled by Bede, and other writers, for his literary attainments, and particularly for his intimate knowledge of the Greek, Latin, and Saxon languages. These three prelates were all interred in the ancient cathedral, and are the only bishops known to have been so honoured of all the twenty-five who presided previous to the Conquest. At the era of that event the see appears to have been fast verging to entire dissolution; but its impending fate was soon after arrested by Lanfranc, archbishop of Canterbury, who raised Ernost, a monk of Bec, in Normandy, to the bishopric, for the avowed purpose of improving its affairs. That bishop, however, died in the first year of his prelacy, and was succeeded by Gundulph, another monk of Bec, who proved a most active agent in the re-establishment of the see. He not only recovered the alienated estates of the bishopric, but, pulling down the old cathedral, he erected a spacious and magnificent edifice in its stead. He likewise rebuilt the priory, and placed therein twenty monks of the order of St. Benedict, upon whom he bestowed extensive privileges and possessions. Gundulph had for his successor Ernulph, abbot of Peterborough; who composed the "Textus Roffensis," a work replete with information on matters of antiquity. He was likewise distinguished as an architect, having, besides his works at Canterbury and Peterborough, built the dormitory, and refectory, and the chapter-house at Rochester. He was succeeded by John, archdeacon of Canterbury, in whose time the monastery was unfortunately destroyed by fire; an event which occasioned the temporary dispersion of the monks. On the re-erection of the priory, however, they were again collected, and, through the exertions of bishop Ascelin, recovered such of their possessions as had been alienated by the cupidity of his predecessor, John, a Norman bishop, who had obtained this see on the death of his namesake above-mentioned. Ascelin's successor was Walter, brother to Theobald, archbishop of Canterbury, who was elected by the monks of Rochester. This bishop assisted at the coronation of Henry, eldest son of Henry III., on which account he was excommunicated by Thomas à Becket. During his prelacy, the cathedral sustained heavy damages by fire. This bishop died in 1182, and was succeeded by bishop Waleran, who, as well as his successor, Gilbert de Granville, was constantly engaged in litigations with the prior and monks, which were at length settled by solemn adjudication in the year 1207: notwithstanding this, however, the monks thought proper to display their hatred to bishop Granville, by refusing burial to his remains in the cathedral;

and

and on being fruſtrated in their reſiſtance, they haſtened the interment, that it might take place before the interdict which the nation then lay under was removed. This prelate rebuilt the biſhop's palace, which had been burnt down by the fire above noticed; and alſo erected a cloiſter of ſtone for the monks: but the re-edification of the cathedral made very ſlow progreſs, as we find it remained unfiniſhed till the year 1240, when Richard de Wendover held the biſhopric. He had been elected to the ſee by the monks, in oppoſition to the claims of patronage maintained by Edmund, archbiſhop of Canterbury, who appealed on the ſubject to the court of Rome, but without ſucceſs. On his death, in 1250, Laurence de St. Martin was advanced to the epiſcopal dignity, and held it till 1274, when he died, and gave place to Walter de Merton, to whom his country is indebted for the foundation of Merton college, at Oxford, which is conſidered to be the "firſt literary community in this kingdom that had the ſanction of a royal charter." His immediate ſucceſſors were, John de Bradfield, who died in 1283; Thomas de Ingelthorpe, who died in 1291; and Thomas de Woldham, who died in 1316. On the deceaſe of the latter, Hamo de Hethe obtained the biſhopric. He was a very active prelate, and conferred conſiderable benefits on the priory and the church. His ſucceſſor was John de Shepey, who had been a monk in the priory, and was a man of great learning and abilities. Some ſermons attributed to him are ſtill extant in New college, Oxford, and there are in the king's library two MSS. of his on legal ſubjects. He died in 1360, when William Witteſley was conſecrated biſhop, but was ſoon afterwards tranſlated to the ſee of Worceſter. Thomas Trilleck next obtained the biſhopric, and after him Thomas Brinton, confeſſor to king Richard II. and the fifty-firſt biſhop of this ſee. Richard Young, the third in ſucceſſion after him, met with great difficulties in obtaining poſſeſſion of his biſhopric, owing to the death, firſt of pope Boniface, by whoſe mandate he was tranſlated from Bangor, and afterwards of his ſucceſſor, pope Innocent. At length, however, he was inſtalled, in May 1407, and held the ſee till 1418, when he was removed by death, and was ſucceeded by John Kemp, who ſubſequently became biſhop of Chicheſter and of London, and archbiſhop of York and of Canterbury. His ſucceſſor was the learned John Langdon, who was diſtinguiſhed for his extenſive knowledge of hiſtory and antiquities, and was author of a chronicle of England. On his death, which happened in 1434, while he was attending the council at Baſil on the part of Henry VI., Thomas Brown, D.D. was elected to the vacant ſee. John Lowe, the fifty-ninth biſhop, was provincial of the order of Auguſtine friars. He held the biſhopric twenty-three years, and is ſuppoſed to have rebuilt the palace at Rocheſter. He died in 1467, and was ſucceeded by Thomas de Rotherham, ſubſequently biſhop of Lincoln, lord chancellor, and archbiſhop of York. The next biſhop of note was the unfortunate John Fiſher, who was beheaded in 1535, by order of Henry VIII. for maintaining the ſupremacy of the pope in eccleſiaſtical affairs. His ſucceſſor was John Hilſey, D.D. a controverſial writer of conſiderable eminence, who died in 1538. Two years afterwards, the priory here was ſurrendered to the king; and in 1542 a new foundation charter was granted, by which a collegiate body was eſtabliſhed in the church, to conſiſt of a "dean, ſix prebendaries, ſix minor canons, a deacon and ſub-deacon, ſix lay clerks, a maſter of the choriſters, eight choriſters, one grammar maſter, twenty ſcholars, two ſubſacriſts, and ſix poor bedeſmen," beſides inferior officers. In the new eſtabliſhment, Walter Phillips, the prior of the late convent, was made firſt dean of the cathedral; and Nicholas Heath, D.D. was the firſt reformed biſhop of the ſee. From his time to the preſent period, twenty-five biſhops have been advanced to the epiſcopal dignity of Rocheſter, among whom the moſt noted were the pious Ridley, who ſuffered along with biſhop Latimer at Oxford; Francis Atterbury, who was exiled for treaſonable correſpondence in 1723; and the late biſhop Horſley, one of the moſt erudite divines the church of England can boaſt of.

The ſituation of Rocheſter cathedral is at a ſhort diſtance ſouth from the High-ſtreet, and eaſt from the caſtle. It is of a cruciform ſhape, and is divided into a nave, aiſles, two tranſepts, and a choir, with a low tower and ſpire riſing at the interſection of the nave and great tranſept. This edifice evidently appears, from the different ſtyles of its architecture, to have been the work of different eras. The chief part of the nave and weſt front diſplay the maſſive character of the early Norman age. The weſt entrance is particularly deſerving of attention, and muſt have been, when entire, a moſt magnificent piece of workmanſhip. The arch which forms this entrance is ſemi-circular; and is ſupported on each ſide by ſeveral columns, two of which are cut into ſtatues, repreſenting king Henry I. and his queen Matilda, the patrons of the founder, biſhop Gundulph. The capitals of all the columns are compoſed of wreathed foliage, mixed with the heads of birds, and other animals. The lintel of the door, immediately under the arch, exhibits a figure, probably deſigned to repreſent the Saviour, attended by angels, and the attributes of the four evangeliſts. The mouldings of the arch, and the tranſomſtone, are charged with varied ſculpture. The remaining parts of the cathedral are comparatively plain in their exterior. Entering the nave by the weſtern door, the maſſive Norman ſtyle is conſpicuous in the firſt five columns, and half of the ſixth, on each ſide, all of them ſupporting circular arches, decorated with zigzag mouldings, above which is a ſeries of ſmaller arches, having over them arches, correſponding, both in ſize and ornament, with the larger ones beneath. Still higher are two ranges of obtuſe-pointed windows, each divided into three lights. The roof is of timber, with knees ſupported on corbels, the fronts of which are carved into figures of angels ſuſtaining ſhields, on which are painted the arms of the city, the ſee, and the priory of Rocheſter, as well as thoſe of the archbiſhopric and cathedral of Canterbury. The weſt wall appears to have been divided into ranges of niches, ſome of them crowned with arches, having plain and billetted mouldings, ſupported on ſmall three-quarter columns, with fluted capitals: others, having neither pillar nor capital, are decorated with zigzag mouldings, continued down the ſides of the receſs. The alterations made in Gundulph's deſign by the introduction of the preſent weſt window, are clearly to be ſeen in the abrupt termination of the different ranges of theſe niches, ſome of them having been cut through the centre. The two eaſternmoſt arches of the nave, on each ſide, exhibit a very different ſtyle of architecture to the preceding; theſe being in the pointed ſtyle, with deep grooved mouldings, riſing from cluſters of ſlender columns. The great tower is ſupported by four obtuſely-pointed arches, reſting on pieces of ſolid maſonry, which are environed by ſlender columns of Petworth marble. The weſt tranſept is in the pointed ſtyle; but, from having been erected at different periods, the architecture is ſomewhat diſſimilar. In the upper part of the north end is a triforium, behind which are lancet windows, each having a ſcreen in front, divided into three arches of unequal height; the vaulting is of ſtone, groined, with a plain grooved moulding: ſeveral of the leſſer pillars and impoſts of arches are ſupported by corbel

corbel heads, chiefly of monks, which diſplay a degree of ſtrength of feature and expreſſion, evincing an advanced ſtate of the art of deſign. The ſouth end of this tranſept principally varies from the other in its ſuperior lightneſs: like that, it has a triforium in the upper ſtory, with lancet windows behind ſcreens. The roof is of timber frame-work, in imitation of vaulting. Under a large arch, on the weſt ſide, is an opening into the chapel of St. Mary, a ſtructure probably erected in the reign of Henry VII. It meaſures forty-five feet in length, and thirty-five in breadth, and exhibits on its ſouth and weſt ſides five ſpacious windows, under obtuſe arches, and divided by mullions. In this chapel the conſiſtory court of the dioceſe is held; and many of the biſhops are buried within it. The choir is entered from the nave by an aſcent of ten ſteps, leading through an arch, in an unornamented ſtone ſcreen, which ſuſtains the organ and organ gallery. The ſtyle of building in this part of the church is uniform in its character; neat, lofty, and ſolid, though not heavy. The whole conſiſts of two tiers of pointed arches, decorated with grooved mouldings, and reſting upon ſlender columns of Petworth marble, with plain capitals. All the windows are lancet-ſhaped, and are formed of ſingle lights, except thoſe neareſt to the altar, which are divided by mullions, and appear to have been formerly filled with painted glaſs. The eaſt tranſept of the church has two aiſles, over which are apartments, (aſcended to by circular winding ſtaircaſes in the wall,) in which were depoſited the veſtments, and ſacred utenſils appertaining to the altars and ſhrines of St. William, St. Paulinus, and others, in the choir. The northern diviſion of this tranſept is ſtill denominated St. William's chapel, from the popular ſaint ſo named, whoſe remains were there enſhrined; and to the number and value of the oblations made at whoſe altar the preſent choir owes its origin. The crypt, which extends beneath the two laſt mentioned portions of the church, has been thought by ſome to be of Norman ſtructure; but more intelligent antiquaries aſſign it to the architect of the choir and upper tranſept, which were built by William de Hoo, in the reign of Henry III. The pointed arches in the windows and entrances are evidences of the truth. Running parallel with the ſouth ſide of the choir is the chapter-houſe, which contains the library, and is entered by a richly ſculptured door-way. In a large hollow between the inner mouldings is a range of human heads and flowers, in alternate ſucceſſion. Beyond theſe, and riſing above each other in detached receſſes to the centre of the arch, are ſix whole length figures, two of which are conjectured to repreſent Henry I. and his queen Matilda, and the others the biſhops Gundulph, Ernulph, Laurence de St. Martin, and Hamo de Hethe, to the laſt of whom the erection of this door-way is attributed. Over theſe figures are ſmaller ones of angels, two on each ſide, apparently ſinging praiſes and glorifying the Saviour, who is repreſented ſtanding naked under a canopy in the centre of the arch. The library, beſides an excellent collection of printed books, contains ſeveral curious and valuable MSS. among which are the original copies of the Textus Roffenſis and the Cuſtumale Roffenſe.

Rocheſter cathedral extends in length from eaſt to weſt 306 feet, of which 150 are included in the nave and 156 in the choir. The breadth of the nave, with the ſide aiſles, is 75 feet, and that of the choir is nearly the ſame. The weſtern tranſept meaſures 122 feet, and the eaſtern one 90 feet long. The width of the weſt front is 94 feet, and the height of the great tower 156 feet. Several of the monuments in this church are curious, both from their antiquity and their workmanſhip. In the ſouth of the choir is a plain ſtone cheſt, ſuppoſed to contain the remains of biſhop Gundulph, and near it is another, on the top of which is ſculptured, in high relief, the figure of a biſhop in pontificalibus, deſigned to repreſent Thomas de Ingelthorpe, the 44th biſhop of the ſee. A third ſtone cheſt, of a ſimilar deſcription, is thought to be the tomb of biſhop Laurence de St. Martin, who obtained the canonization of St. William. All theſe cheſts are conſtructed of Petworth marble: ſeveral others of them are diſperſed throughout the cathedral. On an altar-tomb, beneath a double pointed arched canopy, variouſly ornamented, is a full-length portraiture of biſhop Walter de Merton, whoſe remains are depoſited beneath. Another altar-tomb, in St. William's chapel, commemorates biſhop Lowe; and near it are the monuments of biſhop John Warner and two others of his family. On the north ſide of St. Edmund's chapel, entering into the crypt, is a headleſs epiſcopal figure, ſuppoſed to have repreſented biſhop John de Bradfield, who died in the year 1283; and in the narrow aiſle leading to St. William's chapel, is a monument attributed to biſhop Hamo de Hethe. The other perſons who have monuments here are, Richard Watts, eſq. recorder of the city, who had the honour of entertaining queen Elizabeth at his ſeat called Satis; John, lord Henniker, and his lady, the former of whom died in 1803, and the latter in 1792; ſir Richard Head, and the Rev. Samuel Denne, the learned compiler of the "Memorials" of this cathedral, inſerted in the Cuſtumale Roffenſe.

Adjoining to the cathedral, on the ſouth, are the remains of the chapter-houſe and cloiſter belonging to the priory, which exhibit a very beautiful ſeries of Norman arches and ornaments, but in a ſtate of great dilapidation. The door-way of the chapter-houſe lies under a richly ornamented arch, having on each another of equal elegance, ſupported on ſhort thick columns with flowered and figured capitals, and diſplaying an unuſual variety of mouldings, zigzag, quatrefoil, and billeted. The mouldings of the ſouthernmoſt arch unite with thoſe of a ſmaller arch, belonging to the cloiſter, and theſe again with the mouldings of a ſecond highly enriched door-way, the ſpace between the tranſom of which and the inner moulding exhibits the mutilated remains of an hiſtorical ſculpture. An arch, riſing from two three-quarter columns, and interſected by two others ſpringing from a central column, connects this door-way with a third, likewiſe rich in ornaments, though leſs ſo than the others. Gundulph's tower ſtands on the north ſide of the cathedral between the tranſepts. The maſonry of this building is extremely ſolid, the walls being ten feet in thickneſs, though the entire building is only 40 feet ſquare. The angles are ſtrengthened by pilaſter buttreſſes, and the windows have ſemicircular arches. The precincts of this cathedral appear to have occupied nearly half the area contained within the walls of the city. There were three gates leading into them, *viz.* the Cemetery gate, St. William's gate, and the Prior's gate; the firſt and laſt of which are ſtill remaining. Only a few traces of the offices of the monaſtery now exiſt ſeparately, but conſiderable parts of their walls are incorporated into other buildings. The porter's lodge conſiſts of a ſmall embattled tower, with a pointed archway in the centre. The ſcite of the biſhop's palace, erected by Gundulph, is occupied by a range of modern houſes; and on that of the prior's lodge ſtands the preſent deanery.

Rocheſter had formerly four churches, beſides the cathedral, which were dedicated to St. Nicholas, St. Margaret, St. Clement, and St. Mary, but the laſt is now totally demoliſhed, and St. Clement's is only to be diſcovered as forming part of ſome houſes on the north ſide of the High-ſtreet, near the bridge. The church of St. Nicholas was built in 1421, and conſiſts of a nave, aiſles, and a chancel, with an embattled tower at the north-weſt angle. The

windows

windows are large and pointed; each being divided into three lights, with crockets above. St. Margaret's church is only remarkable for its fine situation, on a lofty eminence, to the southward of the High-street. The town-hall stands on the north side of the same street, and was erected about the year 1687. In the lower division of this structure is the city prison; and in the higher, the hall, a large and lofty room, containing full-length portraits of king William and queen Anne, and of several persons of distinction, connected with the city. The bridge over the Medway, here, was constructed in the reign of Richard II. by sir Robert Knolles, and John, third baron de Cobham, who not only defrayed the expence of its erection, but also left a considerable estate for its repair. For height and strength, this structure is allowed to be superior to any in England, with the exception of the bridges in the metropolis. It measures 560 in length, but is only 14 feet broad between the parapets. Its arches are eleven in number, but of these, three have been rebuilt in modern times.

The charitable institutions in this city are, St. Catharine's hospital, a grammar-school, an alms-house for the relief of poor travellers, and a free-school. The hospital was founded and endowed in 1316, by Simond Potyn, who represented this city in seven parliaments, for the maintenance of twelve poor people, who have an allowance of coal, candle, and money, annually.

The grammar-school was founded by king Henry VIII., for twenty scholars, to be called "King's scholars," with an upper and under master; together with four exhibitions to the universities. The alms-house, which stands on the north side of the High-street, was built in the reign of queen Elizabeth, the proprietor of Satis, before-mentioned, who left estates for its support. The founder of the free-school was sir Joseph Williamson, knt., who died in 1701, and bequeathed 5000*l.* to be expended in the erection of a suitable building, and in the purchase of lands and tenements to maintain two masters, and defray the incidental expences of the establishment. The History and Antiquities of Rochester and its Environs, &c. 8vo. Rochester, 1772. The History and Topographical Survey of the County of Kent, by Edward Hasted, F. R. S. and S. A., Canterbury, 4 vols. folio, 1778, reprinted, &c. in 8vo. 1797. History of Kent, by John Harris, D. D. F. R. S. folio, Lond. 1719. Registrum Roffense, and Custumale Roffense, by John Thorpe, D. D. A New Topographical, Historical, and Commercial Survey of Kent, by Charles Seymour, 8vo. 1776. A Topographic Survey of the County of Kent, by Richard Kilburn, 4to. Lond. 1759. Beauties of England, &c. by E. W. Brayley, vol. viii.

Rochester, a township of America, in the county of Windsor and state of Vermont; containing 911 inhabitants.—Also, a township of Plymouth county, Massachusetts, 52 miles S. of Boston; containing 2954 inhabitants.—Also, a township in Strafford county, New Hampshire, on the W. side of the N. branch of Piscataqua river; 22 miles N.W. of Portsmouth; incorporated in 1722, and containing 2118 inhabitants. One term of the court of common pleas is held annually in this town.—Also, a township in Ulster county, New York, extending W. to Delaware river; about 12 miles W. of Esopus.—Also, a township of Upper Canada, on lake St. Clair, between Tilbury and Maidstone.

ROCHET, or Rocket, a lawn garment, worn by bishops and abbots, resembling a surplice, except in this, that the sleeves are gathered at the wrists; whereas the surplice is quite open. This was one of the sacerdotal vestments; and in that respect differed from a surplice in that it had no sleeves.

Menage derives the word from the Latin *rochettus*, a diminutive of *rocchus*; used in writers of the lower Latin for *tunica*, and formed originally from the German *rok*. The regular canons of St. Augustine also wear rochets under their copes.

Rochets also denote the mantles worn on days of ceremony, by the peers sitting in the English parliament.

Those of viscounts have two bands, or borders, and a half; those of earls, three; those of marquises, three and a half; and those of dukes, four.

Rochet, the name given to a fish, otherwise called *cuculus*, and *red-gurnard*. See Gurnard.

ROCHETTA, in the *Glass Trade*, another name for polverine.

Rochetta, in *Geography*, a town of France, in the department of the Maritime Alps; 16 miles N.E. of Nice.

ROCHETTE, La, a town of France, in the department of Mont Blanc, and chief place of a canton, in the district of Chambery, on the Galon; 10 miles S. E. of Chambery. The place contains 855, and the canton 9092 inhabitants, on a territory of 85 kiliometres, in 18 communes.—Also, a town of France, in the department of the Forests; 4 miles S.S.E. of Dierich.

ROCHFORD, a market-town, in a hundred of the same name, and county of Essex, England, is seated on the bank of a small rivulet, called the Broomhill, at the distance of 16 miles S.E. of Chelmsford, and 39 miles E. of London. The petty sessions for Rochford division of Essex are held here. The privilege of holding markets was granted to this town by king Henry III., and confirmed by Edward I. The market-house is a mean structure of timber. The market-day is Thursday, weekly; and there are annual fairs on Easter Tuesday, and the Wednesday next after the 29th of September. None of the buildings in the town are worthy of notice. The parish church, which stands about half a mile to the westward, is a plain edifice, with a lofty brick tower at the west end. Near it stands Rochford-hall, the manor-house. It is a large and stately building, for some time successively the seat and residence of the Rochfords, the Botelers, earls of Ormond and Wiltshire, sir Thomas Bullen, and Richard, lord Riche. This town gives the title of an earl to the family of Nassau. The parish contains, according to the population returns of 1811, 190 houses, and 1214 inhabitants.

The manor of this town was held by Suene at the time of the Domesday survey; and now is vested in the Long family of Wanstead park. A singular custom, called the Lawless-court, appertains to this manor; and is said to have originated in a conspiracy against the lord of the manor; but detecting it, he ordained as a punishment, that the tenants should ever afterwards assemble, at a certain hour of the night, on the same spot where the conspirators met, and do homage for their lands. The place is called King's-hill, where they were to assemble at midnight on the first Wednesday after Michaelmas day, and transact all their business in whispers, and record the minutes with coal, instead of pen and ink. This ridiculous custom was, till lately, continued. About four miles S.W. is Hadleigh Castle, consisting of some bold ruins; and near it is Southend, a noted watering-place. See Southend.

Raleigh, in this vicinity, though now an inconsiderable village, was formerly a market-town, and the head of the barony of Suene, a powerful Anglo-Saxon Dane, who is reported to have built a castle here, of which some important earth-works still remain. These consist of a mount, of an oval shape at the base, which is environed by a double ditch and rampart, and is further secured by additional

tional embankments on the east side. The principal ditch is nearly fifty feet wide, and appears to have been originally of great depth. The church of Raleigh is a handsome building, in the pointed style of architecture, and contains a very ancient tomb, of beautiful "Gothic" workmanship, but without any inscription to determine the name of the person it was designed to commemorate.

About three miles to the N.W. of Rochford, on the summit of a hill, stands the remains of a very ancient church, supposed to be the same which Simeon Dunelmensis states to have been founded by Canute and Turkill in memory of the victory obtained by them over king Edmund Ironside, within the adjoining parish of Assingdon or Ashingdon. The tower is a low massive octagon, supported by strong buttresses; and in the interior are five thick columns with slightly ornamented capitals, dividing the nave from a north aisle. At Canewdon, to the eastward of Ashingdon, is an ancient encampment, of an oblong form, which probable conjecture attributes to the Danes. Its area contains about six acres of ground. The History and Antiquities of the County of Essex, by Philip Morant, M.A. 2 vols. folio, 1768, London. Beauties of England and Wales, vol. v. by E. W. Brayley and John Britton.

ROCHLITZ, a town of Saxony, in the circle of Leipsic, on the Mulda; containing three churches and a citadel, and a manufacture of cloth, stuffs, and linen; 20 miles S.E. of Leipsic. N. lat. 51° 8′. E. long. 12° 41′.

ROCHOIS, La, in *Biography*, one of the first singers in Lulli's famous operas, whose abilities were not very stupendous, if we may judge of them by the songs which he had to execute. Good voices and good action seem to have constituted the principal merit of this singer. Many of them were brought from remote provinces of the kingdom, before they had any knowledge of music, and were taught their parts by Lulli himself and his father-in-law, Lambert, merely by the ear. But Lulli not only taught his vocal performers to sing, but to act; and sometimes gave instructions even to the dancers. The celebrated La Rochois, we find, had no other master in singing than the opera composer, Lulli. Hist. de la Mus. par Bonnet, t. iii. p. 207 and 209.

ROCHSBURG, in *Geography*, a town of Saxony, in the lordship of Schonburg; one mile E. of Penig.

ROCHSTADT, a town of Westphalia, in the principality of Halberstadt; 10 miles E. of Halberstadt.

ROCHUKE, a town of Bulgaria, situated on the banks of the Danube, at the foot of a hill which continues for several miles near the river, and is covered with vineyards. It is a large and populous town, about the size of Liverpool.

ROCITO, a town of Naples, in Capitanata; 7 miles S. of Volturara.

ROCK, in *Geology*, a large mass of stone, forming part of the solid covering or crust of the globe. In common language, rocks are the bare projecting stony masses that rise above the level of the ground or sea; but the geologist denominates every bed of stone that composes the compact part of our planet a rock, whether it be elevated to view, or buried deep under the surface.

The composition, structure, and arrangement of rocks comprise a most important part of the natural history of the earth, which is now beginning to engage the attention of philosophers in various parts of the world. Numerous and extended observations have greatly enlarged our knowledge of facts, and exposed the fallacy of many of those unfounded distinctions and premature generalizations, which, dignified with the name of systems, have retarded the progress of science.

In the earliest periods of civilization, when stone began to be employed for purposes of architecture or sculpture, it must have been immediately perceived that the rocks of different districts varied greatly from each other; and often in the same mountain, the upper and lower rocks were observed to be of various kinds and qualities.

In the knowledge of the qualities which ensure durability to the labours of the architect, the ancients appear to have greatly exceeded the moderns; but they did not extend their inquiries respecting rocks to any other objects than those of immediate utility. Nor, till about the middle of the last century, was the structure of the external part of the earth regarded as an object deserving the investigation of men of science, who confined themselves to forming theories of the earth in their studies, in preference to an active examination of nature.

About that time, Lehman, a German mineralogist, observed that certain rocks occupy the lowest relative position in mountainous districts, and that these rocks contain no remains of animals or vegetables; but in the upper rocks, numerous impressions and petrified relics of animals and vegetables abound. Hence he inferred, that the first were consolidated before the existence of organized life; and on this account, they were called primitive or primary. The latter were called secondary rocks, because they not only contained these organic reliquiæ, but also fragments of the former rocks, and hence were supposed to be of later formation.

This division into two classes was continued by geologists until the close of the last century, when M. Werner, the celebrated professor of mineralogy at Freyburg, introduced into his arrangement another class, called transition rocks, which includes those rocks that are, in many of their characters, similar to primary rocks, but in which some organic remains occasionally occur: hence he supposed they were formed when the earth was passing from an uninhabitable to a habitable state. The stratified secondary rocks he denominated flœtz rocks, from the German word *flœtz*, signifying flat, because these rocks are generally divided into parallel strata, which are not greatly inclined from an horizontal position. The lower of these rocks were called the oldest flœtz rocks, and the upper the newer flœtz rocks. (See Geology, where a detailed account is given of the Wernerian arrangement.) Since that article appeared, more extended observations have induced even the warmest supporters of the Wernerian system to question the propriety of some of its distinctions.

"The system of classification introduced by Werner was formed principally from observations made in Saxony, and had great merit, as illustrating the geology of that part of Germany; but it has been objected with much reason to the general adoption of the terms, that they were framed to suit a particular theory, before a sufficient number of facts had been collected to warrant its reception. Subsequent discoveries have also proved, that the different classes, into which Werner has divided rocks, have not the marked and definite characters necessary to constitute a natural system of arrangement. Even the professor who first introduced into this country the divisions of transition and flœtz rocks, as a most important discovery of Werner, now states his opinion, '*that transition rocks may alternate with flœtz rocks, and, therefore, that the transition and flœtz classes are not separated from each other in the manner generally alleged.*' This admission is the more remarkable, when we recollect the extreme confidence with which the propriety of this classification

claſſification was ſupported, and the ſolemn trifling often employed to determine whether certain rocks belonged to the tranſition or flœtz claſſes." (Bakewell's Introduction to Geology, 2d edit.) Indeed the term primary, or primitive, is objected to by ſome geologiſts, who conſider theſe rocks as having been in a ſtate of igneous fuſion by ſubterranean fire, which gave to them their cryſtalline ſtructure; but the heat acted with leſs force on the rocks by which they are covered, hence the latter are more earthy. Nor are appearances wanting to ſupport this opinion. Well-authenticated inſtances are known of veins ſhooting from the lower into the upper rocks; and though much labour has been employed to controvert this fact, it is now undoubted. The granite of Cornwall ſends up veins into the ſuperincumbent ſchiſtus, or killas; hence it was inferred that the latter, which is conſidered as a ſecondary rock, was older than the granite or primary rock. It is evident the killas cannot be of more recent formation. Both rocks were probably contemporaneous; in which caſe, we may conceive that veins might ſhoot from the lower into the upper, previouſly to their acquiring a compact ſolid ſtate. Nor will the abſence of organic remains alone prove the prior formation of theſe rocks; for among rocks abounding in petrifactions of animals or vegetables, many beds of rock occur in which no ſuch remains are ever met with, although we are certain to find them in the ſtrata immediately above and below. We have no means of aſcertaining that the ſimilar rocks of different diſtricts were formed at the ſame time; nor can we be certain that they have not once contained organic remains, that were deſtroyed during the proceſs by which they acquired their preſent cryſtalline ſtructure. We may, however, with apparent probability, infer, that their formation was prior to the exiſtence of animals and vegetables in our planet, in its preſent ſtate; becauſe the rocks which immediately cover them contain almoſt excluſively the organic remains of zoophytes, or thoſe animals which are conſidered as forming the firſt link in the chain of animated beings.

It is only from the exiſtence of theſe organic remains, we can infer, with any certainty, that the rocks in which they occur were formed in ſucceſſion. The difference of theſe remains in the upper and lower rocks mark diſtinct epochs in the natural hiſtory of the globe. In the loweſt rocks, which have a cryſtalline granitic ſtructure, no animal or vegetable remains have ever been found; but the calcareous rocks, which immediately cover them, contain ſome few remains of zoophytes and ſhell-fiſh; and in the argillaceous ſlate rocks, alſo, we occaſionally meet with vegetable matter. In the ſand-ſtone ſtrata over theſe, the remains of vegetables are abundant. Above theſe again, in the upper calcareous ſtrata, entire fiſh are occaſionally found, with zoophytes and ſhell-fiſh, of a ſpecies different from thoſe in the lower ſtrata. In the thick beds of aluminous ſhale and clay over theſe, occur the remains of the ſhark and alligator; and in the alluvial ſoil which covers the whole, the bones of the elephant, the rhinoceros, the hippopotamus, and the maſtodonton or mammoth, and of various unknown quadrupeds, are found both in our own country, and in many parts of Europe, Aſia, and America. But neither in the upper nor lower rocks, nor in alluvial ground, have any remains of human ſkeletons been found, except where mines had formerly been worked, or in ſituations where their occurrence could be explained by recent cauſes; ſuch as inundations and volcanic operations, as on the ſhores of Guadaloupe and in the neighbourhood of Veſuvius.

We believe our own countryman, Mr. W. Smith, was the firſt perſon who obſerved that remains of diſtinct genera and ſpecies of animals were peculiar to certain ſtrata, and that the occurrence of the ſame remains was ſufficient to identify the ſame ſtratum, throughout a whole diſtrict, wherever it could be examined. The ſagacious naturaliſt M. Cuvier has applied the ſame diſcovery to illuſtrate the geology of the country round Paris, a diſtrict moſt remarkable for the number and variety of foſſile ſkeletons, and other reliquiæ which it contains. See STRATA.

It is not a little remarkable, that few of the reliquiæ, whether in the upper or lower rocks, belong to exiſting ſpecies of marine or terreſtrial animals; and the vegetable petrifactions found in northern latitudes reſemble moſt thoſe of tropical climates.

The natural hiſtory of rocks compriſes, the ſubſtances of which they are compoſed, their internal and external ſtructure, their poſition, and the order of ſucceſſion, from the loweſt rocks with which we are acquainted upwards to the ſurface—their decompoſition, and the mode of their formation. The latter is the province of ſpeculative geology, for it is only in one claſs of rocks, the volcanic, that we have any experience of their actual formation.

The mineral repoſitories peculiar to certain rocks will be deſcribed under the article VEINS, *Mineral* and *Metallic*.

The Compoſition of Rocks.—Rocks are either ſimple or compound. Thoſe rocks which are compoſed of one mineral ſubſtance, are called ſimple, ſuch as ſlate, ſerpentine, lime-ſtone, &c. although theſe minerals may be compoſed of various elementary ſubſtances. Thus clay-ſlate, or ſlate, conſiſts of ſilex and alumine, combined with oxyd of iron and carbon; but the combination is ſo intimate, as to preſent the appearance of an homogeneous ſubſtance. When two or more minerals enter into the compoſition of rocks, they are called compound. Thus granite is compoſed of quartz, felſpar, and mica, cloſely united together, but each of theſe minerals preſerves its own peculiar character. The elementary ſubſtances of which all rocks, both ſimple and compound, are formed, are, the earths ſilex, alumine, lime, magneſia, the oxyd of iron, carbon, and ſulphur. (See SILEX, ALUMINE, &c.) The newly diſcovered earths and metallic ores, except iron, rarely form the ſubſtance of rocks, but are found in the veins and fiſſures by which they are interſected.

From the above elementary ſubſtances, either ſeparately or combined, all the ſimple minerals are formed which compoſe rocks and mountains. But it may be remarked, that ſilex enters moſt largely into the compoſition of all the lower cryſtalline rocks (except granular lime-ſtones): it forms more than two-third parts of the lower cruſt of the globe.

The moſt important ſimple minerals which form rocks and mountains, are quartz, felſpar, argillaceous ſchiſt, or clay-ſlate, lime-ſtone, hornblende, ſerpentine, chlorite, mica, talc, hornſtone, jaſper, flint, bituminous ſhale, and alum-ſlate. Baſaltic or trap rocks, and lava, are ſometimes compoſed of one apparently homogeneous ſubſtance, but more frequently they preſent the appearance of compound rocks. For the characters of theſe minerals, ſee QUARTZ, FELSPAR, &c.

When two or more of theſe minerals are intermixed together, they form compound rocks; in theſe the minerals are either cloſely united together, without any viſible cement; or aggregated and held together by the intervention of another mineral ſubſtance, which ſerves as a cement, and is ſometimes called the paſte.

The Structure of Rocks, internal and external. The latter, or the ſtructure of rocks *en maſſe*, is as diſtinct from the former, as the order of architecture of a building is diſtinct from

from the form of the bricks or stones of which it is constructed. The internal structure of simple minerals belongs properly to the department of the mineralogist, and that of compound rocks, with their external structure, to the geologist. Compound rocks are either

Granitic, composed of grains or crystals, united without a cement, as in granite.

Porphyritic, consisting of a compact ground, in which distinct crystals are imbedded; or of a granitic ground, in which some of the crystals are much larger than the rest.

Amygdaloidal, from the Latin *amygdala*, an almond, containing kernel-shaped cavities, filled with other mineral substances.

Conglomerated, composed of fragments, or rounded stones, cemented together, as in breccias and pudding-stone.

Granular, composed of small grains, either cemented, or adhering, as in sand-stones.

The external structure of rocks is either

Stratified, composed of layers or strata.

Tabular, in large plates: this includes the slaty structure in the mass.

Columnar, in regular columns or prisms.

Globular, in spherical masses.

Indeterminate, which includes all unstratified rocks that have no determinate shape.

Stratified mountains, or rocks, are composed of layers or strata lying over each other, and divided by parallel seams, like the leaves of a closed book. In the seams or partings which divide the strata, there are frequently thin laminæ of soft earthy matter, but sometimes the surfaces of the upper and lower stratum are closely joined, and require considerable force to cleave them asunder. The layers are denominated strata. See STRATA.

It has been admitted, without sufficient evidence, that all stratified rocks were formed of the sediment of turbid water, which arranged them in succession over each other, as the muddy waves of the ocean deposit their contents in regular layers upon the shore. This mode of formation is called mechanical deposition. It has also been generally believed, that all rocks divided by parallel seams were formed mechanically by the action of water, and as such layers occur occasionally in crystalline rocks, it was inferred by some geologists that this was a proof that such rocks had been formed by water. Thus the tabular structure, which consists of tables or plates of rock that have generally a vertical direction, and frequently a slaty cleavage, has been confounded with stratification: this has given rise to much confusion and contradiction in the description of rocks; some geologists denying, and others asserting the stratification of the same rock. The tabular and slaty structure of many rocks may, with as great probability, be attributed to crystalline arrangement, as the lamellar structure of a crystal of felspar, or a plate of mica. The laws of crystallization have but recently arrested the attention of philosophers, and their researches have been principally confined to their effects in a small scale. The crystallization of mountain masses is equally deserving of notice, as to this cause must we refer both their tabular, columnar, and globular structure.

The columnar structure consists of regular columns or polyhedral prisms, and is almost peculiar to trap or basaltic rocks, and to volcanic rocks: these sometimes form vast ranges of natural columns, as in Iceland, the Lipari islands, the Motta in Sicily, the Giants' Causeway in Ireland, and at Staffa. It was long contended against all probability, that these columns were the effects of accidental rents occasioned by the drying or shrinking in of the mass; but their regularity, and (in many instances) the convex and concave articulations of the joints, prove that they are effects of crystallization. These columns have been observed by Col. Imrie and others formed in currents of lava, that could be traced to the craters of volcanoes. Transactions of the Wernerian Society, vol. ii. pt. 1.

The globular structure consists of balls, sometimes detached, at other times imbedded in rocks of the same kind. These balls are frequently composed of concentric spherical layers. This structure is not unfrequent in basaltic and granitic rocks. The balls are generally harder than the rocks in which they are imbedded, and frequently retain their shape after the outer rock is decomposed. Instances of this structure occur in the basaltic rock of Staffordshire, called Rowley Rag. (See ROWLEY *Rag*.) Globular distinct concretions of granite are from one to two or more fathoms in diameter. These concretions are again composed of curved lamellar concretions, and always include a harder central mass. The spaces between the globes are filled with granite possessing less solidity, which decays more readily, and thus leaves the harder central masses heaped on each other, or strewed about. These distinct concretions must not be confounded with rolled masses. Beautiful examples of these concretions occur in the island of Arran, Bohemia, the Hartz, the Fichtelgebirge, and other places.

The indeterminate or amorphous structure appears to be the most common in unstratified rocks; but our confined and partial observations may frequently lead us to conclude, that rocks have no determinate structure, whereas, could we ascertain their arrangement throughout their whole extent, we might perceive that their structure, viewed on a great scale, was as regular as that of many stratified rocks.

The position of rocks, with respect to each other, is an interesting subject of geological inquiry, as it is supposed to determine their relative ages, and to elucidate the mode of their formation. When one rock covers another in such a manner as to appear moulded upon it, having the same elevations and depressions, it is said by the German geologists to lie in a conformable position. In this manner the schistose or slaty rocks frequently cover rocks and mountains of granite. Stratified rocks are also generally conformable to the shape of the lower rocks, except in situations where the strata appear to have been broken by some subsequent convulsion of nature, which has deranged their original position, and occasioned them to abut against each other, or has given the upper strata a contrary inclination to the lower. In this case their position is said to be unconformable. Where masses of unstratified rocks cover other rocks, filling up the cavities, and lie without any conformity to the shape of the lower rocks, they are called unconformable and overlying. This position is common to most rocks of volcanic origin, and to basaltic rocks; in the former there can be no doubt respecting the mode of their formation. Streams of liquid lava pouring through vast fissures and openings have covered the inequalities of the lower grounds, filling up vallies, and accumulating as the lava cooled and consolidated, thus forming immense mounds and abrupt precipices: some geologists ascribe a similar formation to basaltic and porphyritic overlying rocks.

Those rocks which are commonly imbedded in other rocks, are said to be subordinate formations; thus granular lime-stone, serpentine, and hornblende, frequently form beds in schistose rocks, such as gneiss, mica-slate, and clay-slate, and are then described by geologists as subordinate to the latter.

Beside the above positions, the continuity of rocks is frequently broken by vertical seams or fissures filled with mineral matter different from that of the rock which they intersect. (See

(See Veins, *Mineral* and *Metallic.*) These vertical seams of rock are sometimes of vast extent, and vary in width from a few inches to several hundred feet. The most obvious inference is, that the solid covering of the globe has been rent, and the mineral matter ejected in a state of fusion into the interstices. The similarity of the mineral matter in the greater part of these fissures, provincially called dykes, to that of volcanic eruptions, adds much probability to this opinion. Where these dykes occur, the original position of the rocks on each side is generally changed.

The dislocation of rocks and strata has been most noticed in mining districts, where it is not unfrequently observed, that a stratum which has extended with a regular inclination over a large track of country, is suddenly thrown down several hundred yards or more, and often sunk below the power of the miner to regain it. Sometimes the strata are thrown upwards, and a series of rocks, which exist on one side of the fracture, are entirely removed on the other, and have totally disappeared.

The change in the original position of all rocks and strata, with respect to the level of the sea, is a most important and incontrovertible fact. Whether the sea has diminished or retired into cavities in the earth, or whether the rocks and mountains have been raised by an expansive force, which has broken the solid covering of our planet, and lifted them from the watery abyss to the present elevation, are questions that may long divide the opinions of geologists; but that the summits of our highest mountains were buried for ages under the ocean cannot admit of doubt. On some of these summits, remains of marine animals are at present widely spread; indeed, many of the calcareous mountains of vast extent and height appear to be almost entirely formed of marine shells, which are not heaped together in confusion, but the upper and lower beds of rock contain remains of species distinct from each other; this proves that they were not deposited in their present situation by any sudden inundation, but have been collected in succession at distant periods of time.

In schistose mountains, considered as primary, the beds of rock have generally a vertical position. Some geologists suppose that all these beds were originally deposited horizontally, and have been subsequently elevated by some mighty convulsion of nature. Saussure, who has investigated with so much labour the structure of the Alps, has drawn this conclusion with respect to the rocks which compose Mont Blanc, and the mountains in its vicinity; but we are inclined to believe that the structure of these mountains, as described by this intelligent philosopher, may in many instances be explained in a more satisfactory manner, by considering it as the result of crystallization on a large scale, and the vertical beds of rock as plates of enormous crystals: indeed, Saussure himself appears to have been very frequently impressed with surprise at the tendency to crystalline arrangement observable in these mountain masses, which he describes as presenting regular pyramidal or rhomboidal forms. The crystalline nature of the rocks themselves, and the minerals which fill the vertical seams, point to crystallization as the great agent in the formation of these mountains, whether it took place in an aqueous solution, or when the whole was in a state of igneous fusion deep under the surface. In one situation near the great pyramids of granite, on the south-east side of the valley of Chamouni, he describes a chain of mountains seven or eight leagues in extent, in which the vertical section of the beds presents an arrangement exactly similar to that of the sticks of an opened fan. The lowest beds are nearly horizontal, but they gradually rise till they become vertical at the summit. He says, that many other instances might be cited of a similar arrangement. Now, we can scarcely conceive it possible for any overturning of the mountain to have produced such a position of the beds; but in the crystallization of minerals on a smaller scale the diverging structure is common. There is, however, one fact, which, if it can be satisfactorily ascertained, will prove the truth of Saussure's opinion, that the vertical position of some of these rocks was not their original one. In his description of the rocks in Valorsine, he says, that he found vast beds of pudding-stone in a vertical position, between schistose rocks in a similar position; the beds on one side are gneiss or mica-slate, and on the other slate and sand-stone. The bed of pudding-stone is 100 toises thick; it consists of a fine paste or cement, composed of extremely fine schistose sand-stone, with minute plates of mica, that are perfectly parallel to the seams which divide the beds.

The fragments vary in size, from that of a grain of sand, to six or seven inches in diameter; some are angular and others rounded, resembling the boulders on the shores of the lake of Geneva. These fragments and boulders are of gneiss, mica-slate, and quartz, but none are of clay-slate. Saussure has observed, that it is impossible for these rounded boulders to have been originally placed in a vertical situation. If they were formed mechanically by the action of water, like those on the borders of the lake of Geneva, this inference is undeniable; and we must farther admit with Saussure, that the mass of this mountain, which is 1181 toises above the level of the sea, has been overturned by the same revolution which has given a vertical direction to the whole; for all these beds having the same inclination and direction as that of the pudding-stone, we are compelled to grant that their original situation was the same, and that they have suffered the same change from the same cause. The only objection to this inference that can, with any probability, be urged, is, that these rounded stones may not really be water-worn boulders and pebbles, but were formed in the same manner as the bolls of basalt and granite, which are sometimes imbedded in basaltic or granitic rocks, and which are acknowledged to be the result of a tendency to crystalline arrrangement.

Saussure, however, was fully convinced that they were real boulders, and his guide, on seeing a number of the same rounded fragments on the summit of a mountain in the vicinity, expressed his surprise at finding, in that elevated situation, the pebbles and boulders he was accustomed to see on the borders of the lake. The boulders, in this situation, were evidently the remains of similar beds of pudding-stone, of which the paste or cement had been decomposed and washed away.

It is observed, that secondary strata always rise towards the primitive mountains in their vicinity, which adds probability to the opinion, that the latter were forced up from great depths, and have raised with them the rocks by which they were originally covered, and which now border the primary. The disciples of Werner, however, contend, that the elevation of secondary strata is occasioned by the inclination of the rocks on which they were originally deposited, and that they have undergone no subsequent change.

Succession of Rocks.—There are certain rocks, which commonly occupy the lowest relative position in various parts of the world; the rocks which cover them are frequently arranged in a sequence, which has much similarity in distant districts.

Werner, who formed his system from observations made in in Saxony, where the order of succession presented considerable regularity, concluded that each principal rock constituted what he called a universal formation, or was originally spread round the globe, and that these formations succeeded in a determinate order, encircling each other like the coats of an onion.

More recent and extended observations do not confirm this conclusion to the full extent to which it was carried by the German géologists. Of the thirteen rocks which he classes as primary, some are entirely unknown in various parts of the world, and one of them, the topaz rock, has hitherto been found only in Saxony. Many of the secondary rocks, which occupy a considerable space in Europe, are no where met with in North or South America. In Asia, we are informed by travellers, that a range of mountains, composed of jasper, extends far more than a thousand miles through the eastern parts of Siberia, including Gore island, between that country and America. A geologist, who resided in Siberia, might be disposed to regard jasper as the principal rock-formation in the world, as it extends over a far greater space than the districts in which Werner laid the foundation of his system; on the contrary, in many parts of Europe, jasper is little known, nor is it even enumerated among the principal rocks of Werner.

Mr. Bakewell, in his "Introduction to Geology," admits only three principal rocks in the class of primary; in which arrangement he is supported by D'Aubuisson, an intelligent disciple of Werner, who, on a recent examination of the mountains in the department of Mont Blanc, found that many of the rocks, heretofore regarded as primary, contain some organic remains; hence he admits of one primary formation only, which includes granite, gneiss, and mica-slate.

Brongniart, a celebrated French mineralogist, has more recently declared his opinion, that it is no longer possible to admit the classifications established by Werner. "At the time when these were formed, they rendered an essential service to geology, and created the science; but new observations must produce correspondent changes in the denominations and system of arrangement." Journal des Mines, May 1814. Without adhering to systems, further than they are supported by facts, we consider granite as the lowest rock that is generally met with in alpine districts. Granite is frequently covered by a rock called gneiss, a kind of slaty granite; on this occurs micaceous schist, or mica-slate. For the characters of these rocks, see GRANITE, GNEISS, and MICA-*Slate*.

These three rocks are frequently observed graduating into each other, and sometimes alternating. The substances which compose them appear to have been in a fluid state, and to have united in various forms and proportions; and certain causes have given to the outer part a schistose or slaty structure. The gneiss and mica-slate are generally moulded over the granite, with the same elevations and depressions. Beds of other rocks, particularly of granular lime-stone, hornblende rock, and serpentine, occur occasionally in these rocks, with beds and veins of metallic ores.

The highest mountains on the continents of Europe and Asia are composed of these rocks. Mont Blanc is 15,680 feet above the level of the sea.

Granite rocks are in some instances immediately covered by slate; and in others, secondary stratified rocks rest upon granite, without the intervention of rocks which usually accompany it. More commonly, mountains of slate, or the coarse kind of slate-rock, called by the Germans grey-wacke and grey-wacke slate, cover the mica-slate and gneiss. Immense beds of lime-stone frequently accompany this kind of slate, in which the remains of marine animals, principally zoophytes, appear, but different from any known existing species. A very thick bed of sand-stone, frequently coloured red by the oxyd of iron, often accompanies the coarse slate. It is called by Werner the old red sand-stone, and is succeeded by beds of lime-stone, in which the organic remains of zoophytes and shell-fish are more abundant: these are the lowest rocks in which metallic veins usually occur. Over this lime-stone we meet with numerous strata of argillaceous and siliceous sand-stones, and soft slate or shale, abounding with impressions of vegetables, impregnated with bituminous and carbonaceous matter, and alternating frequently with beds of coal. These secondary stratified rocks, called by the Germans flœtz rocks, will be more particularly described under the article STRATA.

Again, over the strata containing coal, or more properly on the boundary of these strata nearest the sea, we meet with calcareous strata containing the remains of marine animals, but different from those found in the lower rocks. These calcareous strata consist of calcareous sand-stone, roe-stone, and chalk. See ROE-*Stone*, and CHALK.

It is remarkable that chalk, which is extensively spread over the southern counties of England, and the opposite coast of France, and in many of the countries adjoining the Baltic, is unknown in North and South America, and various parts of the world. Over the chalk are found thick beds of clay and sand; and in some parts of Europe there occurs over these a series of strata, containing the remains of fresh-water shells and quadrupeds. See STRATA, in which an account will be given of the fresh-water formation of strata in the vicinity of Paris and the southern parts of England. This appears to be the latest formation of rock that we are acquainted with, except what is taking place in our own times by volcanic fires.

It is worthy of remark, that we meet with no organic remains in the lowest rocks we are acquainted with; that the rocks over these contain a few remains principally of marine animals; that the rocks which immediately cover the marine remains, or the coal series, abound in vegetable impressions and carbonaceous matter; but we rarely meet with animal remains of any kind in these strata, until we approach nearer the sea-shore, when other calcareous strata occur again, containing, almost exclusively, the remains of marine animals, but different from those in the lower rocks. These latter strata consist of calcareous sand-stone, roe-stone, and chalk. See ROE-*Stone*.

Beside the rocks, in which some order of superposition may frequently be traced, there are other rocks which are thrown over them, apparently by some great convulsion of nature which has broken the surface of the globe, and forced them into their present position, without any regular order of succession. These rocks consist of porphyry, sienite, trap, or basalt. From the nature of these rocks, and the similarity of their position with that of volcanic rocks, many philosophers have attributed the same mode of formation to both, and suppose that the former have been orignally currents of lavas formed in remote ages.

Humboldt, who has made more extended observations on volcanoes than any philosopher who has preceded him, says, that in the substances which have been ejected during volcanic eruptions, a gradation may be traced from the more ancient to those of more recent date, and that the latter have always a nearer resemblance to the lavas ejected at the present time. If this observation be correct, it will probably lead to the con-

 clusion,

clusion, that rocks of porphyry, sienite, trap, basalt, and lava, had all a similar mode of formation, as they agree in so many characters of composition and structure. See VOLCANO, VOLCANIC *Products*, TRAP, and SIENITE.

As Mont Blanc in Switzerland is the highest mountain on the continent of Europe or Asia that has been examined by any eminent mineralogist, we shall give a short account of its structure, and the rocks which compose its summit, as described by Saussure, who ascended it in 1786, and who had devoted many years to the study of the rocks in its vicinity. These rocks, situated nearly 2400 fathoms above the sea, are interesting, as being the most elevated that have been observed by naturalists; and the scarcity of rock specimens, brought from great elevations, renders his account the more deserving of notice. A more numerous collection of such specimens from various parts of the globe would throw much light on this department of science.

After having gained the highest point of the mountain, "the first thing which struck me," says Saussure, "in the entire view of the high mountainous summits which I had under my eyes from the summit of Mont Blanc, (the highest of them all,) was the kind of disorder which prevailed in their disposition. When we contemplate the range, of which Mont Blanc forms a part, from less considerable elevations, it appears as if these colossal mountains were situated in a line, and formed a chain; but this appearance vanishes entirely from the bird's-eye view which is here presented. The mountains to the north of Mont Blanc, in Savoy and Switzerland, are indeed united among themselves, so as to form mountain chains, but the primitive mountains do not present this appearance. They are distributed in great masses, or in groups of various strange forms, detached from each other, which appear at least but accidentally united, without any regularity. Thus on the east, the lofty peaks called les Aiguilles de Chamouni, the mountains of Argentiere, of Courtes, and of Taleul, form one triangular group, almost detached from Mont Blanc, and only connected with it at the base by a narrow ridge.

"On the south-east likewise, mount Zuc, La Rogne, and the other primitive mountains to the north of the summit of l'Allée Blanche, form a group nearly triangular, separated from Mont Blanc by the valley of the glacier of Miage, and which is only connected with Mont Blanc by the base of the mountains which close that glacier to the north.

"Mont Blanc itself forms a mass almost isolated, the different parts of which are not in the same line, and have no relation of situation with the other groups.

"On casting my eyes still further, I confirmed the same observation. The primitive mountains of Switzerland and Italy, which I had sufficiently near to be under my eyes, presented only separated masses, or detached groups, without order or regularity. Notwithstanding this irregularity in the forms and distributions of the grand masses, I observed certain important resemblances in the structure of their parts. All that I distinctly saw, appeared composed of plates (*feuillets*), arranged in the same manner nearly from north-east to south-west. I had particular pleasure in observing the same structure in the Aiguille du Midi, which I had formerly endeavoured but in vain to study, being prevented by the inaccessible walls of granite that surround the base. I had a view of the Aiguille du Midi on the second day of my ascent, and never lost sight of it as I proceeded. I assured myself that it is entirely composed of magnificent plates of granite, perpendicular to the horizon, and directed from north-east to south-west. Three of these plates, separated from each other, form the summit, decreasing gradually in height from the southern face, on the side of the Col du Géant.

"When seen from the base, these plates had the appearance of being bent, like the leaves of an artichoke; but this must be an optical illusion, for all those which I could now see distinctly appeared straight; and if there were any exceptions, they were only local, and of small extent.

"This great phenomenon of the vertical position of the plates can only be explained, by admitting a great overturning of the whole mass, which has lifted them from their original horizontal position.

"Another question, which I wanted anxiously to resolve, was also now answered. These great plates of rock preserved the same nature and quality at the summit as at the base, where I had so frequently examined them. This observation proves a remarkable property in mountains with vertical beds: each bed preserves the same nature from the bottom to the top.

"From this magnificent observatory I could comprise in one view the whole of that great phenomenon—which I had before contemplated but in parts—the elevation of the beds forming the mountains on the side of Mont Blanc. On whichever part I turned my eyes, I saw the secondary chains of mountains, and even the primitive of the second order, raising their beds against Mont Blanc, and the high summits in its vicinity. Such were the mountains on the north of Repesoir, of Passy, of Servoz, and Le Buet; on the south, the Col du Ferret, Great St. Bernard, and those of the chain of Cremont, more remote, and beyond the mountainous chains, whose escarpments turn to Mont Blanc. We saw others, whose escarpments were turned in a contrary direction. These appearances are in perfect accordance with the theory which supposes that the crust of the globe has been broken, and the beds of rock raised from their horizontal position. It follows from hence, that the horizontal distance from the bottom of the valley of Chamouni (if that were once the ancient surface of the globe) should have some correspondence with the height of Mont Blanc; and that this distance is nearly the thickness of the stony crust, which has been broken and elevated; and that, consequently, Mont Blanc, which actually rises about a league above the surface, was in its original position buried two leagues beneath it."

The naked rocks on the summit, which form two kinds of arretes or crests of a dark colour, are of granite. The felspar in this granite is white, inclining to grey, green, or reddish: when exposed to the flame of the blowpipe, it yields a colourless transparent glass, but full of bubbles. The felspar is sometimes intermixed with a kind of earthy steatite. The quartz in this granite is semi-transparent and whitish, and appears rather unctuous in the fracture. Very minute fragments were rounded by the flame of the blow-pipe: it is, therefore, more fusible than rock-crystal. These granites are also intermixed with green and black hornblende, and with chlorite, which seems to supply the place of mica, as the latter scarcely appears, and only in minute spangles. In some places, these granites graduate into irregularly schistose rocks, composed of quartz and felspar, whose seams are filled with a brown argillaceous and ferruginous earth, that melts into a black glass. The granite on the actual summit is composed, like the above, of quartz, felspar, and hornblende or steatite. Felspar constitutes about three-fourths of the mass: the hornblende and steatite form too small a portion to be estimated, the quartz forming nearly the whole of the remaining fourth part. On the northern summit, besides the above species of granite, he

met

met with a kind of trap rock, compofed of minute cryftals of white felfpar and hornblende. On the fouthern fummit he alfo found rocks of petrofilex (hornftone), of a pearl-grey colour. It is deferving notice, that the definition of thefe granites, as given by Sauffure, would, according to the Wernerian fyftem, bring them under the denomination of fecondary granites; though furely, if any granite can properly be confidered as primary, it is that of Mont Blanc, and the mountains in its immediate vicinity.

The following extract from profeffor Jamefon's Geognofy comprifes a fhort view of the order of fucceffion of rocks, as laid down by the German geologifts; with obfervations on the fucceffion of the rocks of Saxony and Hanover, defcribed in the quaint language peculiar to the fchool of Freyburg.

"In the primitive clafs of rocks, we obferve feveral rocks always difpofed in conformable and unbroken ftratification, and in which the newer and newer ftrata have always a lower and lower level. Gneifs, mica-flate, and clay-flate, are of this kind. The granite ftretches under them uninterruptedly, and fometimes rifes through them, or juts up in the form of fingle caps or great maffes; fo that the gneifs and other rocks are difpofed on its furface, fometimes in a concave, fometimes in a convex direction, fometimes faddle-fhaped, and frequently mantle-fhaped. It is evident from thefe relations of the ftrata, that granite will frequently form the greateft heights on the furface of the globe.

"Porphyry has a very different kind of ftratification from the preceding rocks. It occurs fometimes broken, fometimes unbroken. When broken, it prefents caps, upfillings, and fhield-fhaped ftratification. When unbroken, it forms widely extended maffes: its pofition is unconformable, and overlying.

"Grey-wacke occurs fometimes in a conformable, fometimes in an unconformable pofition; alfo in caps, upfillings, and fhield-fhaped, and frequently mantle-fhaped, ftrata, furrounding the older mountains.

"The lime-ftone and fand-ftone formations are ufually difpofed in a mantle-fhape, round the older formation; fometimes they are broken, but more frequently unbroken. They are very common and widely diftributed formations.

"Coal, again, fhews a very peculiar character: its original extent is not confiderable; it even appears interrupted, or broken; but its internal characters fhew that its prefent apparently broken appearance is its original one. It occurs commonly in trough and bafin-fhaped hollows, and its ftrata have confequently a concave direction.

"The rocks of the neweft flœtz-trap formation are diftinguifhed from the older by their unconformable, overlying, and broken ftratification. In thefe refpects they nearly agree with porphyry. When the continuity of the formation is broken, it occurs in caps, upfillings, and rarely fhield-fhaped.

"The defcription we have now given of the fucceffion and ftructure of the different claffes of rocks, will enable us to inveftigate the ftructure of the whole mountain groups. We fhall illuftrate this by a very fhort defcription of two well-known tracks of country, the Hartz, and the Saxon Erzgebirge, or metalliferous mountains.

"*Defcription of the Hartz.*—An immenfe mafs of granite forms the centre of this country; it rifes through the other ftrata, and is elevated a confiderable height above them all, forming the famous mountain—the Brocken. Mantle-fhaped ftrata of clay-flate are wrapped around this central mafs. It is worthy of remark, that gneifs and mica-flate, two of the moft confiderable of the older formations, are wanting in this country. To the clay-flate fucceeds tranfition lime-ftone, then grey-wacke, and grey-wacke flate; and the whole of thefe are wrapped around the granite in mantle-fhaped ftrata, and invariably with lower and lower outgoings, correfponding to the newer and newer ftrata. The flœtz rocks that immediately fucceed the tranfition furround them in mantle-fhaped ftrata. Immediately on the neweft of the tranfition rocks refts the oldeft of the flœtz, the old red fand-ftone; to this fucceeds the other flœtz formation, in the following order, according to their relative age:—firft flœtz lime-ftone, firft flœtz gypfum; fecond or variegated fand-ftone, fecond or newer flœtz gypfum, fecond flœtz lime-ftone. Thefe flœtz rocks are the links that connect the tranfition with the alluvial, the next clafs of rocks. Thefe are found in the loweft fituations. We have thus, from granite to the alluvial formation, all the feries marked with a diminifhing level, in proportion to the newnefs of the ftrata.

"*Defcription of the Saxon Erzgebirge.*—The mine diftrict of the electorate of Saxony has a bafis of granite which rifes through the fuper-incumbent rocks in the different places at Altenberg, Johanngeorgenftadz, and Bobrifch, on the road leading from Freyberg to Drefden. The newer formations, *viz.* gneifs, mica-flate, topaz-rock, and clay-flate, are wrapped around the granite in mantle-fhaped ftrata, and the diminifhing levels of the outgoings correfpond to the newnefs of the formations. Over thefe we meet with other primitive formations that overlie the older formations, and their continuity is partly broken, and partly unbroken; here are porphyry, fienite, newer granite, quartz, and ferpentine. Still lower down we meet with tranfition rocks, of which the lime-ftone appears at Kalk-grun and Wildenfels; the amygdaloid at Voghtland; and the grey-wacke and grey-wacke flate near Freyberg. Still lower down, and often covering the preceding formations, we find fand-ftone and lime-ftone; and in feveral places, as at Hainchen, Pottchappel near Drefden, and Zwickau, there are depofitions of the coal formation. Laftly, the neweft flœtz-trap formation covers all the others in unconformable, overlying, and very broken ftratification."

Decompofition of Rocks.—Where rocks rife above the furface, and are expofed to the action of air and moifture, they are liable to decompofition and difintegration. The former confifts in the feparation of the conftituent parts, the latter in the feparation of the integrant parts: the one may be compared to the moulding of the ftones of which a building is conftructed, the other to the disjointing and diflocation of the ftones in a found ftate, when a building is thrown down. Both thefe proceffes frequently take place in the fame rock.

The difintegration of rocks is fometimes rapidly effected by earthquakes, lightning, and the immediate action of fubterranean fires. It is, however, to the more conftant operations of moifture and change of temperature, that the deftruction of rocks and mountains may be principally attributed; but no well-authenticated obfervations have yet been made to determine the extent of thefe effects during a given period of time. It has been vaguely ftated, that the height of the Pyrenées is diminifhing about one foot in a century; hence it was calculated that a million years would be required to level the rocky boundary which feparates France and Spain. It is obvious that a lapfe of many centuries would be required to verify fuch a conclufion; and though the decompofition and difintegration of rocks are, in many fituations, fufficiently rapid to be obfervable during the fhort period of a fingle life, yet, in other fituations,

rocks

rocks present the same unvarying outline for ages, and preserve their angular sharpness, which is either natural, or, in some instances, the effect of art. Thus, the blocks of granite remaining in the quarries at Sienna, in Upper Egypt, have all the impressions of the tools with which they were worked during the latter period of the Roman empire; and the basaltic rocks formed by the extinct volcanoes of Auvergne are so compact, as to present, at this day, the appearance of trickling lava suddenly congealed, though the period of their formation was prior to the record of authentic history. The causes of disintegration are, the vicissitudes of the atmosphere, change of temperature, and the absorption and congelation of water. The sudden dilation or contraction produced by the expansion and congelation of water, is alone sufficient to rend the strongest rocks when it enters their fissures. In Greenland the rocks are said, from this cause, frequently to burst with a noise like thunder. The external causes of decomposition are, principally, water and oxygen. Mineral substances, containing sulphur or metallic matter capable of a higher degree of oxygenation, absorb oxygen from water, or the atmosphere. To this cause the decomposition of stones, containing pyrites, is to be attributed. Calces of iron, moderately oxygenated, are the most general cause of decomposition; they act by absorbing a greater portion of oxygen, by which they gradually swell, and are disunited from the other constituent parts of the stone in whose composition they enter. When least oxygenated, their colour is black, or dark brown; and in some instances, when combined with alumine, or magnesia, greenish-grey; the alumine, as it becomes more oxygenated, turns to a purple-red and orange, and finally a pale yellowish-brown; the magnesia becomes at first blue, then purple and red. Iron, in its metallic state, or, at least, when but slightly oxygenated, also decomposes water; but if exposed to the air, it becomes further oxygenated, and the compound into which it enters gradually withers, as Dr. Higgins observed, in imitating pozzolana. Higgins, on Cements, 124.

Stones, into whose composition calces of iron, highly oxygenated, seem originally to have entered, are said, by Mr. Kirwan, to decompose with great difficulty, of which he instances red jasper; but perhaps the more perfect vitrification of these minerals may be the cause of their durability.

Calcareous rocks are liable to the decomposing effects of water, partly mechanical and partly chemical. Carbonate of lime is insoluble in water, except when aided by carbonic acid; but as this exists more or less in almost all water, it acts slowly upon lime-stones, particularly on those of a loose texture. Potash and soda enter also into the composition of many rocks; and to the existence of potash in felspar, one of the constituents of granite, the decomposition of granite rocks may be generally attributed.

From the combination of some extraneous mineral substance with rocks, remarkably rapid instances of the decomposition of rocks are sometimes known to take place. According to Dolomieu, all the houses of Malta are built of a fine grained lime-stone of a loose and soft texture, but which hardens by exposure to the air. There is a circumstance which hastens its destruction and reduces it to powder, namely, when it is wetted by sea-water; after this it never dries, but is covered by a saline efflorescence, and a crust is formed some tenths of an inch thick, mixed with common salt, nitre, and nitrate of lime. Under this crust the stone moulders to dust, the crust falls off, and other crusts are successively formed, until the whole stone is destroyed. A single drop of sea-water is sufficient to produce the germ of destruction, which gradually increases and spreads, like a caries, through the whole mass of stone; nor does it stop there, but after some time affects all the neighbouring stones in the wall. The stones most subject to this decay are those that contain most magnesia; those that are finer grained, and of a closer texture, resist it. Notwithstanding the speculations of Dolomieu and Mr. Kirwan on the cause of this uncommon property in the stone of Malta, we conceive that a satisfactory explanation is still wanting.

We have before stated, that water is the principal agent in the gradual destruction of rocks, but sometimes entire mountains are suddenly levelled by subterranean currents, which work their passage through fissures and cavities, and silently prepare the causes of the most alarming catastrophes in alpine districts. In proportion to the elevation and abruptness of rocks, these catastrophes are more frequent and extended. In the cantons of Switzerland numerous instances of this kind are on record, and one, which we shall subsequently notice, occurred in our own times.

The town of Pleurs, about a league from Chavennes, containing about 2200 inhabitants, and numerous splendid palaces, was suddenly buried under a mountain on the 25th of August, 1618.

On the same evening an inhabitant, who entered the town, advised his neighbours to leave the place, saying, he had seen the mountains cleaving, but could obtain no credit; his daughter, whom he had persuaded to depart with him, returned to lock up some valuables, and was overwhelmed with all the other inhabitants in one common ruin. Mr. Coxe says vineyards, chesnut trees, and houses, now cover the spot where this unfortunate town once stood.

On the 23d of September, 1714, a great part of the mountain Diableret fell in between two and three o'clock in the afternoon, and buried more than 100 huts, and a considerable part of the valley. Those who saw this disaster say that it happened in a moment, and at the same time whirling clouds of dust arose suddenly, which darkened the air like a sudden night.

In 1751, a mountain fell down, situated near Passy, between Salenches and Servoz. Saussure says, the noise was so dreadful, and so thick and dark a cloud of dust arose, that many persons supposed that the world was at an end. Intelligence was received at Turin, that a terrible volcano had broken forth in these mountains: in consequence of which the king sent the celebrated naturalist, Vitaliano Donati, to verify the report, who gives the following account of the event. "I hurried with extreme pleasure to examine so extraordinary a phenomenon. After having travelled four days and four nights without halting, I came in front of a mountain all covered with smoke, and from which were incessantly detached, both by day and night, large masses of stone with a noise perfectly like that of thunder, or of a large battery of cannon, but louder and more terrible. The peasants had all retired from the vicinity, and did not dare to look at the ruin, but at the distance of two miles, or even farther. All the neighbouring hills were covered with a dust much resembling ashes. All said they had seen at intervals a smoke, which was red during the day, and accompanied with flames at night. I attentively examined the smoke, but neither perceived flames nor any smell of sulphur. Nor did the rivulets I examined with care, present the least appearance of sulphuric matter. Thus persuaded, I entered the smoke, and though quite alone, went to the brink of the abyss, where I saw a large rock darted down, and observed that the smoke was only dust raised by the fall of the rocks, the cause of which I soon

ſoon after ſought for and diſcovered.—A great part of the mountain ſituated above that which had fallen was compoſed of earth and ſtones, not diſpoſed in beds, but confuſedly heaped together. I thus perceived that the mountain had been ſubject to ſimilar falls, which had left the large rock that fell this year without a ſupport, and with a conſiderable projection. This rock was compoſed of horizontal beds, of which the lower were of ſlate, or rather of fragile ſchiſtoſe ſtone of little conſiſtency, while the two beds beneath theſe were of marble like that of Porto Venere, but full of fiſſures, which croſſed the beds. The fifth bed was wholly compoſed of ſlate in vertical plates, entirely diſunited; this bed formed all the upper part of the fallen mountain. Upon the ſame level ſummit were three lakes, the waters of which penetrated conſtantly through the fiſſures of the beds of rock, and decompoſed their ſupports. The ſnow, which had fallen in Savoy in greater abundance than had ever been ſeen in the memory of man, increaſed the effect, and the united waters occaſioned the fall of three million cubic fathoms of rock, a maſs ſufficient to form a large mountain."

On the 2d of September 1806, at five in the evening, the Knippenhoul rock, which formed the ſummit of mount Roſenberg, was on a ſudden detached from its ſituation; and at the ſame time part of the mountain, about 280 feet thick on the eaſt ſide, and ſeveral feet thick on the weſt, gave way, and fell into the valley which ſeparates the lake of Zug from that of Lauwertz. One part of the mountain fell into the lake of Lauwertz, which cauſed ſuch an agitation in the waters of the lake, that they overthrew a number of houſes, chapels, mills, &c. along the northern ſhore. Upwards of 1000 perſons were the victims of this calamity. A ſociety of thirteen travellers were on the road from Arth to Schwetz; nine who walked firſt periſhed, the other four eſcaped. In this convulſion enormous pieces of rock were carried through the air to prodigious diſtances. The lake of Lauwertz has loſt about a quarter of its extent. That rich plain, before ſo beautiful, now preſents a mountain of 100 feet in height, $1\frac{1}{2}$ league in length, and as much in breadth. The villages of Goldau and Rothen, conſiſting of 115 houſes; that of Buſingen, of 126; and that of Kuſlock, have totally diſappeared. Of Lauwertz, which had 25 houſes, there remain ten buildings, all much damaged. Twenty years previouſly, general Pfyffer predicted this cataſtrophe, from the knowledge he had of the nature of the mountain. A profeſſor of Schwitz ſaid, that above Spietsfleu there was a lake of water which had undermined the rock for ſeveral years, and that below there was a cavern of great depth, where the waters were ingulphed. The quantity of water which had fallen during the preceding years haſtened the cataſtrophe, and the rains of ſome preceding weeks decided it. On the 10th, eight hundred perſons were employed in digging for the bodies of thoſe who were deſtroyed by the falling of the mountain. In forming a channel to draw off the waters, between thirty and forty labourers were ſwallowed up by a torrent of muddy water which broke in upon them ſuddenly. Annual Regiſter, 1806, page 449.

In the mountainous parts of North Wales, Cumberland, and Weſtmoreland, ſimilar effects, on a diminutive ſcale, are taking place; and the ſcattered maſſes of rock, ſpread widely over the ſides and feet of the hills, prove that they have once had a greater elevation.

By the decay of rocks and mountains, new and productive ſoils are formed to renovate the ſurface of the globe, and fit it for the ſupport of vegetable and animal life; and it has been remarked that thoſe rocks which form the moſt fertile ſoils, are preciſely thoſe which decompoſe with the greateſt rapidity, whilſt thoſe which are unfavourable to vegetation reſiſt, for ages, the effects of atmoſpheric influence. It can ſcarcely be denied that this beneficent proviſion of the Author of nature, is ordained to repair the conſtant waſte and change which are taking place on the ſurface.

> "Nec ſpecies ſua cuique manet, rerumque novatrix
> Ex aliis alias reparat natura figuras." Ovid.

The formation of rocks, or the proceſs by which they acquired their preſent form and conſiſtence, may, perhaps, ever remain a ſubject of uncertain ſpeculation, as no analogous formations are now taking place, except in one claſs of rocks, the volcanic.

Some geologiſts contend that all the ſolid materials in the mineral kingdom were once in a ſtate of aqueous ſolution, from which rocks and ſtrata were formed, partly by chemical precipitation, and partly by ſediment; the lower cryſtalline rocks being entirely chemical products, the intermediate or tranſition partly chemical and partly mechanical depoſitions; and the upper rocks and ſtrata principally mechanical, or formed of ſediment or the fragments of former rocks. It has been objected to this hypotheſis, that neither the elementary ſubſtances, nor the compounds of which rocks are formed, are ſoluble in water. In reply to this it has been contended, that though the ſubſtances called elementary are inſoluble, in all probability there was a time when they exiſted in a more ſimple uncombined ſtate; and that the more ſimple elements were once ſoluble in water, though the preſent ſubſtances called elementary are not ſo; in the ſame manner as very ſoluble ſubſtances are known to become nearly inſoluble by chemical union with each other, of which we have an inſtance in the tartareous acid and potaſh, which are both very ſoluble, but when united in certain proportions, they form a ſalt that can only be diſſolved in twenty times its weight of water.

According to theſe geologiſts, the quantity of water which once covered the whole globe muſt have been much greater than at preſent; but in what manner it has been diminiſhed they do not attempt to explain.

Other geologiſts ſuppoſe that moſt of the rocks, whether ſtratified or not, were formed of the ſand, or ſediment, waſhed down from former continents, and that they have acquired their preſent ſtructure and hardneſs from the action of a central fire, which they believe to exiſt conſtantly in our planet, but which is called into greater activity at certain periods by laws with which we are unacquainted. According to the ſyſtem of theſe philoſophers, the preſent continents were raiſed from the bottom of the ocean by the action of the ſame fire, and the rocks of baſalt and porphyry were forced through, and ſpread over, the ſurface in a ſtate of fuſion, like currents of lava from active volcanoes. It muſt be admitted, that the only inſtances we have of the formation of rocks, in our own times, are from the agency of fire; and that ſome of the lavas preſent the cryſtalline internal ſtructure, or contain imbedded cryſtals as perfect as thoſe found in primary rocks. It is foreign to the purpoſe of this article to diſcuſs the probabilities of thoſe two theories which have acquired the names of the Neptunian and Plutonian, for an account of which, ſee EARTH. The deſcent of ſtony maſſes from the atmoſphere, ſometimes of great ſize and weight, is now fully proved; and the formation of theſe ſtones, from the concretion of gaſeous matter, may probably throw ſome light ultimately on the moſt abſtruſe queſtions in geology, and lead to new, and more correct, views of the nature of our planet. Perhaps the different primary beds of ſtone, that environ the globe, were formed by ſimilar concretions from an atmoſphere of vaſt extent. Of one thing

thing we are certain, that the formation of many of the secondary ſtrata was ſubſequent to the exiſtence of animal and vegetable life; were it not ſo, their remains could not be enveloped in them. Another fact is not leſs certain, that many of theſe beds were depoſited very gradually, and form a medium in a ſtate of perfect tranquillity: this is proved by the extremely delicate unbroken fibres and ſpines of ſome of the organic remains which could not have been preſerved entire, had the particles of the ſtony matter, by which they are covered and imbedded, been of conſiderable ſize, or had they been depoſited in a tumultuous element. See STRATA.

Rocks, beſide furniſhing the metallic ores, and materials for architecture, have the moſt important uſes in the phyſical conſtitution of the globe, not only as forming the ſolid baſes or ſkeletons on which iſlands and continents are conſtructed, but theſe elevations and inequalities are abſolutely neceſſary to ſupply the dry land with pure and running ſtreams, and to drain the ſuperfluity of moiſture in rainy ſeaſons, which would otherwiſe form ſtagnant and putrid pools, infecting the air with death: without theſe rocky elevations the earth muſt remain a ſolitary deſert, fitted only for the abode of reptiles and amphibious animals. Thus, by the very irregularity and confuſion which ſeem to prevail in the diſpoſition of the fractured ſurface of the globe, it is rendered ſalubrious and productive, and prepared to ſatisfy the wants, and gratify the various inclinations and inſtincts, of its numerous inhabitants.

ROCK, in *Agriculture*, a ſtony ſubſtance of different kinds, that frequently affords much interruption to tillage, and is highly injurious as a ſubſtratum, that occaſionally upholds water, and prevents its paſſing downwards. Where this laſt is the caſe, they are moſtly of the cloſe, hard, compact kind. They may likewiſe be hurtful in other ways, as by covering the ſurface of graſs-land, and by occupying lands which might otherwiſe produce uſeful plants. Their effects, as non-conductors of water, depends upon their qualities, in ſome meaſure, as well as upon that of the beds of earthy matter in which they are ſituated, and will be more fully conſidered in ſpeaking of SPRING-*draining*. The rocky beds of free-ſtone, blue-ſtone, and lime-ſtone, as well as thoſe of ſome other ſorts, exiſt in very different ſtates, in different parts of the kingdom; and are, on that account, more or leſs favourable to the purpoſes of huſbandry, in the ground by which they are covered.

Rocks of particular kinds are not unfrequently inſtrumental, in their decompoſitions, in contributing to the formation of land or ſoil. Thoſe lands or ſoils which ariſe, in ſome degree, from the decompoſition of rocks of the ſandſtone and granite kinds, are for the moſt part of the thin, poor, hungry deſcription; continuing for very great lengths of time, in many caſes, with but very ſlight coverings of vegetable matter or plants of the graſſy ſort upon them. But thoſe proceeding, in ſome meaſure, from the decompoſition and mouldering down of rocks of the lime-ſtone, chalk, and ſome other kinds, are in general well and cloſely beſet with plants of the permanent graſs kind, and give, when broken up, deep rich earthy beds, for the nouriſhment and ſupport of different ſorts of vegetables as crops.

Where lands are ſituated immediately upon beds or layers of rocks or ſtones, they moſtly become dry, and ſuitable for the purpoſes of vegetation, much ſooner than where they are depoſited upon an under-ſoil of a clayey or marly nature. This approach of the rocky ſtrata towards the ſurface-beds of land or ſoil, is probably one great cauſe of the fertility of land in moiſt or wet climates, ſuch as thoſe of ſome parts of this country, as many of the more northern diſtricts, and moſt parts of Ireland.

The rocks and ſtrata of other kinds, from the decompoſitions of which land or ſoils have been formed, as well as thoſe which conſtitute the more internal parts of the globe itſelf, have a certain order and arrangement, which is not altogether uſeleſs to the inquiring farmer; eſpecially as ſtrata of the rocky nature, which are very different in their kinds, not unfrequently happen to be aſſociated together; and thoſe which are placed directly below the layers of land or ſoil contain materials, which may, in many caſes, be of utility in ameliorating them. But the general view of the nature, compoſition, and poſition of rocks, whether of the primary or ſecondary kind, as well as of other natural ſtrata of a ſimilar deſcription, properly belongs to the general head of *rock;* which ſee. See alſo SOIL and SUBSOIL.

ROCK, in *Ornamental Gardening*, a ſubſtance or body, which is of much utility in producing effect in the forming and laying out the grounds of country reſidences. It is ſuggeſted by Mr. Loudon, that, though in reality theſe can neither be created, increaſed, nor taken away, yet that ſeveral operations may be effected with them, which ſeem of the ſame nature, and conſequently to be of much importance in landſcape. They may, it is ſuppoſed, be either *ſhewn*, *concealed*, or rendered more *characteriſtic*. They may be ſhewn with more and better effect, by taking away earth from about them, and forming breaks and abruptneſſes in the ſurface of the ground where they are. This may, it is ſaid, be accompliſhed in many different ways; but that thoſe methods are to be preferred, which are moſt effectual in ſhewing a perpendicular ſurface, or upright front of rock; as it is not only the grandeſt manner of ſeeing them that can be contrived, but, at the ſame time, the moſt economical and conſiſtent with the good management of the land; no horizontal ſurface of any conſequence, whether of the wood or paſture kind, being to any material extent deſtroyed. Rocks appear in this way in a great many ſituations, in different parts of the country, in the ornamental grounds of reſidences.

It is alſo further ſuggeſted, that rocks may be ſhewn by removing of wood, either alone, or in connection with ground. This practice, it is ſuppoſed, would often have a fine effect on the ſides of hills, mountains, and ſteeps, as well as upon the banks of rivers and lakes; in the laſt of which caſes, it would frequently be aſſiſted in connection with the removal of water, which can often be effected with eaſe: as, for inſtance, when a lake has an outlet, or when the channel of a river has conſiderable declivity. In all caſes where rocks are to be ſhewn, it is conſtantly the moſt preferable to exhibit erect, projecting, or at leaſt nearly perpendicular ſurfaces; as other kinds never occur in nature, except under the ſurface of water, or in barren deſerts: for although they were originally, or after convulſions of nature, left wholly naked, yet by time and circumſtances they have gradually become clothed on their upper ſurfaces by an earthy matter and vegetable productions.

Rocks may be concealed, it is imagined, either completely, or in a partial manner, and by any one or the whole of the materials which ſhew them. Complete concealment is, however, it is thought, rarely deſireable, except in caſes where the rocks are of the barren or diſagreeable kind; as in the inſtance of a perfectly naked ſurface of rocks, or ſmall naked angular fragments of them ſtaring through ground of uniform or ſimple ſurface: in the former of which caſes, they ſhould be covered with earth; and in the latter, be blown out of the ground by means of gunpowder,

powder, or dug out of it in other ways, as is frequently the cafe in forming and laying out ornamented grounds.

But partial concealment may often take place in circumftances of this kind, and is, it is fuppofed, beft effected by wood; and in cafe the form of the part or parts, which appear, be in the grand ftyle, and the concealment accomplifhed in a judicious manner, the imagination, which is ever ready to magnify the extent or power of indiftinct objects, will, it is fuppofed, conceive the reft to be much more noble, than if they had been of forms capable of being advantageoufly difclofed. Partial concealment may likewife fometimes be effected by earth or water, and even by buildings; in all of which, the general principles are the fame, it is fuppofed.

It is ftated, that in rendering rocks more characteriftic, the firft requifite is to attend to their general characters: thefe may either be grand, terrific, fanciful, or romantic and picturefque. Grandeur here confifts, it is fuppofed, commonly in the breadth of light and fhade, or the height of the maffes; and may be heightened by increafing thefe, either by removing fmall parts of the rock itfelf, or by clearing away the appertaining matters, which tend to conceal or injure the principal maffes. Romantic or terrific rocks may, it is thought, fometimes be improved by concealment or difclofure, but rarely by increafing their character. And thofe of picturefque beauty may often be operated upon with fuccefs, either by giving more breadth, variety, or intricacy to the rocks themfelves; or by covering them with vegetation; or planting trees before them, to effect variety or harmony; or bufhes and creepers above them, to hang over and produce fhade and intricacy. An excefs of intricacy is, however, fuggefted, as dangerous, and as tending more than any other quality to make a rock trifling. Crags are faid to be frequently trifling on this account, as well as the rock in different fituations. In fhort, the management of rocks, it is imagined, is yet very little, if at all, underftood in this country. In many parts they are indeed feen fhewn, but in fuch a way as that they appear little better than upright maffes of red earth. The fubject is unqueftionably deferving of more attention than it has hitherto met with, from the defigners of ornamented grounds.

Rock-*Work*, any fort of work or defign, which is formed of the parts or fragments of rocks, or large ftones, in gardens or pleafure-grounds.

All works of this nature fhould be contrived in fuch a manner, as to harmonize as much as poffible with the peculiarities of the fituations or places in which they are made. See Rock and Stone.

They were formerly much more common, in both thefe fituations, than they are at prefent.

Rock *Alum*. See Alum.

Rock-*Butter*, in *Mineralogy*, a faline mineral, formed in the fiffures of rocks of alum-flate. It occurs both maffive and ftalactitical, and fometimes pulverulent. It has a greyifh-white or a ftraw-yellow colour, and a fweetifh and fomewhat acidulous aftringent tafte, like alum. It is indeed a kind of native alum. The feel is fomewhat greafy, from which and its colour it has received its name.

Rock-*Cork*, *Suber Montanum*, a flexible and fomewhat elaftic mineral, found in mineral veins. It is fometimes maffive, and fometimes in laminæ or plates: thefe have been called rock-leather and rock-flefh. The common colour is a yellowifh-grey of various fhades: it is fometimes a yellowifh-brown and cream-colour. It has a fibrous ftructure, and but little luftre. The fractured furface is delicately uneven. This mineral is opaque, and very foft, yielding to the nail. It breaks with great difficulty, and cracks when handled: it is fo light as to fwim on water, and is almoft infufible in the flame of the blowpipe.

The conftituent parts, as given by Bergmann, are,

Silex	56.2
Magnefia	26.1
Alumine	2
Lime	12.7
Iron	3
	100

Rock-cork approaches in its nature to afbeftus, from which it differs principally by the promifcuous arrangement of the fibres.

Rock-*Cryftal*, the pureft variety of cryftallized quartz. (See Quartz.) This ftone is fometimes employed in jewellery, and is differently named, according to the places from whence it is procured, as Briftol ftone, Scotch pebbles, &c.

Rock-*Fifh*, a common Englifh name for the *gobius marinus*, or fea-gudgeon. See Gobius *Niger*.

Rock *Germander*, in *Botany*, a fpecies of *veronica*; which fee.

Rock-*Oil*. See Petroleum.

Rock-*Ouzel*, in *Ornithology*. See *Ring* Ouzel, and Amzel.

Rock-*Rofe*, in *Botany*. See Cistus.

Rock-*Salt*, in *Mineralogy* and *Geology*, a natural falt, of the fame kind as common table falt. This ufeful mineral forms large beds and maffes in many parts of the world, and even compofes entire mountains. It occurs in large columnar or in fpheroidal concretions, and alfo cryftallized in cubes. Rock-falt is fubdivided by Werner into two kinds, foliated and fibrous. The more common colours of foliated rock-falt are, white, grey, reddifh-brown, and red; but fometimes it is violet, fky-blue, and green, and is more or lefs tranfparent or pellucid: it breaks into cubical fragments, which have a vitreous luftre: the ftructure is indiftinctly foliated. In fibrous rock-falt the fibres are generally fmall and curved; in other refpects it differs little from the former. The tafte of both is like that of common falt. The red varieties are coloured by earthy matter and oxyd of iron; the white and tranfparent are extremely pure, being compofed almoft entirely of muriatic acid and foda, or, according to Davy, of chlorine and fodium. In the pureft kind alfo, there is fcarcely any trace of water of cryftallization. According to Henry, pure tranfparent rock-falt, calcined for half an hour in a low red heat, equal to four or five degrees of Wedgewood's pyrometer, loft abfolutely nothing of its weight. It is remarkable, alfo, that if free from any adventitious moifture, it may be fuddenly and ftrongly heated with fcarcely any of that found called decrepitation, which is produced by a fimilar treatment of all the varieties of manufactured common falt. The fpecific gravity of the pureft fpecimens of rock-falt is about 2.170, of the lefs pure about 2.130.

Rock-falt is widely diftributed over the globe; it appears principally in the lower fecondary ftrata. It is moft frequently accompanied with fulphate of lime or gypfum, and by beds of clay impregnated with falt. Befide the beds of rock-falt which are known, numerous brine-fprings in various parts of the world atteft the exiftence of this mineral deep under the furface, as it is evident thefe fprings percolate beds of falt, or ftrata impregnated with it. Several brine-fprings have recently been difcovered in the deep coal-mines of of Northumberland and Durham. In the coal-mines near Afhby-de-la-Zouch, in Leicefterfhire, there are fprings of brine 245 yards below the furface; and though thefe fprings are in the centre of the ifland, they are 140 yards below the level of the fea. How much deeper their fource may be, has not been afcertained.

The moft obvious hypothefis refpecting the formation of rock-falt is, the one which fuppofes that it was depofited from the fea, or by the deficcation of falt lakes which formerly covered the prefent continents. Againft this it has been objected, that the compofition of rock-falt is much more pure than the contents of fea-water, which contains a quantity both of muriate and fulphate of magnefia, fulphate of foda, and of fulphate of lime. Rock-falt is alfo found at great heights above the prefent level of the fea. Thefe objections will, in a confiderable degree, be invalidated by the confideration that whatever impurities there may be in fea-water, if the procefs of evaporation go on very flowly the falt will be cryftallized nearly pure. Of this we have an inftance in the fpecies of falt made at Lymington, in Hampfhire, called *falt cat*, which is gradually formed in the courfe of ten or twelve days, by fpontaneous evaporation of the liquor which drains from the common falt. This falt is fo pure (though evaporated from the moft impure part, the mother water, or refidue of fea-water), that 1000 parts contain only 12 of foreign impurities, or little more than one *per cent*. Thus if the deficcation of lakes or bafins filled with falt water were very gradual, as it muft be, except in the vicinity of fubterranean fires, the muriate of foda or rock-falt would be cryftallized before the other falts, which being more deliquefcent might be feparated and wafhed away. In this manner the fulphate of lime or gypfum, which exifts in fea-water, and accompanies rock-falt, may alfo have been depofited, and being nearly infoluble would remain.

The occurrence of rock-falt deep under the earth, or high above the level of the fea, can fcarcely form an objection to its formation from fea-water; for it is admitted by all geologifts, and is proved by undoubted facts, that the ocean once covered our prefent continents. Now by whatever procefs the dry land was raifed above the fea, whether by the elevation of the former, or the depreffion of the beds of the latter, extenfive hollows and clofed vallies muft have formed lakes of falt water, from which the falt might be depofited by evaporation. Some of thefe vallies or hollows would occur in elevated fituations. With refpect to the beds of rock-falt placed under other ftrata, however difficult it may be to explain the formation of the fecondary ftrata, the exiftence of organic remains in them prove that each ftratum was once the uppermoft part of the globe, and the ftrata by which it is covered were depofited upon it in fucceffive and probably at diftant periods. Nor is the difficulty greater with refpect to the ftrata covering rock-falt, than the ftrata covering coal and beds of coal-fhale abounding in vegetable impreffions. No organic remains have indeed been difcovered in the ftrata over the rock-falt of Chefhire, but they are commonly met with at greater depths over the rock-falt beds in Poland, and in other parts of Europe. The occurrence of rock-falt at the fides or feet of extenfive mountainous chains, may perhaps illuftrate its formation, as it is probable thefe extenfive chains once formed the boundaries of inland feas or lakes, when the relative level of the ocean and our continents was very different from the prefent.

Rock-falt is not mined in any part of our ifland, except Chefhire, though it was bored through at Droitwich; and it exifts, in all probability, in many of the weftern counties through which the red fand-rock extends. We have proofs of its exiftence from the brine-fprings at Droitwitch, in Worcefterfhire, at Lemington in Warwickfhire, and at Afhby Wolds, in Leicefterfhire; and alfo in the counties of Northumberland and Durham, on the eaftern fide of England. The fprings at Droitwitch furnifh a brine as ftrong as thofe of Chefhire. A defcription of the rock-falt of Chefhire being given as an article of rural economy, we fhall proceed to give a fhort account of the moft important repofitories of this ufeful mineral in other parts of the world.

Salt is very abundant in Africa; all the plains and fandy defarts are impregnated with falt, and the greater part of the fprings in thefe defarts are fo faline, that it is not poffible to drink the water. To the fouth of Abyffinia, at the feet of the mountains which feparate that country from that of the Gallas negroes, falt exifts in dry and folid maffes. The fummit of the mountains which border the defart to the weft of Cairo, prefents an immenfe plain covered with a mafs of falt. According to Horneman it is fpread over fo large a track of furface, that no eye can reach its termination in one direction; its breadth extends feveral miles. To the weft of the defart of Sahara are the great falt rocks of Tegaza, on the fouth-eaft frontier of the defart of Zuenziga, a little diftance from Cape Blanc. They are worked by the Moors. Thefe falt mines furnifh the white and coloured falt, which is carried by caravans to Cafnah and Tombuctoo, to fupply the Negro ftates; for it does not appear that there are any falt mines in Negro land properly called. The mines of falt fpread in that part of Africa which the ancients called Libya, have been well indicated by Herodotus, and it is in this country that he has defcribed buildings conftructed of rock-falt, like thofe in Caramania and Arabia. Other falt mines, according to Park, are found on the fouthern frontier of the great defart Sahara. Their produce is alfo fold to the Negroes on the borders of the Niger and the Jolibe. In the kingdom of Tunis, mount Had Delfa is entirely compofed of very compact falt of a red and violet colour. The lake des Marques, and the plains near it, alfo contain much falt. There are mines of rock-falt in the country of Bamba, in the kingdom of Congo. On all the weftern coaft of Africa there are falt lakes and marfhes. In the neighbourhood of the Cape of Good Hope, and in Caffraria, rock-falt is lefs common; but there are falt lakes to the eaft of the Cape, on the frontiers of Caffraria, which contain at the bottom beds of falt varioufly coloured.

Salt lakes exift in the Cape Verde iflands, and natural falt-marfhes, particularly in Bona Vifta.

Spain is the only country in the fouth of Europe which contains extenfive repofitories of rock-falt in confiderable maffes above the furface. It is found there in elevated fituations, forming entire hills: brine-fprings alfo iffue from the feet of the mountains which traverfe that country. According to the defcription of Mr. Bowles, the repofitory of rock-falt which lies between Caparofo and the river Ebro, is in a chain of hills which extend from eaft to weft. Thefe hills are compofed of lime-ftone, mingled with gypfum, the chain extending more than two leagues. In the moft elevated part is fituated the village of Valtierra, on a flope towards the middle of which is found a bed of rock-falt. It may be about 400 paces long, and 80 wide. The falt is contained in a bed of about five feet in thicknefs.

"I examined," he adds, "with attention thofe beds of falt; I compared them with the layers of earth and gypfum in which it is imbedded; I found the outfide layer to be compofed of gypfum; and, immediately afterwards, I met with two

two inches of white ſalt, ſucceeded by two inches of ſtony ſalt, and a layer of earth. I found others alternately compoſed of earth and ſalt to the very bottom of the mine, which is of gypſum, undulated like the other layers. The layers of ſaline rock are of a duſky blue, thoſe of ſalt are white.

"This mine is conſiderably elevated above the ſea, for you aſcend continually all the way from Bayonne.

"The ſecond hill is that of Cardona, in Catalonia, near the mountain of Montſerrat, ſixteen leagues to the N.W. of Barcelona, and a few leagues from the Pyrenees.

"The village of Cardona is ſituated at the foot of a rock of ſalt, which, from the ſides of the river Cardonere, ſeems nearly mural. This rock is a block of maſſive ſalt, which riſes from the earth about four or five hundred feet, without crevices, chaſms, or layers. No gypſum is found near it. This block is about a league in circumference; and its elevation is equal to that of the ſurrounding mountains: as its depth is not known, it is impoſſible to ſay on what it reſts.

"In general, the ſalt, from the top to the bottom, is white, though ſome parts are red; ſome is alſo found of a fine blue. There are alſo in Spain other repoſitories of rock-ſalt and ſaline ſprings. In La Mancha, at Almengranilla, there is a maſs of ſalt ſimilar to that of Cardona; it is ſeventy yards in diameter, mixed with ſulphate of lime, and covered with the ſame ſtone, including cryſtals of red quartz; above which are ſiliceous pudding-ſtones, and a ſtratum of carbonate of lime."

The mines of rock-ſalt that are wrought at Poza, near Burgos, in Caſtille, are remarkably ſituated, being placed in a vaſt crater. A French traveller, M. Fernandez, found pumice-ſtones, puzzolana, and other volcanic productions there.

Rock-ſalt is likewiſe found near Aranjuez and Ocanna, in the tranſition hills between Sierra Morena and Madrid.

On the north ſide of the Pyrenées no beds of rock-ſalt have been diſcovered, but numerous brine-ſprings occur, particularly at Salies: in the department of the Lower Pyrenées the ſoil is calcareous, and ſulphate of lime is found in the neighbourhood of the ſpring.

There are ſalt-ſpring at Salies, to the ſouth of Thoulouſe. alſo at Salins and Montmorat, in the department of the Jura; in the firſt of theſe the water contains fifteen *per cent.* of ſalt.

There are about twenty brine-ſprings in the department of La Meurthe, which contain, on the average, thirteen *per cent.* of ſalt. Theſe ſprings are at no great diſtance from each other; ſome are at the foot of the chain of Jura, the others at the foot of the Voſges: the product of theſe brine-ſprings ſupplies Switzerland with ſalt. There are ſalt-ſprings in the department of Mont Blanc, in the midſt of the Higher Alps. In the ſame department, near St. Maurice, there is a ſalt-rock near the region of perpetual ſnow, which is probably the higheſt ſituation in Europe where this mineral occurs. The rock conſiſts of gypſum, intermixed or impregnated with ſalt, which is extracted by ſolution in water; the inſoluble part remains porous and light. Various brine-ſprings alſo occur in other parts of France.

Though there are numerous brine-ſprings in the north of Germany, no beds of rock-ſalt appear on the ſurface, until we approach the circle of Auſtria and the neighbouring countries. The range of ſalt-rocks commences at Halle, in the Tyrol, paſſes through Reichenthal in Bavaria, and continues to Hallein in Salzburgh, Halſtadt, Iſchel, and Ebenſel, in Auſtria, and terminates at Auſſe in Styria. The ſalt at Halle is worked in a peculiar manner: parallel galleries are run into the rock, in theſe dykes are formed, and water is let into them, where it remains from five to twelve months. When the water is ſaturated, it is drawn off in pipes, and the ſolution is evaporated.

On comparing the geological ſituation of the greater part of the beds of rock-ſalt and brine-ſprings, it will be ſeen that they occur moſt frequently at the foot of high mountainous chains. The mines of rock-ſalt in Tranſylvania, Upper Hungary, Moldavia, and Poland, may be cited in further proof of this. Theſe mines are numerous, and very important from their extent, and the vaſt maſſes of ſalt they contain. They are found along the chain of the Carpathian mountains, and ſpread nearly in an equal degree on each ſide of the chain accompanying theſe mountains to the extent of more than two hundred leagues, from Wieliczka in Poland, towards the north, to Fokſzian or Rymnick in Moldavia, to the ſouth.

The ſtrip of land that contains the ſalt-rock or brine-ſprings, is near forty leagues broad in ſome parts. In it may be reckoned about ſixteen mines, that are worked for ſalt; forty-three indieations of mines that have never been wrought; and four hundred and twenty, or four hundred and thirty, brine-ſprings.

The moſt remarkable of theſe commence in the north-eaſt, and extend in a ſoutherly direction, including thoſe of Wieliczka, Bochnia, and Samber, in Poland; and ſome brine-ſprings in Buchovina and Moldavia, particularly near Ockna. On the ſouth-weſt of the chain, following the ſame direction, are thoſe of Sowar, near Eperies, in Upper Hungary; of Marmaroſch, in Hungary; of Dees, Torda, Paraid, and Viſackna, near Hermanſtadt, in Tranſylvania, &c.

The ſalt-mines of Wieliczka, near Cracow, and thoſe of Bothnia, which appear to be a branch of them, have become celebrated from the accounts given of them by almoſt every traveller who has viſited that country; many of their deſcriptions are too highly coloured. They are, indeed, very ancient, having been worked ever ſince the year 1251; but have nothing to diſtinguiſh them above others, except the extent of the works in the beds of rock-ſalt, the dimenſions of which ſtill remain unknown. The ground that covers the rock-ſalt is compoſed, like that over moſt other ſalt-mines, of alternate ſtrata of ſand, pebbles, and marle, including large blocks of ſalt. You go down to theſe mines by ſix ſhafts, of four or five yards in diameter. Various ſtructures have been formed in the body of the ſalt itſelf. We find there a ſtable, chambers, and chapels, all the parts of which, as pillars, altars, and ſtatues, are of ſalt. The ſhafts and galleries are perfectly dry, ſo that you are more incommoded by duſt than dirt. There are ſprings, however, both of ſalt water and of freſh in theſe mines. It appears that the air is not ſo foul in them as in moſt ſalt mines; but the workmen do not reſide in them, as ſome have aſſerted. In certain parts of the mine, hydrogen gas ſometimes collects and explodes.

The ſalt is cut out in little aſcending ſteps. It is formed into parallelepipedons, weighing about eighty or a hundred pounds, or into cylinders, which are put into caſks. This mine produces about ſix thouſand tons of ſalt every year.

According to the deſcription of Dr. Townſon, the ſalt in the upper mines does not form continuous ſtrata, or rocks, but exiſts in immenſe detached blocks or maſſes, imbedded in marle. He gives the following account of the ſtrata which cover the ſalt.

 Vegetable

	Yards.
Vegetable foil	4
Sandy clay	10
Fine fand effervefcing with acids	7
Marle with fand, containing fragments of fand-ftone	18
Sand-ftone	2
Marle mixed with falt, in fmall particles and cubes	40

At the depth of forty yards in this marle the falt is found. The blocks of this mineral are of fuch a fize, that in paffing through the galleries formed in them, fometimes the upper, and fometimes the lower end only of a block may be feen ; but often, though the galleries are three or four yards high, the breadth can only be obferved, and even in fome places the blocks of falt form the fides of the gallery for fifteen or twenty yards. Thefe blocks compofe the upper bed of falt, and from them the whole of what is called the green falt is obtained. This falt, which is of a greenifh or blackifh hue, owes its colour to numerous fine particles of a fubftance which feems to be of the nature of argillaceous fchiftus fcattered through it. This variety of falt, on account of its impurity, is retained in the country for home confumption. In this marle, alfo, blocks of fand-ftone are fometimes found imbedded, and the marle itfelf is ftrongly impregnated with falt. Lower down there is another bed of falt, called fzybicker falt, which is in fome places two or three yards thick ; it is of a purer quality than the former, and is exported to foreign countries. This variety of falt-rock is difpofed in very extenfive beds. The mine has been driven in one place twelve hundred yards, from eaft to weft, and four hundred from north to fouth ; falt being ftill found there. The utmoft extent is yet unknown. The nature of the ftratum beneath the fzybicker falt has not been afcertained ; for the miners, being apprehenfive of increafing the quantity of water, have never proceeded to a great depth in this ftratum. The greateft depth of the mine is two hundred and forty yards. It does not appear that the remains of organized bodies have been found in great abundance in the ftrata connected with the falt-rocks now defcribed. None have been obferved, according to Dr. Townfon's information, in the fzybicker falt, or the lower ftrata ; but fome have been feen in the marle which envelopes the block of green falt ; fuch as bivalve fhells, at the depth of feventy-two yards ; crabs' claws, at the depth of eighty yards ; and charred coal, mixed with falt and gypfum, at the great depth of two hundred yards.

From the circumftance of mafs being formerly celebrated in thefe mines two or three times a week, it has been faid that the workmen, to the amount of five hundred, live conftantly below ground. They do not, however, continue longer than their hours of working. To keep the mines dry, the falt water is drawn up in leathern facks, and is thrown away ; the fmall quantity of frefh water which they afford is referved for the ufe of the horfes which are employed in the fubterraneous operations. At the time Mr. Townfon vifited them, twenty-four horfes were conftantly kept below ground.

In the mine of Bochnia the falt prefents itfelf in a ftratum at once, and not in detached pieces. The ftrata of clay, as well as thofe of falt, are undulated, and not of an uniform thicknefs. The falt is fometimes brown, at others reddifh, and at others tranfparent. The different coloured falt is not arranged in parallel layers. The ftrata dip at an angle of about forty degrees with the horizon. Dr. Townfon informs us that very beautiful fpecimens of fibrous muriate of foda are found in it.

At Thorda the mafs of falt is divided into horizontal but undulated ftrata. Thefe ftrata are about eight or ten inches thick. The loweft are the moft undulated.

Near Ockna, in Moldavia, there is a hill of rock-falt, in many parts of which the falt appears expofed to view.

The mines on the fouth-eaft of the Carpathian chain appear more numerous, and are difperfed through a greater fpace of ground than thofe on the north-eaft. They are in general very near the furface. Some of thofe in Tranfylvania are fo to fuch a degree, that perfons are appointed to cover the falt with turf, when it is wafhed bare by the rain. Thefe maffes, however, are fo thick, that their bottom has never been found. They are not worked to the depth of more than a hundred and feventy or eighty yards, becaufe the extraction of the falt becomes then too expenfive. In the county of Marmarofch they have been wrought to the depth of upward of two hundred yards. Thefe mines contain likewife a great deal of petroleum, and the ground in which they are contained is every where furrowed by rivers. The mud interpofed between the water of thefe and the falt, is imagined to prevent the falt from being diffolved by them.

At Paraid, in Tranfylvania, there is a valley, the bottom and fides of which are of pure falt. Walls of falt appear there fixty or feventy yards high.

The mine of Eperies is three hundred and fixty yards deep.

In the falt mines of Marmarofch, water has been found included in the fubftance of the falt-rock.

The mines of the fouth-weft of the Carpathian mountains are generally wrought by means of fhafts. There are at leaft two to each mine ; one for the workmen, the other for drawing up the falt. The falt is cut out in afcending fteps, which produces empty fpaces, of a conical form, in the midft of the ftrata. The ladders reach perpendicularly to the bottom of this conical fpace : fo that within it they ftand perfectly detached. Thus the greater part of the body of falt is extracted, leaving empty fpaces, which are conical, and which communicate with one another by means of galleries. It has been thought, that, in order to leave lefs falt, it would be better to give thefe fpaces the fhape of a parabola. The falt is fo plentiful, that the miners are paid only for fuch pieces as weigh upwards of eighty pounds, the others being rejected as ufelefs. When the workmen are incommoded by water, it is drawn up in leathern bags, to be emptied out of the mine.

The Tranfylvanians and Moldavians extract falt from their brine-fprings, by throwing the water on wood fires, as the Gauls and Germans did in former times.

No falt-mine, or brine-fpring, is known either in Sweden, or in Norway.

There are a great number of both, and particularly of falt lakes, in Ruffia. Among thefe is the falt lake of Tor, towards the northern extremity of Little Tartary.

There are fimilar falt lakes in the Crimea.

At Balachna, on the banks of the Wolga, are fome very rich brine-fprings.

In Ruffia, in Afia, we find the brine-fprings of Permia, of which there are a great number at the foot of the mountains of Poyas.

About eighty verfts from Yena Tayeofka, in the defart between the Wolga and the Uralian mountains, there is a mine of rock-falt.

In the government of Aftracan, to the north of the Cafpian fea, in the environs of Orenburgh, and in the country of the Bafhkirians, falt lakes are very common, and the water evaporating during the fummer, the falt appears

appears cryſtallized on their ſurface, and round their borders. When this water is highly concentrated, it has a deep red colour. The ſalt formed in them has often the ſame hue; and when this is the caſe, it diffuſes a very perceptible violet ſmell.

One of theſe is the ſalt lake of Elton, above Aſtracan, in the re-entering angle formed by the Wolga. The Kalmucks called it the Golden lake, becauſe of its red appearance, when the ſun ſhines on it.

The lake of Bogdo, ſituate near this, yields a perfectly white ſalt, free from ſulphate of magneſia, and preferred to that of lake Elton.

Near Aſtracan, too, is the mine of Iletzki, celebrated for the quantity of ſalt it furniſhes. The ſalt lies at no great depth, and reſts on a very hard clay. The ſoil above it is ſandy, and full of holes, containing water ſaturated with ſalt.

In Siberia there is a mine of rock-ſalt on the right bank of the Kaptendoi; and on that of the Kawda are fourteen brine-ſprings. Others are found in the government of Kolivan, and in the environs of Irkutſk, near the lake Baikal, in the centre of Aſiatic Ruſſia. Laſtly, the country near the Caſpian ſea is ſo impregnated with muriate of ſoda, that in the environs of Gourief, the fogs and dew that ſettle on people's clothes, and on plants, are ſaline. Pallas.

Among the Mongul Tartars, the ſoil is ſo thoroughly penetrated with muriate of ſoda, that the people lixiviate it, and evaporate the ſolution to obtain ſalt.

That part of China, which borders on Tartary, contains ſalt-mines, and the ground is ſtrongly impregnated with ſalt.

Salt is found in the ſame manner throughout almoſt the whole table-land of Great Tartary, Thibet, Hindooſtan, and particularly Perſia, where very extenſive plains are ſeen covered with a ſaline efflorescence. The iſle of Ormus, at the mouth of the Perſian gulf, appears, according to the accounts of travellers, to be one large rock of ſalt. This ſubſtance is alſo found in ſolid maſſes near Balach, on the eaſtern ſide of Perſia. In the deſart of Caramania, according to Chardin, rock-ſalt is ſo abundant, and the atmoſphere ſo dry, that the inhabitants uſe it for building their houſes. It is found in the neighbourhood of Iſpahan, and in the mountains to the north of that city.

The repoſitories of rock-ſalt in America are leſs known. According to Ulloa and others, it is found in vaſt quantities in the elevated deſarts of Peru, at the extraordinary height of 10,000 feet, or more, above the preſent level of the ſea. It is extremely hard, forming ſolid, continuous rocks of a dull violet colour.

The mountain of Xaragua, in the iſland of St. Domingo, affords ſalt; and in the ſame iſland there is a very remarkable ſalt lake, about 22 leagues in circumference, called Henriquelle. The water, which is inhabited by lizards, alligators, and land-tortoiſes, all of a large ſize, is deep, clear, bitter, ſalt, and of a diſagreeable ſmell. Near the middle of the lake is an iſland, about ſix miles long and three broad, well ſtocked with goats, whence it has the name of Cabrito iſland; and in this iſland is a ſpring of freſh water.

Salt lakes occur in other of the Weſt India iſlands. In North America, weſt of the Alleghany mountains, in the ſtate of Kentucky, are numerous repoſitories of rock-ſalt and brine-ſprings: theſe are called *licks*, where the elks and buffaloes formerly repaired in herds, to lick the ſoil impregnated with rock-ſalt. On the weſtern ſide of the great river Miſſouri, a chain of mountains extends 80 miles in length, and 45 in breadth, and of conſiderable height: it conſiſts of pure rock-ſalt, barely covered with earth, but without any tree or ſhrub. Further weſt, in California, ſalt is found in a very pure ſtate, in large and ſolid maſſes.

From the preceding account it will be ſeen that this moſt uſeful mineral is found in every quarter of the globe; and in many parts it exiſts in maſſes of immenſe ſize and extent, compared with the rock-ſalt in our own iſland, in the county of Cheſter. Such, however, is the ſuperior induſtry of our inhabitants, that the quantity annually exported from that county alone greatly exceeds that procured from any other diſtrict in the known world, being not leſs than 140,000 tons, the produce of the ſalt-rock and brine-ſpring; while the celebrated mines at Wieliczka, in Poland, are ſtated to yield only about 6000 or 7000 tons. Where rock-ſalt is white or colourleſs, it is immediately applicable to all uſeful purpoſes; but when mixed with earthy matter, it is rendered pure by the ſimple proceſs of ſolution in water. The liquor is afterwards drawn off into pans, leaving the inſoluble part behind; and the water is then evaporated either by the natural warmth of the climate, or by fires. See SALT.

ROCK-*Salt*, in *Rural Economy*, that ſort of foſſile, rocky, ſaline material, which is dug out of the bowels of the earth, from different depths, in ſome parts of this and other countries, where it exiſts in layers of different thickneſſes. The beds of this kind of ſalt, which are found in the county of Cheſter, are highly intereſting and important to the country, whether conſidered as affording an article of manufacture and commerce, or as forming a ſource of revenue. The diſcovery of the beds or ſtrata of this ſort of matter, in this diſtrict, is, however, of no very remote date, as will be ſeen under the head of ROCK-*Salt Pits;* but the layers are pretty numerous, and of conſiderable extent, differing greatly in their purity, though, in many inſtances, requiring a greater or leſs degree of preparation before the ſalt can be uſed.

It is remarked by the writer of the account of the Agriculture of Cheſhire, that, from ſome experiments made on different ſpecimens of rock-ſalt, it would appear that the tranſparent kind of it is an almoſt pure muriate of ſoda, which contains no admixture of either earth or earthy ſalts; and that the colour of the leſs tranſparent and brown ſpecimens is derived from the earth that enters, in greater or leſs proportions, into their compoſitions. That on 480 grains of tranſparent rock-ſalt being diſſolved in four ounces of diſtilled water, there was, firſt, no precipitate let fall, on the addition of carbonate of potaſh. Secondly, no alteration was produced by this ſolution on blue vegetable juices. Thirdly, on the addition of a few drops of tincture of galls, a ſlight purple tinge was given to the ſolution; and after ſtanding ſome hours, there was a brown ſediment at the bottom of the veſſel. Fourthly, on the addition of muriate of barytes, there was no precipitate thrown down. From the firſt of theſe trials, it is ſuppoſed that rock-ſalt has no muriate of lime, or muriate of magneſia, combined with it; from the ſecond, that it has no uncombined acid or alkali; from the third, that it contains ſome portion of iron; and from the fourth, or laſt, that there is no ſulphate of lime contained in it.

And that, on examining different ſpecimens of the leſs tranſparent, and the brown rock-ſalt, with the ſame reagents as in the above trials, it was found that theſe conſiſted of muriate of ſoda, or ſea-ſalt, in combination with a certain proportion of earth, varying in quantity from one to thirty *per cent.*; alſo, that the earth was wholly the argillaceous or common clay; but that ſome of the ſpecimens contained a few grains of ſulphate of lime, in 480 of thoſe of the rock-ſalt.

The beds of this ſalt are now well known to be the principal

cipal cauſe of the ſalt-brine ſprings in this county; and, in connection with ſome other circumſtances, to have a great ſhare in cauſing the vaſt differences in their ſtrength, in different places. See SALT-*Brine Springs*.

This is a ſtrong ſort of ſalt, which is found uſeful for a variety of domeſtic purpoſes, according to the different manner in which it is prepared, or the difference in the ſize of the particles or cryſtals of which it is compoſed, as will be more fully ſhewn under the head SALT.

Although rock-ſalt is found in various parts of the above diſtrict, there are no pits of it wrought at preſent, except in the vicinity of Northwich. And part of the inferior rock-ſalt, which is procured there, is, it is ſaid, uſed at ſome of the refineries in that neighbourhood; and a further quantity ſent down the river Weaver, for the ſupply of the refineries at Frodſham, in the ſame county, and thoſe on the banks of the Merſey, in Lancaſhire. The purer rock-ſalt, or that which is called in general Pruſſian rock, is carried by the ſame conveyance to the port of Liverpool; whence, according to the above writer, it is exported chiefly to Ireland, and the ports of the Baltic. The annual quantity of rock-ſalt ſent down the firſt of the above rivers is found, on the average of the laſt ten years, to be 51,109 tons. But in this, it is obſerved, is included what is uſed at the Frodſham and Lancaſhire refineries, which may probably be about one-third of the whole. And it is added, that it appears, from the report of the committee of the houſe of commons, appointed to inquire into the laws reſpecting the ſalt duties, printed in June 1801, that,

in 1798	were exported	20,162	tons of rock-ſalt.
1799		33,913	
1800		34,939	

Of this quantity,

in 1798, - -	16,095	tons
1799, - -	22,374	
1800, - -	19,663	

were ſent to different ports in Ireland: the remainder was principally exported to Denmark, Ruſſia, Sweden, Pruſſia, and Germany. However, a ſmall quantity went to Guernſey, Jerſey, and the Weſt Indies.

This ſhews, in a ſtriking manner, the great utility and advantage of this article in a manufacturing and trading point of view, as well as in other ways.

In regard to the original formation of the beds or ſtrata of rock-ſalt, in this and other countries, different theories, opinions, and conjectures, have been formed and propoſed; but it is one of thoſe geological queſtions which is extremely embarraſſing in its nature, and very difficult in its ſolution. Mr. Holland has, however, in the above work, ingeniouſly ſtated ſeveral ſuppoſitions on the ſubject, and the objections to which they are expoſed. It is remarked, that wherever rock-ſalt is met with, ſulphate of lime ſeems to be very generally diſcovered in mixture with the earthy ſtrata above it. And the writer of the "Memoire ſur le Ser Marin," in the 11th volume of the Annals of Chemiſtry, it is added, informs us, that this is the caſe in Poland, Tranſylvania, and Hungary; alſo, that there is commonly a layer of gypſum betwixt the ſtrata of ſtone and the bed of ſalt. This gypſeous layer is of different colours, and is found cryſtallized, ſtriated, and mixed with marine ſhells. The gypſum above the beds of rock-ſalt in Cheſhire is, in like manner, found cryſtallized and ſtriated; but no marine exuviæ, or organic remains, it is obſerved, are ever met with in any of the ſtrata. Nor does gypſum accompany it, as is uſual in other places, as near Cordova, in Spain, where rock-ſalt forms a mountain 500 feet in height, and three miles in circumference, as noticed by Kirwan and Townſhend. Jars, the author of the "Voyages Metallurgiques," who, it is aſſerted, has given the moſt particular account we have of the upper ſtratum of rockſalt about Northwich, remarks, that "it appears to have been depoſited by layers or beds of ſeveral colours;" and that "theſe layers of ſalt are in ſuch a poſition, as to lead us to believe that the depoſition of it was made in waves, ſimilar to thoſe which are formed on the ſea-coaſt."

This, Mr. Holland ſays, coincides with an opinion ſuggeſted by Mr. Stanley, a friend of his, in regard to the probable origin of the beds of rock-ſalt, now in exiſtence in this diſtrict; who ſtates that rock-ſalt is there found in ſeveral ſtrata, one above the other, with intermediate beds of indurated clay, in the vallies of the Weaver, and thoſe of the other rivers and brooks emptying themſelves into it; but that it has never been found ſo near the ſurface, as to be above the level of the ſea, or beneath any ſolid rock. If beds of rock-ſalt are to be conſidered as ſo many depoſits of ſalt from ſea-water, we muſt ſuppoſe the ſea, at ſome former period, to have occupied the vallies in this county; and that, from time to time, the communications were interrupted between theſe vallies (then deeper than they are now) and the ſea. Earthquakes, or accumulations of ſand in the eſtuaries of the Merſey and the Dee, might, it is contended, have cauſed the interruptions. Whenever the ſea-water in the vallies became ſeparated from the ſea, the ſalt contained in it would ſubſide, by the natural proceſs of evaporation. This, it is ſuppoſed, would the more eaſily have taken place, if, by any ſubterraneous fermentation, the ground below the water ſhould have been heated. To account for a greater accumulation of ſalt than the ſea-water filling all the loweſt parts of the diſtrict would contain, we muſt ſuppoſe, it is ſaid, that the obſtruction interpoſed between the vallies and the ſea had been repeatedly broken down, and renewed again. Tides, unuſually high, might occaſionally overcome the reſiſtance of the accumulated ſand; and if the intervals between the inundations were only of ſhort duration, a ſubſidence of ſalt might take place, equal to the formation of the thickeſt ſtratum of the rock-ſalt now exiſting. Long intervals between the inundations would admit of an accumulation of clay, and other earthy particles, over the ſalt thus depoſited; and in this manner would be formed a new baſis for another ſtratum of rock-ſalt to repoſe upon. Thus, it is thought, the regular and aſtoniſhing exiſtence of the ſalt ſtrata may be accounted for, without neceſſarily ſuppoſing them coeval with the original formation of the earth: but to confirm the theory, it is ſuggeſted that much obſervation and cloſe inquiry into the natural hiſtory of the county would be required.

Mr. Holland, however, juſtly thinks that there are many objections to the theory which ſuppoſes the beds of rock-ſalt, in this diſtrict, to have been formed by depoſition from the waters of the ſea; ſome of which he ſtates rather for the ſake of promoting diſcuſſion and inquiry, than of affording any very decided opinion on a matter of ſo much doubt, uncertainty, and obſcurity. Though on making a perpendicular ſection of the upper bed of rock-ſalt, an irregular ſtratification, ſuch as noticed by Jars, may, he ſays, by frequent accurate examination, be obſerved, the general appearance of the ſides of the openings, whence the rock-ſalt is taken, is that of a confuſed and irregular red maſs; in which ſome portions of ſalt have a greater, others a leſs, proportionate admixture of earth; while, here and there, they may be ſeen perfectly pure and tranſparent. He, therefore, aſks, is it likely that this irregularity and confu-

ſion

ſion would have exiſted, had the beds of rock-ſalt in this diſtrict been formed by the evaporation of ſea-water inundating the land at certain intervals of time, as the above theory ſuppoſes? On the contrary, ſays he, would it not be natural to expect from reaſonings, *à priori*, that the ſalt, thus depoſited from ſea-water, would be diſpoſed in layers perfectly regular, and differing from one another merely in thickneſs, or a few other circumſtances of inferior moment?

Another fact which, it is ſuppoſed, invalidates, in ſome meaſure, the notion that the rock-ſalt has been depoſited from the waters of the ſea, is the great diſproportion of quantity, ſhewn by analyſis to exiſt, between the earthy ſalts contained in the brine of this diſtrict, and thoſe held in ſolution by ſea-water; the ratio here being as one to ten, or the proportion which the earthy ſalts bear to the pure muriate of ſoda in ſea-water is ten times greater than that which prevails in the Cheſhire brine. The aſcertaining of this fact proves, it is ſuppoſed, that the rock-ſalt (from the ſolution of which the brine is formed) is combined with a much ſmaller proportion of earthy ſalts than exiſts in ſea-water; a circumſtance difficult to be accounted for, on the ſuppoſition that the beds of this ſubſtance were formed by the evaporation of the ſea-water, occupying the vallies and loweſt parts of the land. It muſt be noticed, however, as worthy of attention, that the earthy ſalts, intermixed with the rock-ſalt in the above diſtrict, are the ſame which are held in ſolution by ſea-water, being principally muriated magneſia and ſulphate of lime.

There is, however, a ſtill ſtronger proof, it is ſuppoſed, againſt the notion that the beds of rock-ſalt in this county are depoſitions from the ſea-water, in the circumſtance that no marine exuviæ have ever been diſcovered in the ſtrata. This, it is imagined, would almoſt indubitably have been the caſe, had the land been covered with ſea-water during a period of ſufficient length for the depoſition of beds of ſalt of ſuch prodigious thickneſs; and the fact, that no ſuch exuviæ do actually exiſt, is ſuppoſed in itſelf ſufficient to induce a ſuſpicion that the theory in queſtion cannot be well founded. Other objections too, it is obſerved, offer themſelves to its validity; ſuch as the enormous depth of ſea-water neceſſary to the production of a body of rock-ſalt forty yards in thickneſs; the difficulty, if not impoſſibility, on ſuch principles, of accounting for the formation of the ſingular inſulated mountain of rock-ſalt at Cordova, in Spain; with others of a more trivial nature, which will readily preſent themſelves in this inquiry.

It is, however, at the ſame time candidly acknowledged, that there are many facts and circumſtances of actual obſervation, that confer a ſtrong degree of plauſibility on the opinion, againſt which it has been contended. The certainty that the ſurface of the county was at ſome former period much lower than it is at preſent, and the diminution of the thickneſs of the ſtrata of rock-ſalt in proportion as they recede from the ſea, are circumſtances which undoubtedly range themſelves on this ſide of the queſtion: and, upon the whole, it is thought, that it may be doubted whether the theory, which regards the beds of rock-ſalt as depoſits from ſea-water, does not accord more exactly with exiſting appearances, than any other which has been adduced on the matter.

It is ſuppoſed that many things, which at firſt ſeem objections, may be obviated by a reference to the principles of the Huttonian theory of the earth, and the excellent illuſtrations of it by profeſſor Playfair. However, in the preſent ſtate of our knowledge, any opinion formed on the matter muſt, it is imagined, from its very nature, be purely theoretical. See Rock-*Salt Pits*.

Rock-*Salt Pits*, ſuch pits, ſhafts, mines, or openings, as are dug or made in any other manner in the ground, for the purpoſe of getting and raiſing rock-ſalt from them. Pits of this ſort are met with in many parts of the county of Cheſter, which are wrought to very conſiderable extents, and are of great importance to the intereſts of the diſtrict in many different ways, as well as to the nation in general, as may be ſeen under the head Rock-*Salt*.

According to the ſtatement of Mr. Holland, in his Agricultural Survey of the above county, the firſt bed and pit of ſalt-rock was found and wrought in Marbury, at a ſmall diſtance from the town of Northwich, at the depth of about thirty yards from the ſurface, in the year 1670, when ſearching for coal. The bed was thirty yards in thickneſs, and reſted upon a ſtratum or layer of hard clay. In conſequence of this diſcovery, other ſimilar attempts were made; and on ſinking ſhafts or pits any where in the vicinity of it within the ſpace of half a mile, it was found to exiſt at about the ſame depth from the ſurface of the earth, when not prevented from being dug down to by brine-ſprings or thoſe of common water. This continued the only place in which it was found until the year 1779, when this ſort of rock was again met with in ſearching for brine in the neighbourhood of Lawton, at the depth of about forty-two yards, but only of the thickneſs of about four feet; there being beneath it a bed of indurated clay ten yards in thickneſs, which being penetrated through, a ſecond ſtratum of rock-ſalt was diſcovered twelve feet in thickneſs; and on continuing the ſinking of the pit, another layer of indurated clay, fifteen yards in thickneſs, was paſſed through; below which appeared a third ſtratum of rock-ſalt, which was ſunk into not leſs than twenty-four yards; the loweſt fourteen yards, being the pureſt, or the leaſt mixed with other ſubſtances, were the only parts that were wrought.

Until this period, in the neighbourhood of Northwich, no attempts had, however, been made to ſink pits in order to find a lower ſtratum of rock-ſalt; as the one which had been firſt met with was ſo thick, and furniſhed ſuch an abundant ſupply for every demand, there could be no other inducement to this than the expectation of meeting with a ſtratum, at a greater depth, which might contain a leſs admixture of earthy matters. It would ſeem, too, that the fear of meeting with ſprings below, which might impede the working out of the materials from the pits, and even render this wholly impracticable, prevented the proprietors of them from ſinking deeper. As, however, no inconvenience or interruption of this nature had occurred, on ſinking through different alternate ſtrata of rock-ſalt and clay at Lawton; and it had been found that there was a lower ſtratum of rock-ſalt there, which was more pure than thoſe nearer the ſurface, the owners of one of the works or pits in this vicinity were induced, a little time after the trials at Lawton, as in 1781, to ſink deeper than had yet been done, and to paſs through the bed or body of indurated clay lying underneath the rock-ſalt, which had been ſo long known and wrought. This indurated clayey material was found to be from ten to eleven yards in thickneſs; and immediately beneath it a ſecond ſtratum of rock-ſalt was met with, the upper part of which differed little in purity from that of the higher ſtratum or layer of rock; but on penetrating into it to the extent of from twenty to twenty-five yards, it was there found to be much more pure and free from earthy admixture.

ture. But it continued to have this increafed degree of purity for four or five yards only; while, for fourteen yards ftill lower, to which depth the pit or fhaft was funk, the proportion of earthy matter was again as large as in the upper part of the ftratum. It was therefore, on this account, thought ufelefs to fink the pit to any greater depth. Many other proprietors of pits, fhafts, or mines, in the fame neighbourhood, it is ftated, followed the example which had been thus fet them; and penetrated through the bed of indurated clay lying beneath the upper ftratum of rock-falt. A fecond ftratum of rock-falt was conftantly met with below this; and on paffing down into it, the fame order of difpofition as to purity was obferved, as in the pit or mine in which it had been firft noticed and examined; and the fame has been found to prevail in all the pits, fhafts, works, and mines, which have fince been funk in the fame vicinity.

It is further noticed, that there is great uniformity in the ftrata which are paffed through in finking pits for rock-falt or brine; and that they very generally confift of clay and fulphate of lime mixed in various proportions; that of the latter fomewhat increafing as the pit, fhaft, or work approaches the rock or brine. The workmen diftinguifh the clay by the appellation of *metal*, giving it the name of red, brown, or blue metal, according to its colour; and the fulphate of lime by that of *plaifter*. See Quarry.

The ftrata formed by thefe are, in general, clofe and compact; allowing very little frefh water to pafs through them. In fome places, however, they are broken and porous: and they admit fo much frefh water into the pit or work, that whenever they have been met with, it has been ufual to difcontinue any attempts to pafs through them in finking the pits. In thefe places the workmen call the metal *faggy*. It was thought not only impracticable to overcome a water, which vulgar prejudice had magnified into a great ftream running under ground; but it was believed, even if the finking could be continued below this, that the water could not be kept out of the pit, fhaft, or work, and that it would either weaken the brine fo as to deftroy its value, or would find its way into the cavity of any rock, pit, or mine which might be found below it. Later experience, it is faid, has proved, that thefe ideas were not altogether well founded. A few years ago an attempt was made in Witton to pafs through this porous ftratum, in order to get to the brine. It was met with about twenty-eight yards from the furface; the thicknefs of it was about thirteen feet; and the quantity of water, which was forced through it into the pit or fhaft, was three hundred and fixty gallons a minute. By means of a fteam-engine, the finkers were enabled to pafs through this water; to fix a gauge or curb a few yards below it, in a ftratum of indurated clay; and thence to bring up a wooden frame, fupporting a wall of puddled earth twelve inches thick, by which the accefs of the frefh water into the pit or fhaft was in a great degree prevented, and an opportunity given to pafs down to the brine below. A fhaft was afterwards funk through this porous ftratum, for the purpofe of obtaining rock-falt; which object was, after a fhort time, defeated, by the influx of brine into the fhaft at the furface of the upper ftratum of rock-falt; an accident originating in a caufe completely diftinct from the frefh water in the porous ftratum or bed. An exact fection of the different ftrata funk through in reaching the fecond bed of rock-falt in the pit at Witton, near Northwich, is given by Mr. Holland in the above report; and all the ftrata in the neighbourhood of the laft town are fuppofed to have nearly a fimilar difpofition. The inclination of them in the pit or fhaft at the above place was from north-weft to fouth-eaft; and the dip about one yard in nine. The ftratum through which the frefh water flowed is fhewn, and the level it found, it is faid, was fixteen yards from the furface, which, it is remarked, nearly correfponds with that of the brook below. The line of feparation between the loweft ftratum of earth, and the firft of rock-falt, is very exactly defined; they are perfectly diftinct, and do not at all run into each other. It is farther noticed, that in carrying a horizontal tunnel for one hundred yards along the upper ftratum of rock-falt, this was found to be irregular and unequal on its furface; the irregularities in a great meafure correfponding with thofe on the furface of the ground above.

The higheft bed or body of rock-falt in the pits near Northwich is the thickeft in thofe fituated the moft to the north-eaft, gradually declining in thicknefs towards the fouth-weft, fo as to lofe one-fixth of it in the courfe of about a mile. It decreafes from about thirty yards in thofe the fartheft to the north-eaft, to about twenty-five in that the moft to the fouth-weft.

A fingular appearance is remarked to prefent itfelf on making a horizontal fection of the ftratum of rock-falt in the pits: on the whole of the furface made by fuch a fection, various figures, it is faid, may be obferved, differing in form and fize, fome of them being nearly circular, others approaching more to an oval form, while in many an irregular pentagon may be traced. Some of them are not more than two or three feet in diameter; others are ten or twelve feet. The lines which form the boundaries of thefe figures are white, and from two to five or fix inches wide. On examining thefe appearances, they are found, it is faid, to be owing to the rock-falt, in the white lines forming the divifions of the figures, being perfectly pure, and free from earthy admixture. When combined with the falt, having earth in various proportions mixed with it, a general effect is produced, it is faid, not very diftantly refembling mofaic work. This difpofition is uniformly obferved, it is faid, throughout the whole thicknefs of the ftratum of rock-falt; and that in whatever part of it fuch a fection as the above is made, fimilar appearances are met with. To what caufe it has been owing that the rock-falt has been depofited in this fingular manner, it is thought difficult to conceive. The whole ftratum of rock-falt may, it is fuppofed, be compared to a mafs of bafaltic columns; the lines of feparation in each pillar being marked by the pure and tranfparent white falt. Thefe appearances, it is noticed, afford feveral grounds for inferences favourable to the theory of the earth mentioned under the head rock-falt, to the illuftrator of it. See Rock-*Salt*.

It is likewife further obferved, that the divifion betwixt the lower portion of the upper bed of rock-falt, and the indurated clay or ftone beneath it, in pits of this kind, is as exactly defined, as that between the upper portion of it and the earth above. That in paffing through this ftone fmall veins of rock-falt are met with, here and there running in it, in various directions; and that wherever there has been any little crevice in it, it is found filled up with rock-falt, to which the clay and oxyd of iron have given a deep red tinge. The thicknefs of this ftratum of ftone is faid to be uniformly found to be from ten to eleven yards; and the lower part of it is as diftinct from the fecond bed of rock-falt, as its upper part is from the firft: alfo that its termination is equally abrupt or fudden.

And that the perpendicular section of the second bed of rock-salt varies little from that of the upper bed, till it has been penetrated about twenty yards from the surface, when it assumes a more stratified appearance, and is here found, as already noticed, to have a much smaller proportion of earth combined with the muriate of soda. A section of this stratum, similar to the above, displays the same figured appearance in the roof of the pit, as that of the upper stratum.

In the very instructive report mentioned above, the writer has given a coloured representation of the roofing of a rock-salt pit, and another of the part where the lower surface of the upper bed of rock-salt joins the inferior clayey or other strata. These, as well as other matters in that work, are particularly worthy of the attention of the inquirer on this subject.

But though beds of this sort of material have been occasionally met with in some other parts of the same district, they have not been wrought, principally on account of the want of water carriage: as the working of those pits at Lawton was soon discontinued, it is now only from the pits in the neighbourhood of the town of Northwich that rock-salt is procured. At this time there are ten or twelve in number; at all of which the rock is wrought in the lower stratum or bed only. The pits or shafts are for the most part square, and built or formed with timber; but there is one at the distance of about a mile from the town of Northwich, which is of a circular form, and built in brick-work.

In regard to the manner of working the pits or mines, there is nothing of any very great interest or moment to be noticed. By means of boring and blasting the rocky stratum, and the use of wedges with the different mechanical instruments employed in mining, the salt-rock is separated, so as to be raised in large masses, which vary in form and purity. However, before any considerable extension of the workings in the pits, in any particular direction, takes place, care is taken to make sure of a good safe open roofing for the cavity which is to be formed in getting out the rock. In doing this the workmen make use of pointed implements of the common pick kind, working the materials out in an horizontal manner, so as to form an excavation in the rock, and making it in as simple a way as possible, or as the work will admit. In consequence, however, of its being situated a few feet above the purer part of the stratum, the rock which is obtained during this process is commonly of inferior quality, and is, for the most part, made use of in the refineries. The depth of the workings from the excavations or roofings, it is remarked, depends in a great measure upon the nature of the stratum, and the proportion of it occupied by the rock of the purer quality, or, as it is termed, *Prussian rock*. Fifteen or sixteen feet may perhaps, however, be taken, it is thought, as the average depth of the workings in the pits. The cavity thus formed presents a striking appearance; and when illuminated by candles fixed in the rock, the effect, it is asserted, is highly brilliant. In some of the pits or shafts, the excavated roofs are supported and kept up by pillars eight or ten yards square, which are in general arranged with a degree of irregularity: others are worked out in aisles; the choice here however seems to be wholly arbitrary, depending on the men who are employed in the work. Until these few late years, horse labour was wholly employed in raising rock-salt from the pits and shafts about the town of Northwich; but this method has now, in some measure, given way to the best kind of steam-engine, which has been substituted in its stead, in many of them with very great advantage. In others, however, horse labour is still continued to be made use of for this purpose. The men who are employed in working the rock-salt pits, have their pay by the quantity of the material which they raise, having in general somewhat less than half a crown for the ton weight, they finding tools and every thing else necessary for the work.

ROCK-*Fish Creek*, in *Geography*, a river of Virginia, which runs into James river. At the mouth of this river is a precipice, hanging over a navigable part of the river, formed of marble, variegated with red, blue, and purple. N. lat. 37° 37′. W. long. 78° 54′.

ROCK-*Castle River*, a river of Kentucky, which runs into the Cumberland, N. lat. 36° 43′. W. long. 84° 14′.

ROCK *Point*. See PUNTA *de Calenduras*.—Also, a cape on the N. coast of the island of Cumbava. S. lat. 8° 8′. E. long. 118° 35′.

ROCK *River*, a river of America, which runs into lake Michigan, N. lat. 37° 37′. W. long. 83° 35′.

ROCK *Town*, a town of Africa, on the Grain Coast. N. lat. 4° 35′. W. long. 7° 50′.

ROCKAWAY, a small post-town of America, in Morris county, New Jersey, on the S. side of a river of the same name; 15 miles N. by W. from Morristown.

ROCKBENT, a township of Pennsylvania, in Lancaster county, containing 1026 inhabitants.

ROCKBRIDGE, a mountainous county of Virginia, bounded N. by Augusta, and S. by James river, which divides it from Botetourt county. It contains 10,318 inhabitants. The famous natural bridge is in this country. Here is an useful academy, for twenty to forty students, liberally endowed by the late general Washington, and called, after him, "Washington Academy." The chief town is Lexington.

ROCKCASTLE, a county of Kentucky, containing 1731 inhabitants.

ROCKEN, a cape on the S. coast of the Isle of Wight. N. lat. 50° 34′. W. long. 1° 13′.

ROCKENBACH, a town of Germany, in the principality of Culmbach; 5 miles N. of Neustadt.

ROCKENHAUSEN, a town of France, in the department of Mont Tonnerre, and chief place of a canton, in the district of Kaiserslautern; 10 miles N. of it. The place contains 940, and the canton 5129 inhabitants, in 17 communes.

ROCKENHOF, a town of Germany, in the territory of Nuremberg; 8 miles N.N.E. of Nuremberg.

ROCKET, in *Pyrotechny*, an artificial fire-work, consisting of a cylindrical case of paper, filled with a composition of certain combustible ingredients; which being tied on a stick, mounts into the air to a considerable height, and there bursts.

The rocket has a great part in all fire-works of entertainment, being not only used singly, but sometimes also as an ingredient in others.

Besides the rocket here defined, which is properly called the *sky-rocket*, there is another, which, from the sphere it moves in, *viz.* the water, is denominated *water-rocket*. For the mechanism, preparation, &c. of each of them, we refer to the article PYROTECHNY.

Dr. Pemberton, in his Chemistry, p. 209, &c. has given the following concise account of rockets. A rocket (he says) is a hollow cylinder, usually made of paper, of a thickness equal to about one-sixth of its diameter within, and filled with gunpowder, or some like composition. If a rocket a rocket be made of great bignefs, intended for a fignal in war, or fuch like ufe, its cafe may be made of a more folid material.

Near one end the cafe of the rocket is drawn in, till its diameter be reduced to one-half of the whole internal diameter. This place is ufually called the choke. The moft approved length of the cafe, from the choke, is about fix times its internal diameter, to be filled with gunpowder ; if the rocket be fmall, beat into fine duft, and rammed in with as even ftrokes as can be, that the powder be uniformly compreffed. In great rockets, the charge is ufually a little weakened by adding to the gunpowder a fmall portion of charcoal and of fulphur.

To the end of the rocket is added a cylindrical cavity, not above half the length of the rocket from its choke in height, and of fuch a diameter, that, together with the materials put into it, it may not exceed the weight of the reft of the rocket. Thefe materials, befides fome corn powder to burft the cafe, confifts of fome compofition, that may give the appearance of ftars, a fhower of fire, or the like.

Thefe fiery fhowers may be made of faw-duft, boiled in water, ftrongly impregnated with nitre, and while wet rolled among gunpowder in duft ; or by gunpowder mixed with melted brimftone, and when cold, grofsly beaten.

Thefe ftars are a mixture of gunpowder, nitre, fulphur, antimony, camphor, and the like combuftible materials, moiftened with a folution of fome gum, in order to form pellets of a convenient fize. Thefe pellets are to be covered over with thread, well foaked in a ftrong folution of nitre, and while wet rolled in gunpowder. To charge the rocket with larger balls, any of the aforefaid ingredients (of which nitre, in a fufficient quantity, muft always be one) may be mixed with turpentine, melted pitch, or rofin, and tow fteeped in it. In this way larger balls may be formed, which fhould be covered over with thread, prepared as juft now defcribed.

It is neceffary for giving the rocket a fufficient degree of motion, that the powder within the rocket be bored with a tapering cavity from the choke. At the choke this cavity muft be as wide as the choke itfelf ; at the farther end it need not be more than one-half that width. The length of this bore muft be but one inner diameter of the rocket fhort of the whole height to which the rocket is rammed. The ufe of this bore is to increafe the furface, that takes fire at once ; that a greater body of fire may iffue out of the mouth of the rocket. For from the vehemence with which the fire iffues out, the rocket receives its motion. Rockets are ufed in all fire-works that have motion, except fuch as are thrown into the air after the manner of bombs. When the rocket is defigned to mount upwards, a ftick, eight or nine times the length of the rocket, is tied to it, fufficient to poife the rocket at an inch or two from its mouth.

Rockets, *Sky, Theory of the Flight of.* Mariotte takes the rife of rockets to be owing to the impulfe or refiftance of the air againft the flame. Dr. Defaguliers accounts for it otherwife, as we fhall ftate in the next article, with remarks upon the theory. We fhall here add, that the ftick is attached to keep it perpendicular; for if the rocket fhould begin to tumble, moving round a point in the choke, as being the common centre of gravity of rocket and ftick, there would be fo much friction againft the air, by the ftick between the centre and the point, and the point would beat againft the air with fo much velocity, that the re-action of the medium would reftore it to its perpendicularity. When the compofition is burnt out, and the impulfe upwards is ceafed, the common centre of gravity is brought lower towards the middle of the ftick ; by which means the velocity of the point of the ftick is decreafed. and that of the point of the rocket is increafed ; fo that the whole will tumble down, with the rocket end foremoft.

All the while the rocket burns, the common centre of gravity is fhifting and getting downwards, and ftill the fafter and the lower as the ftick is lighter ; fo that it fometimes begins to tumble before it be burnt out : but when, the ftick being a little too heavy, the weight of the rocket bears a lefs proportion to that of the ftick, the common centre of gravity will not get fo low, but that the rocket will rife ftraight, though not fo faft.

Mr. Robins, confidering the great ufe that may be made of rockets, in determining the pofition of diftant places, and in giving fignals for naval and military purpofes, procured fome, with a view of afcertaining the height to which they rife, and the diftance at which they may be feen. The greateft part of them did not rife to above 400 yards, one to about 500, and one to 600 yards nearly. The greateft diftance at which thefe were obferved, was from 35 to 38 miles. Others were fired at a different time ; one of which rofe to 690 yards ; and it was obferved, that the largeft, which were about $2\frac{1}{2}$ inches in diameter, rofe the higheft. In fome fubfequent experiments, conducted by M. Da Cofta, Mr. Banks, &c. it was found that of two rockets, of about $3\frac{1}{2}$ inches diameter, one rofe to about 833, and the other to 915 yards. In another trial, a rocket of 4 inches diameter rofe to 1190 yards. In other experiments, a rocket of $1\frac{1}{2}$ inch rofe to 743 yards ; one of 2 inches to 659 ; one of $2\frac{1}{2}$ inches to 880 ; another of the fame fize to 1071 ; one of 3 inches to 1254 ; one of $3\frac{1}{2}$ inches to 1109 ; and one of 4 inches rofe to near 700 yards, and, turning, fell to the ground before it went out. Befides thefe, there was one of the rockets of 24 inches in diameter, which rofe to 784 yards, and another of the fame fize to 833 yards. From thefe experiments it is inferred, that rockets from $2\frac{1}{2}$ to $3\frac{1}{2}$ inches in diameter are fufficient to anfwer all the purpofes for which they are intended ; and they may be made to rife to a height, and to afford a light capable of being feen to confiderably greater diftances than thofe juft mentioned. The manufacture of large rockets is expenfive ; and they are more uncertain than thofe of a fmaller fize. Phil. Tranf. vol. xlvi. p. 578, &c. or Robins's Math. Tracts. vol. i. p. 317, &c.

To prevent mifchief from the fall of the rocket-fticks, which are fometimes very heavy, they now bore the fticks of large rockets, and fill them with powder, that they may fhiver in the air before they fall. See Fire-*Works*.

Rockets, *Congreve's*, a new fpecies of war rockets, being thus called from the name of their inventor, fir William Congreve. They differ from the common rocket, as well in their magnitude and conftruction, as in the powerful nature of their compofition ; which is fuch, that without the incumbrance of any ordnance, (the rocket containing the propelling power wholly within itfelf,) balls, fhells, cafe-fhot, and carcaffes, may be projected to the diftance of from 1000 to 3000 yards, which renders them a moft efficacious fpecies of artillery ; as they may not only be employed in every cafe, and for every purpofe, of the ufual light and heavy ordnance, but they are available alfo in a variety of inftances, in which the nature of the ground or other

other impediments prevent the effectual introduction of that arm.

These rockets are of various dimensions, as well in length as in calibre, and are differently armed according as they are intended for the field, or for bombardment and conflagration; carrying, in the first instance, either shells or case-shot, which may be exploded at any part of their flight, spreading death and destruction amongst the columns of the enemy; and in the second, where they are intended for the destruction of buildings, shipping, stores, &c. they are armed with a peculiar species of composition, which never fails of destroying every combustible material with which it comes in contact.

The latter are called *carcass-rockets*, and were first used at Boulogne, their powers having been previously demonstrated in some experiments made at Woolwich by sir William Congreve, in the presence of Mr. Pitt and several of the cabinet ministers, in the month of September 1805. Sir Sidney Smith was ordered to command the expedition intended for this purpose; but from the lateness of the season, it being near the end of November before the preparations were completed, nothing was done that year. In 1806 sir William Congreve renewed his proposition for the attack of Boulogne by rockets, which was ordered to be put in execution after lord Moira, at that time master-general of the ordnance, and lord Howick, first lord of the admiralty, had satisfied themselves of the efficacious nature of the weapons, from other experiments made again at Woolwich for that purpose. The attack was accordingly made under the command of commodore Owen, late in October 1806; having been put off during the summer months, in consequence of the negociations for peace, at that time pending between the courts of England and France.

From this delay, however, instead of being conducted upon the grand scale at first intended, it became a mere desultory attack, in which not more than 200 rockets were fired. The town, however, was set on fire by the first discharge, and continued burning for near two days: it was supposed also that some shipping were destroyed, but the greater part of the rockets certainly went over the basin into the town.

After this, their first introduction as a military weapon, the carcass-rockets have been used in almost every expedition, and in nearly all under the immediate inspection of their inventor. Their reputation was completely established at Copenhagen, where they did incredible execution: after the siege, they were ordered by lord Chatham, the master-general of the ordnance, to be reported upon by a committee of field officers of artillery, who had witnessed their effect in that bombardment, and who pronounced them to be "*a powerful auxiliary to the present system of artillery*." Indeed the powers of this weapon are now established upon the best of all testimonies, the best of all criterions, the testimony of the enemy; a striking instance of which occurred at the siege of Flushing, where general Monnet, the French commandant, made a formal remonstrance to lord Chatham respecting the use of them in that bombardment; than which no better fact need be recorded of the effect they must have produced. If such, therefore, be the acknowledged power of the weapon in such an early stage of its progress, and only when a handful, as it were, were used, merely by way of experiment, under the inventor, with not more than twenty or thirty men to assist him, what may not be expected, when regularly organized in the service, and generally combined with the other implements of bombardment?

At present we have spoken only of the carcass-rockets; it is not, however, in bombardment only that this species of artillery may be advantageously employed; their powers in the field having been demonstrated to be equally irresistible. The crown prince of Sweden was the first general who bore testimony to their effects in this service; a small corps of rocketeers, under the command of Capt. Bogue of the royal artillery, having been attached to this division of the allied armies; and who, in the ever memorable battle of Leipsic, while yet the fate of empires was suspended in fearful equilibrium, gloriously maintained the honour of the British arms, and incontrovertibly established the reputation of the rocket-system.

They were afterwards employed with great effect when the British army, under the command of the duke of Wellington, crossed the Adour; and, had the war continued, we should, in all probability, have seen them as commonly in active service in the field as the other artillery. In consequence of these successes, and a variety of other instances, which our limits will not allow us to enumerate, his royal highness the prince regent commanded the formation of a rocket corps, which took place on the 1st of January 1814, by augmentation to the regiment of royal artillery, as proposed by lord Mulgrave, master-general of the ordnance.

Having thus given a sketch of the history, improvement, and introduction of the rocket-system of artillery, we shall proceed to give such explanation of the nature and application of the weapon in different species of attack and defence, as may be consistent with the general interest of the service; such only being suffered to transpire; for, the military rocket being exclusively an English weapon, all the more minute and important particulars, both of construction and composition, are very properly kept a profound secret, being probably known in complete detail by no person except the inventor himself.

The general form of all the different kinds of rockets, for whatever service they may be designed, is cylindrical, being formed in strong metallic cases, and armed, as we have before stated, either with carcass composition for bombardment and conflagration, or with shells and case-shot for field-service. They are, however, of various weights and dimensions, from the eight-inch carcass, or explosion rocket, weighing nearly three hundred weight, to the six-pound shell-rocket, which is the smallest size used in the field. The sticks which are employed for regulating their flight are also of different lengths, according to the size and service of the rocket; and which, for the convenience of carriage, are stowed apart from the rocket, and so contrived as to consist of two or more parts, which are connected to it, and to each other, when requisite, with the utmost expedition.

Rocket ammunition is divided into three classes, *heavy*, *medium*, and *light*; the former including all those of above 42lbs., which are denominated according to their calibre, as eight-inch, seven-inch, six-inch, &c. rockets; the medium include all those from the 42lb. to the 24lb. rocket; and the light, from the 18-pounder to the 6-pounder inclusive.

The carcass-rockets are armed with strong iron conical heads, containing a composition as hard and solid as iron itself, and which, when once inflamed, bids defiance to any human effort to extinguish it; and consequently involves, in an inextinguishable flame, every combustible material with which it comes in contact. The 42-pounder and 32-pounder carcass-rockets, are those which have hitherto been chiefly employed in bombardments: the penetration of the 32lb. carcass-rocket in common ground is nine feet; and in in ſome inſtances where they have been employed, they have been known to pierce through ſeveral floors, and through the ſides of houſes: this is the ſmalleſt rocket uſed in bombardment, and the largeſt employed in the field; the more uſual ſize for the latter ſervice being the 24, 18, 12, and 6-pounders.

The ranges of the eight-inch, ſeven-inch, and ſix-inch rockets, are from 2000 to 2500 yards; and the quantity of combuſtible matter, or burſting powder, from 25lbs. to 50lbs.; and from their weight combined with leſs diameter, they poſſeſs a greater power of penetration than the heavieſt ſhells, and are therefore equally efficient for the deſtruction of bomb-proofs, or the demolition of ſtrong buildings; ſo that the facility of application, on which the inventor has hitherto reſted the merit of the rocket-ſyſtem, is not its only excellence; for it thus appears, that it actually will propel heavier maſſes than can be done by any other means, that is to ſay, maſſes, to project which, it would ſcarcely be poſſible to caſt, much leſs to tranſport, mortars of ſufficient magnitude. The largeſt rocket that has yet been conſtructed, has not, we believe, exceeded three hundred weight; but ſir William Congreve ſeems to have in contemplation others of much ſuperior magnitude, weighing from half a ton to a ton weight, which being driven in very ſtrong caſt-iron caſes, may poſſeſs ſuch force, that, when fired along trenches cut to the foot of the glacis, from the neareſt point of the third parallel, againſt the revetement of any fortreſs, even unimpaired by a canonnade, it ſhall, by its maſs and form, pierce the ſame; and, having pierced it, ſhall with one explosion of ſeveral barrels of powder, with which it is loaded, blow ſuch portion of the maſonry into the ditch, as may, with very few rounds, complete a practicable breach.

The 42 and 32-pounders are thoſe, as we have before ſtated, which have hitherto been principally uſed in bombardment, and which, for the general purpoſes of that ſervice, are found quite ſufficient, as they will convey from 7lbs. to 10lbs. of combuſtible matter each, and have a range of upwards of 3000 yards.

The 32-pounder rocket may be conſidered as the medium rocket, being the ſmalleſt uſed in bombardment as a carcaſs or exploſion rocket, and the largeſt uſed with ſhot or ſhell in the field; but as the 24-pounder is very nearly equal to it in all its applications in the latter ſervice, being quite equal to the propelling of the Cohorn ſhell, or 12-pounder ſhot, it is, from the ſaving in weight, generally preferred to the 32-pounder.

The 18-pounder, which is the firſt of the light nature of rockets, is armed with a 9lb. ſhot or ſhell; the 12-pounder with a 6lb. ditto; the 9-pounder with a grenade; and the 6-pounder with a 3lb. ſhot or ſhell. From the 24-pounder to the 9-pounder rocket incluſive, a deſcription of caſe-ſhot rocket is formed of each nature, armed with a quantity of muſket or carbine balls, put into the top of the cylinder of the rocket.

The following table preſents a general view of the ranges, elevations, and other particulars of ſeveral of the moſt uſual deſcriptions of Congreve rockets.

Nature of Ammunition.	Armed with		Extreme Range.	Elevation for extreme Range.
			Yards.	
42-Pounder carcaſs-rockets	Carcaſſes	large, 18lbs. of combuſtible matter	3500	Elevation for extreme range not leſs than 60°
		ſmall, 12lbs. ditto		
42-Pounder ſhell-rockets	Shells	$5\frac{1}{2}$-inch		
		12-pounder ſpherical		
32-Pounder carcaſs-rockets	Carcaſſes	large, 18lbs. of combuſtible matter	2000	60°
		medium, 12lbs. = 13-inch carcaſs	2500	60° to 55°
		ſmall, 8lbs. = 10-inch ditto	3000	55°
32-Pounder ſhell-rockets	Shells, 9-pounder ſpherical		3000	50°
32-Pounder caſe-ſhot rockets	Caſe-ſhot	large, containing 200 carbine balls	2500	55°
		ſmall, 100 ditto	3000	50°
32-Pounder exploſion rockets	Strong iron cones, containing from 5lbs. to 12lbs. of powder, to burſt by fuzees		from 2500 to 3000	55°
12-Pounder caſe-ſhot rockets	Caſe-ſhot	large, 72 carbine balls	2000	45°
		ſmall, 48 ditto	2500	45°

Note. The mean velocity of any rocket is to that of its equivalent ſhell in about the ratio of 8 to 9, the ranges being the ſame.

From the preceding table it will be ſeen, that the 32-pounder carcaſs-rocket will range 3000 yards, with the ſame quantity of combuſtible matter as that contained in the 10-inch ſpherical carcaſs; and 2500 yards, with the ſame quantity as that of the 13-inch ſpherical carcaſs. It will be ſeen alſo, that the 12-pounder caſe-ſhot rocket, which is ſo portable that it may be uſed with the facility of muſquetry, has a range nearly double that of field artillery, carrying as many bullets as the 6-pounder ſpherical caſe: add to which, that from the nature of the conſtruction of the rocket, theſe bullets are projected from it in any part of its track, with an increaſe of velocity, whereby its operation becomes frequently moſt deſtructive at that point where any different ſpecies of ammunition ceaſes to be effective.

Of this deſcription of caſe-ſhot rocket, 100 infantry ſoldiers will carry into action, in any ſituation where muſquetry can act, 300 rounds, and 10 frames for diſcharging them; from each of which, four rounds may be fired in a minute. And of the ſame deſcription of caſe-ſhot for the uſe of cavalry, four horſes will carry 72 rounds, and four frames; from which may be fired 16 rounds in a minute; each horſe not having more than the ordinary burden of a dragoon's horſe.

The rockets uſed by the cavalry are, however, now deſigned to be the 12-pounders, armed with a 6-pounder ſhell or caſe-ſhot; each horſe carrying four of theſe rockets.

Every third man, beſides his portion of ammunition, has, in addition, to carry the chamber from which the rockets are diſcharged. This chamber, however, weighs

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but ſix pounds, and is, therefore, but little additional burden; ſo that the rockets may be diſcharged parallel to the ſurface, and as near to it as poſſible.

The weight of ammunition carried by the troop horſe, with the full complement going into action, is ſuch, that the horſe is fully equal to any ordinary operations. But in long marches, ſmall tumbrils are provided for carrying a part of the ammunition; which leaves the horſe, in travelling, one ſtone four pounds of ammunition to carry, a burden of two ſtone leſs in line of march than that of the heavy dragoon's or artillery-man's horſe: to which we may further add, that as the rocketeer has no heavy duty to perform, no guns to ſponge, nor any to limber up or unlimber, he may, upon an average, be a lighter man by three ſtone than is required for an artillery-man, who has conſtantly the above duties to perform; a difference amounting, within a few pounds, to the whole weight of the ammunition carried by the men even in action.

A ſubdiviſion of rocket cavalry conſiſts of 24 horſes and 20 men, four of the horſes being employed in carrying the ammunition for the ſubdiviſion. Each of theſe ammunition horſes carries 18 rockets and rocket-ſticks, and a proportion of ſmall ſtores, weighing in all, including ſaddle, ſaddle-bags, &c. 19 ſtone; ſo that theſe 20 men will carry into action 152 rounds of 12-pound ſhell or caſe-ſhot, and ſix chambers, or *bouches à feù*; from which, without any extraordinary exertion, 80 rounds of 6-pound ammunition may be diſcharged in three minutes.

It is obvious that the combined celerity and quantity of the diſcharge of ammunition of this deſcription of artillery cannot be equalled, or even approached, taking in view the means and nature of the ammunition employed, by any other ſyſtem. The univerſality, alſo, of the operation, not being encumbered with wheel-carriages, muſt be duly appreciated; as, in fact, it can proceed not only wherever cavalry can act, but even wherever infantry can get into action, as has been already ſtated.

The heavier ſpecies of rockets, as the 32-pounder or 24-pounder, as alſo the 18 and 12-pounders, are ſometimes carried in cars of a peculiar deſcription, which not only convey the ammunition, but are contrived alſo to diſcharge each two rockets in a volley, from a double iron-plate trough, which is of the ſame length as the boxes for the ſticks, and travels between them; but which, being moveable, may, when the car is unlimbered, be ſhifted into its fighting poſition at any angle from the ground ranges, or point blank, up to 45°, without being detached from the carriage. The limbers are always ſuppoſed to be in the rear. The rockets are fired with a port-fire and long ſtick: two men will fight the light car, and four men the heavy one.

At preſent we have confined our remarks to rocket cavalry: it is obvious, however, that they may, with equal facility, be accommodated to the uſe of infantry. In this caſe, one man in ten, or any greater proportion, carries a frame of very ſimple conſtruction, ſtanding on three legs, like a theodolite, when ſpread; and which cloſes ſimilarly, for the convenience of carrying. It is mounted at top with an open cradle, from which the rockets are diſcharged, either for ground ranges, or at any required elevation. The reſt of the men carry each three rounds of ammunition, which for this ſervice is propoſed to be either 12-pounder ſhell-rockets, or the 12-pounder rocket caſe-ſhot; each round equal to the 6-pound caſe, and ranging 2500 yards; ſo that 100 men will bring into action, in any ſituation where muſquetry can be uſed, nearly 300 rounds of this deſcription of artillery, which ranges at 45°, nearly double thoſe of light field ordnance.

When the rockets are employed in bombardments, they are diſcharged from frames of a different conſtruction; the rockets employed in this ſervice being larger than thoſe uſed for the field: they are, however, equally ſimple, and the diſcharges may be made with great rapidity. In many caſes, however, the frames are diſpenſed with, and the rockets are thrown from a battery erected for that purpoſe. The great advantage of this ſyſtem is, that as it diſpenſes with apparatus, where there is time for forming a work of this ſort, of conſiderable length, the quantity of fire that may be thrown in a given time is limited only by the length of the work; one of 200 feet in length being ſufficient for firing 100 rockets in a volley, and ſo on for any greater length; or an inceſſant and heavy fire may, by ſuch a battery, be kept up from one flank to the other, by replacing the rockets as faſt as they are fired in ſucceſſion.

Another uſe is for the defence of a paſs, or for covering the retreat of an army, by placing any number, hundreds or thouſands, of 32 or 24-pounder ſhell-rockets, or 32-pounders armed with 18-pounder ſhot, limited as to quantity only by the importance of the object which is to be obtained; as, by this means, the moſt extenſive deſtruction, even amounting to annihilation, may be carried amongſt the ranks of an advancing enemy, and that with the expoſure of ſcarcely an individual. For this purpoſe, the rockets are laid in batteries of 100 or 500 in a row, according to the extent of ground to be protected; ſo that one man is in fact alone ſufficient to fire the whole in ſucceſſion, beginning with that neareſt to the enemy, as ſoon as he ſhall perceive him near enough to warrant his firing. Where the batteries are very extenſive, each battery may be ſubdivided into ſmaller ones; ſo that the whole, or any part, or particular diviſion, may be fired, according to the number and poſition of the enemy advancing.

A ſimilar application of the rocket artillery is as follows: a low work is thrown up for the defence of a poſt, or of a chain of poſts, conſiſting merely of as much earth and turf as is ſufficient for forming the ſides of ſhallow embraſures, for large rockets, placed from two to three feet apart, or nearer; from which the rockets are ſuppoſed to be diſcharged independently, by a certain number of artillery-men, employed to keep up the fire according to the neceſſity of the caſe. In this manner, ſuch an inceſſant fire may be maintained as would be next to impoſſible for an advancing enemy to paſs through, not only from the quantity, weight, and deſtructive nature of the ammunition, but from the cloſeneſs of its lines, and its contiguity to the ground. The larger kind of theſe rockets are alſo equally applicable to the attack and defence of fortified places. They may alſo be employed by infantry againſt an attack from cavalry: they may be even carried by a ſtorming party into the place, by which the parapet may be ſcoured of the enemy, any ſtreet or paſſage enfiladed; or thrown occaſionally into the town, as well to diſtract the attention of the garriſon, as to ſerve as an index to each of the ſtorming diviſions, as to the ſituation and progreſs of each party. In fact, there is no limit to their application, being as general and extenſive as that of gunpowder itſelf.

In naval warfare the rocket-ſyſtem likewiſe poſſeſſes peculiar advantages; for in conſequence of there being no re-action in theſe projectiles on the point of diſcharge, rockets, carrying the quantity of combuſtible matter, as, by the ordinary ſyſtem, would require to be thrown from the largeſt mortars, and from ſhips of very heavy tonnage, may be be used in the smallest boats of the navy; and the 12-pounder, and 18-pounder, have been frequently fired from four-oared gigs; and it should also be remarked, that rockets of the above weight will ricochet in the water remarkably well at low angles; they may also be employed to facilitate the capture of a ship by boarding, by being thrown, by hand, into the ports, &c. by the boarding party, as soon as they get along-side, as the confusion and destruction which will thence inevitably ensue, cannot but facilitate the performance of this dangerous duty. These rockets are also peculiarly adapted to add to the dreadful effects of fire-ships; for, according to the present system, it is not improbable that a number of fire-ships may pass harmlessly through an enemy's fleet, by the exertion of their crews in towing them clear, whereas, if they were supplied each by a sufficient number of rockets, such an extensive and devastating fire would be spread in every direction, as to involve every vessel of the enemy in that destructive element. After the above statement, little need be said in reference to the general utility and importance of the rocket-system. It will be sufficient to observe, that it consists, first, in their being a species of projectiles of the most destructive kind, which, containing in themselves the propelling power, dispenses with the use of heavy ordnance, and consequently offers great facilities to the movement of an army. 2dly. The extensive nature of the fire that may be kept up, by a few men, against any important point. 3dly. It may be employed in a variety of cases in which the usual artillery, from the nature of the ground, or other impediments, cannot be rendered effective; and lastly, in naval bombardments, in consequence of its trifling re-action, it may be thrown from cutters and small boats, and therefore from points which could never be approached by the vessels usually employed in that service.

It may also not be amiss to observe, that in point of expence the rocket likewise possesses the advantage. The 32-pounder carcass-rocket costs only 1*l.* 1*s.* 11*d.* complete, in every respect, for service; whereas its equivalent, the 10-inch spherical carcass, with the charge of powder necessary to convey it 3000 yards, which power is contained in the rocket, costs 1*l.* 2*s.* 7*d.*, independent of any charge for the mortar, mortar-bed, platform, difference of transport, &c. &c. attaching to the spherical carcass, and not to the rocket, which actually requires no apparatus whatever to use it in a bombardment, and has, therefore, no charge attaching to it, beyond the first cost, but that of transport; and a vessel of 300 tons will carry 5000 of them at least. It is also further to be observed, that the above 1*l.* 1*s.* 11*d.* supposes the whole construction to be effected by manual labour: by introducing machinery, which we understand is about to be done, the expence of the 32-pounder carcass-rocket will be reduced to 18*s.*, or even to 16*s.*, by using bamboo instead of the usual stick, which is but about three-fourths of the expence of the 10-inch spherical carcass, independent of all the other charges of transport, &c. attending the latter.

But the comparison, as to expence, is still more in favour of the rocket, when compared with the larger nature of carcasses. The 13-inch spherical carcass costs 1*l.* 17*s.* 11½*d.*, to throw it 2500 yards, while its equivalent rocket costs but 1*l.* 5*s.* 0*d.*, being a saving, on the first cost, of 12*s.* 11½*d.*, and a similar proportion of saving runs through the whole system.

Rocket *Light Ball*, also invented by sir William Congreve, is a species of light ball thrown into the air by means of one of his rockets; where, having reached the summit of the rocket's ascent, it is detached from it by an explosion, and remains suspended in the air by a small parachute, to which it is connected by a chain. Thus, in lieu of the transient momentary gleam obtained by the common light ball, a permanent and brilliant light is obtained, and suspended in the air for five minutes at least, so as to afford time and light sufficient to observe the motions of an enemy either on shore or at sea; where it is particularly useful in chasing, or for giving distant and more extensive night signals. It is to be observed, that nothing of this kind can be obtained by the projectile force of either guns or mortars, because the explosion infallibly destroys any construction that could be made to produce the suspension in the air.

Floating Rocket Carcass.—This is another of the inventor's applications of his rocket, and of the parachute; for the purpose of conveying combustible matter to distances far beyond the range of any known projectile force; at the same time that it is cheap, simple, and portable. The floating carcass, like the light ball, is thrown into the air attached to a rocket, from which being liberated at its greatest altitude, and suspended to a small parachute, it is driven forward by the wind, and will, in a moderate breeze, afford ranges at least double those of the common carcass; and may, therefore, for naval purposes, from a blockading squadron, be thrown in great quantities, by a fair wind, against any fleet or arsenal, without the smallest risk, or without approaching within range either of guns or mortars. Thus, in the blockade, a few years back, of the Russian fleet at Baltic fort, it might have been continually used, at all events, with great prospect of success, and certainly where no other means of annoyance could be applied. The rocket containing this carcass is not larger than the 32-pounder carcass-rocket; and the whole expence, added to the rocket, does not exceed five shillings; nor are the approaches of the carcass itself necessarily visible by night, as it may be so arranged, as not to inflame till some time after it has settled. It is evidently, therefore, capable of becoming a very harassing weapon, with a great chance of doing as much mischief as any other carcass amongst large fleets and flotillas, by lodging unperceived in the rigging, or lighting on extensive arsenals, in situations where no other means of annoyance whatever exists.

Rockets, *Theory of the Motion of.* The theory of the flight of rockets differs very essentially from that of the usual projectiles. In the latter, the body is launched into space with a certain and determinate velocity; and by rejecting the resistance of the air, a most beautiful theory is established, possessing great simplicity and generality, and which is, therefore, highly interesting to the speculative mathematician, notwithstanding it is of little or no use to the practical artillerist. In order to render the theory useful in the latter sense, a great variety of experiments have been made to ascertain the effect of the air's resistance, which is not at all considered in the former case, the initial velocity of the ball, the strength of fired gunpowder, &c. &c.; yet after all, it must be acknowledged that very little has been gained, and the practitioner is still much more guided by his own experience, than by any light that has been thrown upon the subject from long and intricate mathematical theories.

The motion of rockets is more complicated than that of common projectiles, partaking, in fact, of all the anomalies that attend the accelerated motion arising from the rocket composition, and the uniform motion of the rocket-case, after the composition is expended; and as little or no advantage

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tage has yet been gained from the experiments that have been made with cannon, even where the angle of elevation and the initial velocity of the ball were both accurately known, it seems totally useless to look for any assistance from mathematical investigations, with respect to determining the ranges, &c. of military rockets: because if we could determine with the greatest accuracy the point, position, and velocity of the rocket, at the moment when the composition was expended, the remaining part of its track would still be subject to all the inequalities attending on common projectiles.

If we confine our investigations only to that motion which has place during the time the composition is burning, it is not improbable that much light might be thrown on the subject from a well arranged course of experiments; and that their motion might be reduced to precise rules, in several applications of the rocket-system, particularly in the cases we have mentioned, where they are intended to be used as a kind of battering-train.

The great impediment in gunnery to the exact determination of the momentum of any given ball, when projected with a given velocity, and from a given distance, is the resistance of the air; because it can only be found from experiment at certain distances, and it is difficult from a few partial cases to infer a general law. That the resistance of the air to the same ball is as some function of the velocity, there can be no doubt; but we much question whether that determined by Dr. Hutton, *viz.* $r = .00002576\,v^2 - .00388\,v$, although the most accurate of any yet found, is as correct as could be wished. Indeed, when we consider the infinitude of different forms under which the function of a single variable may appear, it seems much too confined a scale to attempt to reduce it to the simple form $a\,v^2 + b\,v$; *viz.* to limit the dimension of the function, and attempt every accommodation by means of the co-efficients a and b. With regard to the rocket, the case is very different: the very medium, which in the former instance is the great impediment to an accurate theory, is here the principal agent in producing the motion; and moreover, we are here, from the nature of the weapon, enabled to ascertain all the successive energies of the propelling power, and the resisting force, which, in the other case, are only determinable at two or three different distances: on which account, it is to be presumed that more advantage may be here expected to be gained from experiment, than in the cases above referred to.

Instead of a ball impinging on the ballistic pendulum, at the distance of 60 or 100 yards, as practised in gunnery experiments, a rocket might be fixed to the same pendulum, and its whole energy observed with the greatest accuracy; or, in case such experiment should be thought inconclusive, for want of that partial vacuum which has place behind the rocket when in flight, it might be attached to some wheel, or revolving body, and its successive energies measured by the motion of some weight attached to the revolving axis of the machine. This is a most important advantage attending experiments on the momentum of rockets, which it is impossible to accommodate to other projectiles.

We are not aware, however, that any such experiments have yet been undertaken; and, therefore, all our investigations on the flight, momentum, &c. of rockets must necessarily be hypothetical. In fact, we have two distinct theories of the motion of rockets, the one by Mariotte, and the other by Desaguliers; the latter attributing their motion to the momentum of combustion, and the other to the elastic nature of the gas generated by the combustion and the resistance of the air. Desaguliers illustrates his hypothesis as follows: "Conceive the rocket to have no vent at the choke, and to be set on fire; the consequence will be, either that the rocket will burst in the weakest place, or if all its parts be equally strong, and able to sustain the impulse of the flame, the rocket would burn out immoveable. Now as the force of the flame is equable, suppose its action downwards, or that upwards sufficient to lift 40 pounds; as these forces are equal, but their directions contrary, they will destroy each other's action. Imagine then the rocket opened at the choke; by this means, the action of the flame downwards is taken away, and there remains a force equal to 40 pounds acting upwards, to carry up the rocket and stick." Although there is some ingenuity and plausibility in the above reasoning, we are by no means inclined to admit its accuracy. The action of the flame or gas within the rocket, when closed, as supposed above, we conceive to arise wholly from the elastic nature of the gas, and the re-action it experiences against the ends and sides of the rocket-case; the whole of which ceases, as soon as a free vent is given to the flame; and, therefore, if a rocket could be fired in a vacuum, as the flame would, in that case, experience no resistance, there would be no re-action, and consequently no motion would ensue. In order to submit the above supposition to experiment, take a strong piece of whale-bone, and bend it into the form of a bow, by means of a bit of thread or silk fastened to each extremity: then if this bow be suspended by its middle, and two pieces of board, or two books, be set up on their edges, each touching one end of the bow, and the string by which it is bent be cut, both books will, from the elastic nature of the whale-bone, be thrown down with considerable force. Now repeat the experiment, but set up only one book, leaving the other end of the bow entirely free; then cut the string as before, and it will be found that, for want of the re-action of the other book, no effect, or very little, is produced on the standing book: it may be a little disturbed, but it will not fall. This we consider to be a very similar case to the action of the gas on the rocket, when shut up and opened, as supposed by Desaguliers; and if so, it shews very distinctly the inaccuracy of his hypothesis.

As a mere matter of mathematical investigation, it certainly reduces the theory to the most simple form; because here it is not essential, so far as regards the propelling power, what may be the velocity of the rocket; which power is, therefore, supposed uniform during the whole time of combustion: whereas, in Mariotte's theory, which attributes the motion of the rocket to the resistance or re-action of the air, the propelling force will decrease as the velocity increases, in consequence of the partial vacuum left behind the rocket in its flight; so that the velocity becomes, as it were, both a *datum* and *quæsitum;* and the correct solution of the problem necessarily involves the integration of partial differences of the highest orders.

We must confess that we feel no inclination to meet the problem under this formidable shape, unless we had a good set of experiments on which to rest our first premises, and from which, therefore, some useful conclusions might be expected to be deduced. We shall, therefore, in what follows, avail ourselves of a few problems relative to the motion and flight of rockets in non-resisting mediums, as given by Mr. Moore of the Royal Military Academy, in his Treatise on the Motion and Flight of Rockets; who, we presume for want of experiments, has adopted the hypothesis of Desaguliers, by supposing the motion of the rocket to arise from the momentum of the ignited composition. We shall also suppose the rocket and stick perfectly free the moment after being fired; for, without this, it is obvious that the angle of elevation of the rocket's direction, and that of its actual diſcharge, will be eſſentially different. The firſt motion of the rocket, like all other motions not produced by a great momentary impulſe, is ſlow; and before the ſtick is clear of the frame, gravity has been acting upon the rocket, and depreſſed it below its natural poſition, while the ſtick is prevented from being equally depreſſed, by the top of the frame; ſo that the angle of projection is in fact conſiderably leſs than the angle of the frame, or ſlope of the rocket's firſt poſition. In conſequence of this, the rocket has the appearance of falling the moment after projection; and, for this reaſon alſo, the angle for producing the greateſt range of a rocket exceeds very conſiderably that which gives the extreme range of a ſhell projected from a mortar.

Prop. I.

The ſtrength or firſt force of the gas from the inflamed compoſition of a rocket being given, as alſo the weight and quantity of the compoſition, the time of its burning, and the weight and dimenſions of the caſe and ſtick; to find the height to which it will aſcend, when projected perpendicularly upwards.

It is obvious here, that the principal point of inveſtigation is the height to which the rocket will riſe, and the velocity it will have acquired, at the moment when the compoſition is all expended; as the determination of its farther aſcent, with theſe data, depends upon well-known and eſtabliſhed principles. We ſhall, therefore, only conſider the former caſe. For this purpoſe, put

$w =$ the weight of the rocket-caſe and ſtick.
$c =$ the weight of the compoſition.
$a =$ the time in which it will be conſumed.
$n =$ the medium preſſure of the atmoſphere.
$sn =$ the aſſumed force of the inflamed compoſition.
$d =$ the diameter of the rocket's baſe, and pd^2 its area.
$x =$ the ſpace deſcribed. And
$v =$ velocity acquired in any indeterminate time t.

Then $snpd^2$ is the conſtant impelling force of the compoſition.

Now the weight of the quantity of rocket-matter that is conſumed in the time t is $\frac{ct}{a}$; therefore, $c - \frac{ct}{a}$ is the weight of the part unconſumed; and $w + c - \frac{ct}{a}$, or $m - \frac{ct}{a}$ (making $m = w + c$), is the weight of the whole maſs, at the end of the time t.

Hence $snpd^2 - \left(m - \frac{ct}{a}\right)$ is the *motive* force, and

$$\frac{snpd^2 - \left(m - \frac{ct}{a}\right)}{m - \frac{ct}{a}} = \frac{asnpd^2}{am - ct} - 1, \text{ the } \textit{accelerating} \text{ force.}$$

Therefore, from the known formulæ for variable forces, we have $\dot{v} = 2gf\dot{t}$, which hence becomes

$$\dot{v} = \frac{2agsnpd^2\dot{t}}{am - ct} - 2g\dot{t};$$

the fluent of which is

$$v = -\frac{2agsnpd^2}{c} \times \text{hyp. log.} \left(\frac{am}{c} - t\right) - 2gt, \text{ or}$$

$$v = -b \text{ . hyp. log.} \left(\frac{am - ct}{c}\right) - 2gt;$$

$$\text{where } b = \frac{2agsnpd^2}{c}.$$

This fluent, corrected for the caſe in which $t = 0$, gives the correct fluent,

$$v = b \text{ . hyp. log.} \frac{am}{am - ct} - 2gt;$$

which, when $t = a$, becomes

$$v = b \text{ . hyp. log.} \frac{m}{m - c} - 2ga,$$

the velocity required.

Again, to find the ſpace deſcribed in the ſame time, we have $\dot{s} = v\dot{t}$, or $\dot{x} = b\dot{t} \times \text{hyp. log.} \frac{am}{am - ct} - 2gt\dot{t}$.

The correct fluent of this is $x = \left(bt - \frac{bam}{c}\right)$ hyp. log. $am + \frac{b}{c}(am - ct)$. hyp. log. $(am - ct) + bt - gt^2$; and in the caſe when $t = a$, it becomes $x = \frac{ab}{c} + \left((m - c) \text{ hyp. log.} \frac{m - c}{m} + c - \frac{acg}{b}\right)$ the ſpace ſought.

It will be obſerved, however, that in both theſe caſes, gravity has been ſuppoſed to act directly in oppoſition to the motion of the rocket; but had we conſidered the flight uninterrupted by gravity, (as we muſt ſuppoſe, in eſtimating its flight, when projected at any given angle, where gravity is not conſidered as in any reſpect retarding the rocket's motion in the firſt line of projection,) then the laſt terms in each of the above expreſſions will diſappear, and we ſhall have ſimply

$$v = b \text{ . hyp. log.} \frac{m}{m - c}, \text{ and}$$

$$x = \frac{ab}{c} + \left((m - c) \text{ hyp. log.} \frac{m - c}{m} + c\right).$$

Having thus determined the height of the rocket, and its velocity, when the compoſition is juſt conſumed, it follows that its whole height may be determined in the uſual manner, by the known formula for the aſcent and deſcent of heavy bodies.

Prop. II.

To determine the path of a rocket near the earth's ſurface, neglecting the reſiſtance of the air.

If, during the time the rocket was on fire, the weight of the whole maſs remained conſtant, the path of the rocket would, from the known laws of the compoſition and reſolution of forces, be a right line; but this not being the caſe, on account of the continual waſting of the compoſition, the accelerative force will be different at every inſtant; and, therefore, ſince the accelerative force of gravity is conſtant, the path of the rocket will neceſſarily be a curvilinear one.

Let A C (*Plate Pyrotechny, fig.* 16.) be the firſt direction of the rocket, and A D the curve in which it moves; draw C D B perpendicular to the horizontal line A B. Now the path of the rocket will be determined by finding the relation between A B and B D, or between A C and C D, the angle B A C being given.

Now

Now we have found, generally for A C, $x = \left(bt - \frac{abm}{c}\right)$ h. l. $am + \frac{b}{c}(am - ct)$ h. l. $(am - ct) + bt$, while $CD = gt^2$. Hence, by assuming any number for t, the relation between A C and C D will be determined, or the relation between A B and D B; for representing A C by $\varphi(t)$, we have $AB = \text{cof. } A . \varphi(t)$, and $CB = \text{tan. } A . \text{cof. } A \varphi(t)$, and $DB = \text{tan. } A . \text{cof. } A \varphi(t) - gt^2$.

Prop. III.

To find the velocity of the rocket in the curve at any given instant.

Let A C (*Plate Pyrotechny, fig.* 17.) $= x$, and $AD = z$, being the space described by the rocket in the time t; then calling the velocity at $C = b$. h. l. $\frac{am}{am - ct} = V$; the velocity at D in the curve will be expressed generally by $\frac{\dot{z}V}{\dot{x}}$, following from the laws for the resolution and composition of motion. Now, by the laws of falling bodies, $CD = gt^2$: and putting k and l for the natural sine and cosine (to rad. 1) of the angle C A B of projection, we shall have $AB = lx$, $CB = kx$, and D B (the ordinate of the curve) $= kx - gt^2$. Therefore

$$\dot{z} = [(k\dot{x} - 2gt\dot{t})^2 + l^2\dot{x}^2] \text{ and}$$

$$v = \frac{\dot{z}V}{\dot{x}} = \frac{[l^2\dot{x}^2 + (k\dot{x} - 2gt\dot{t})^2]^{\frac{1}{2}}}{\dot{x}} \times V.$$

Again, by the theory of variable motions, $\dot{x} = v\dot{t}$; consequently

$$v = \frac{[l^2 v^2 \dot{t}^2 + (kV\dot{t} - 2gt\dot{t})^2]^{\frac{1}{2}}}{V\dot{t}} \times V, \text{ or}$$

$$v = [v^2 l^2 + (kV - 2gt)^2]^{\frac{1}{2}}, \text{ or}$$

$$v = [l^2 b^2 . \text{h. l.}^2 \frac{am}{am - ct} + (kb . \text{h. l.} \frac{am}{am - ct} - 2gt)^2]^{\frac{1}{2}},$$

the velocity of the rocket at D; which requires no correction.

When the angle of projection is 90°, $l = 0$, and $k = 1$; therefore v, in this case, will be $= b$. hyp. log. $\frac{am}{am - ct} - 2gt$, as determined in the preceding part of this article; and when $g = 0$, or when the action of gravity is not considered, the velocity of the rocket in its rectilinear path is $v = b$. hyp. log. $\frac{am}{am - ct}$, which agrees with what has been already observed.

When the angle of elevation is 30°, $k = \frac{1}{2}$, and $l = \frac{1}{2}\sqrt{3}$, therefore

$$v = \left(\tfrac{3}{4}b^2 . \text{h. l.}^2 \frac{am}{am - ct} + (\tfrac{1}{2}b . \text{h. l.} \frac{am}{am - ct} - 2gt)^2\right)^{\frac{1}{2}}.$$

And when the angle of elevation is 60°, then changing the values of k and l, we have

$$v = \left(\tfrac{1}{4}b^2 . \text{h. l.}^2 \frac{am}{am - ct} + \left(\frac{\sqrt{3}}{2}b . \text{h. l.} \frac{am}{am - ct} - 2gt\right)^2\right)^{\frac{1}{2}}.$$

Prop. IV.

To find the horizontal range of a rocket, the angle of elevation, and the time the composition is on fire, being given.

Let D (*Plate Pyrotechny, fig.* 18.) be the place of the rocket, when all the matter it contained is just exhausted; and C m and C n the measures of the velocities of the rocket in the directions A C, D I, the latter of which is a tangent to the curve at D; then by trigonometry, sin. $< Cnm$ ($= nCB = IDB$) $= \frac{Cm}{Cn}$. sin. $< Cmn = \frac{Cm}{Cn}$ cos. of the angle of elevation $= \frac{\text{velocity at C}}{\text{velocity at D}}$ cos. C A B.

Whence, calling the velocities at C and D, V and v, computed on the principles of our second proposition, we have sin. $IDB = \frac{V}{v}$ cos. C A B: and since we have found the angle I D B, it will be easy to determine that part of the range denoted by B L. For the curve from D being a parabola, $DH = \frac{suv^2}{g}$, and $VE = \frac{s^2v^2}{4g}$, (from the laws of projectiles in vacuo,) where s and u represent the sine and cosine of the angle I D H; consequently $VF =$

$$VE + EF = VE + DB = \frac{s^2v^2}{4g} + kx - gt^2,$$

whereof x is given by the first proposition.

Again, by the nature of the parabola $VE : VF :: EH^2 :$

$$FL^2 = \frac{u^2v^2}{g}\left(\frac{s^2v^2}{4g} + kx - gt^2\right), \text{ and therefore}$$

$$FL = \frac{uv}{\sqrt{g}}\left(\frac{s^2v^2}{4g} + kx - gt^2\right)^{\frac{1}{2}}, \text{ whence}$$

$$AL = \frac{uv}{\sqrt{g}}\left(\frac{s^2v^2}{4g} + kx - gt^2\right)^{\frac{1}{2}} + \frac{suv^2}{2g} + lx,$$

the entire range of the rocket, as required.

For a great variety of other propositions relative to this subject, see Moore's Treatise on the "Motion and Flight of Military Rockets."

Rocket, in *Botany*. See Eruca.

Rocket, *Bastard*. See Reseda.

Rocket, *Corn*, *Sea*, or *Square-podded Rocket*, a distinct genus of plants, called by Tournefort *erucago*, and by Linnæus *Bunias*; which see.

Rocket, *Garden*, a name by which the *hesperis* of botanists is sometimes called. See Hesperis.

Rocket, *Water*, *Marsh*, or *Winter*, the name of a species of *Sisymbrium*; which see.

Rocket is also used for a habit. See Rochet.

ROCKFORD, in *Geography*, a post-town of America, in North Carolina; 573 miles from Philadelphia.

ROCKHILL, a township of America, in Bucks county, Pennsylvania, containing 1508 inhabitants.

ROCKINGHAM, a market-town and parish in the hundred of Corby, and county of Northampton, England, is situated close to the river Welland, at the distance of 26 miles N.N.E. from Northampton, and 84 miles N.N.W. from London. In former times it was a place of some note on account of its castle and appendant forest. This castle was built by William the Conqueror, on the summit of a hill overlooking the town, and appears to have been occa-

occasionally the residence of several of our early monarchs. In the reign of William Rufus, a great council of the nobility, bishops, and clergy, was assembled here to terminate the dispute between the king and Anselm, archbishop of Canterbury, respecting the right of investiture, and obedience to the see of Rome. The council sat on Sunday the 11th of March, 1094, in the chapel belonging to the castle. Edward III. frequently honoured this fortress with his presence, as is evident from the numerous dispatches, and other instruments of royal authority, which are dated at Rockingham, in different years of his reign. Edward IV. settled the manor here, together with the castle and forest, on his queen, Elizabeth, for her life-time. These afterwards formed part of the duchy of Cornwall, and continued so till the reign of Edward VI., when they were granted to Edward, lord Clynton, from whose family they passed to the Watsons, one of whom, sir Lewis Watson, was created baron Rockingham, of Rockingham castle, in the year 1644. At what period the castle was dismantled is uncertain; but it is probable that event happened early in the reign of Henry III., as in the 34th year of that monarch, it is described as being in a ruinous condition. Leland, who visited it in the time of Henry VIII., gives the following account of this structure in the first volume of his Itinerary. "The castelle of Rokingham standith on the toppe of an hill, right stately, and hath a mighte diche, and bulwarkes agayne withoute the diche. The utter waulls of it yet stond. The kepe is exceding fair and strong; and in the waulles be certein strong towers. The lodgings that were within the area of the castelle be discovered and faul to ruine. One thing in the waulls of this castle is much to be notid; that is, that they be embatelid on booth the sides. So that if the area of the castelle were won by cumming in at either of the 2 greate gates of the castelle, yet the keepers of the waulles might defende the castelle. I marked that there is a stronge tower in the area of the castelle, and from it over the dungeon dike is a drawbridge to the dungeon toure." All that now remains of the original building is the arched gateway of the grand entrance, which is flanked by two massy bastion-towers. Rockingham forest extended about 20 miles in length, from Oxendon bridge to Stamford bridge, and four or five miles in breadth. Leland says there were only "fallow dere in it" "with dyers lodges for kepers" in his time.

The town of Rockingham consists chiefly of one irregular street. The market-day is Thursday, weekly; and there is an annual fair on the 25th of September. These privileges were granted by Henry III., at the request of Edmund, earl of Cornwall, the then possessor of the manor; but they are at present only nominal. According to the population returns of 1811, this parish contains 49 houses, and 230 inhabitants. The church is not remarkable, except for some handsome monuments, erected to commemorate different individuals of the Watson family. An altar-tomb, in the chancel, bears the recumbent statue of a man in armour, with that of a female by his side; and on the entablatures are the figures of nine children, sculptured in relief. This tomb was erected in memory of Edward Watson, grandfather of the first lord Rockingham, and his wife, one of the daughters of sir Edward Montague, lord chief justice of the court of king's bench. Another handsome monument commemorates Lewis Thomas, lord Sondes, who died June 21, 1806. Beauties of England, &c. vol. xi. by John Britton, F.S.A. The History and Antiquities of Northamptonshire, compiled from MS. Collections of the late learned Antiquary, John Bridges, esq. by the Rev. P. Whalley, 2 vols. fol. Oxford, 1791.

ROCKINGHAM, one of the six counties into which the state of New Hampshire is divided. It lies on the S.E. part of the state, having the Atlantic on the S.E., the county of Hillsborough on the W., Strafford on the N., and the state of Massachusetts on the S.; about sixty miles long and thirty broad, and comprehending the only sea-port, and most of the commercial towns, in the state. The number of inhabitants is 50,175. Its chief towns are Portsmouth, Exeter, and Concord.—Also, the N.E. township in Windham county, Vermont, on the W. bank of Connecticut river, which separates it from Walpole, in New Hampshire. It contains 1954 inhabitants.—Also, a county of Salisbury district, in North Carolina, bounded E. by Caswell, and W. by Stokes. This county is watered by the river Dan, on the banks of which are large tracks of low fertile land. Many parts of the county furnish iron ore. The number of inhabitants is 10,316.—Also, the chief town of Richmond county, North Carolina, situated on an eminence, about 6 miles E. of Great Pedee river, and containing a court-house, gaol, and a few dwelling-houses; 74 miles from Hillsborough.—Also, a mountainous county of Virginia, bounded N. by Shenandoah, and S. by Augusta. It contains 12,753 inhabitants.—Also, a post-town (usually called *Rocktown*, though its legal name is *Harrisonburg*) and the seat of the courts of the above county, situated on a branch of the Shenandoah river, and containing a court-house, gaol, and about 30 houses; 52 miles S.W. of Strasburg, in Pennsylvania.

ROCKINGHAM *Bay*, a bay on the N.E. coast of New Holland, N.W. of Cape Sandwich. This bay was so called by Cook in June 1770, who says that it is large, and appears to afford good shelter and good anchorage. The N. point of this bay is in S. lat. 17° 59′, and its boundary is formed by an island of considerable height, which is marked in the chart by the name of "Dunk Isle," and which lies so near the shore as not to be easily distinguished from it. The longitude of the N. point of the bay is 213° 57′ W.

ROCKLAND, a county of New York, in the United States, on the W. side of Hudson river: it was separated from Orange county, and is now the southernmost county in the state on that side of the river, bounded by New Jersey S.W., Orange county N.W., and Hudson's river E. The number of inhabitants is 7758.

ROCKLINGEN, a town of Germany, in the margraviate of Anspach; 2 miles N.E. of Wassertrudingen.

ROCKMANSTATT, a town of Bavaria, in the bishopric of Bamberg; 5 miles S.W. of Weismain.

ROCKNABAD, *Abi Rockny*, a famous rivulet of the clearest water, about two feet broad, running between two gardens in the vicinity of Shirauz, in Persia. See SHIRAUZ.

ROCKSALT, a township of Philadelphia county, in Pennsylvania, containing 1508 inhabitants.

ROCKSALT, in *Mineralogy*. See ROCK-*Salt*.

ROCKY, in *Geography*, a small river of North Carolina, which discharges itself into Yadkin river.

ROCKY *Bay*, a bay on the E. coast of Labrador. N. lat. 53° 30′. W. long. 56° 10′.—Also, a bay on the coast of Terra del Fuego, in the straits of Magellan; 6 miles S.E. of Dolphin bay.—Also, a bay on the S.E. coast of Nova Scotia, N.E. of Halifax harbour.

ROCKY *Island*, a large rock in the river Detroit, Upper Canada, on the E. side of Grosse isle, composed of limestone, lying in pretty regular strata.

ROCKY *Meadow*. See PRAIRIE *de Rocher*.

ROCKY *Mount*, lies in Catabau river, in the lowest part

part of Chester county, South Carolina, and is one of the largest fishing places in the southern states. It is said that a fisherman, with a hand net, sometimes takes 10 or 12,000 shad in a day.

Rocky *Point*, a cape on the S. coast of Jamaica, S. of Carlisle bay.—Also, a cape on the S. shore of lake Erie.—Also, a cape on the coast of New Albion. N. lat. 41° 8′. E. long. 236° 5′.—Also, a cape on the S.E. coast of Alashka, so named by Capt. Cook in 1778. N. lat. 55° 10′. E. long. 198° 50′.

Rocky *River*, a river of the Indiana territory, which runs into the E. side of Mississippi river, about 70 miles below the mouth of Mista river.

Rocky *Land*, in *Agriculture*, that sort which is much covered or beset with rocks or stones, either upon the surface or underneath it. Land of this kind is very common, and of considerable extent in many parts of the country, and, of course, often very injurious to the operations of tillage, as well as of planting, and many others. See Clearing, and Reclaiming, *Land*.

ROCO Grande, in *Geography*, an island on the coast of the Spanish Main, in the West Indies. N. lat. 11° 5′. W. long. 67° 39′.

ROCOU. See Roucou.

ROCQUIGNY, in *Geography*, a town of France, in the department of the Ardennes; 12 miles N. of Rethel.

ROCROY, a town of France, and principal place of a district, in the department of the Ardennes. The place contains 2875, and the canton 8077 inhabitants, on a territory of 237½ kiliometres, in 12 communes. N. lat. 49° 55′. E. long. 4° 35′.

ROD, Virga, *Virge*, a wand, or long slender stick, or staff. See Verge.

Rod is also used for a land-measure of 16½ feet: the same with perch and pole. It is likewise a long measure in Sweden, equal to 8 ells or 16 feet, the Swedish foot being to the English as 40 to 39. See Measure.

There are also local rods of seven yards and an half, or more. Likewise some of smaller lengths in particular places. See Weights and Measures.

Rod, in *Gauging*. See Gauging-*Rod*.

Rod, in the *Manege*, called in French *gaule*, is a switch, held by the horseman in his right hand, partly to represent a sword, and partly to conduct the horse, and second the effects of the hand and heels.

Rod, *Golden*, or *Aaron's*, in *Botany*. See Golden-*Rod*.

Rod, *Shepherd's*. See Teazel.

Rod, *Golden, Tree*. See Bosea.

Rod-*Knights*, in *Ancient Customs*. See Redmans.

Rod, *Black*. See Black-*Rod*, and Usher.

Rod, *Ezekiel's*. See Ezekiel.

Rod, *Fishing*. See Fishing.

Rod, *Rhineland*. See Rhineland.

RODA, in *Geography*, a town of Saxony, in Thuringia; 3 miles N. of Sangerhausen.—Also, a town of Spain, in the province of Aragon; 20 miles S. of Ainsa.—Also, a town of Spain, in Catalonia, on the Tar; 6 miles N.N.E. of Vicque.—Also, a town of Saxony, in the principality of Altenburg; 28 miles W.S.W. of Altenburg.—Also, a river of Germany, which runs into the Mayne, 2 miles below Hanau.—Also, a town of Egypt, on the Nile; 3 miles E. of Ashmunein.

Roda, *La*, a town of Spain, in New Castile; 19 miles S. of Alarcon.

RODABERG. See Rœttvik.

RODACH, a town of Germany, in the principality of Coburg; 6 miles W.N.W. of Coburg. N. lat. 50° 21′. E. long. 10° 57′. The town lies on a river of the same name, which runs into the Itsek, 6 miles S. of Coburg.

RODAK, a town of Hindoostan, in the country of Delhi; 50 miles E. of Hissar. N. lat. 29°. E. long. 76° 35′.

RODANSEE, a lake of the Ucker Mark of Brandenburg, S. of Templin.

RODAS, a town of South America, in the province of Popayan; 65 miles S. of Santa Fé de Antioquia.

RODATIO, unusual shortness of the eye-lashes.

RODAU, in *Geography*, a town of Saxony, in the Vogtland; 6 miles W. of Plauen.—Also, a river of Germany, which runs into the Wumme, 2 miles W. of Rotenburg, in the county of Verden.

RODAUN, a river of Prussia, which joins the Motlau at Dantzic, near which both together fall into the Vistula.

RODAW, a town of Prussia, in the province of Oberland; 14 miles E.N.E. of Marienwerder.

RODBYE, a sea-port town of Denmark, in the island of Laaland, with a convenient harbour. The principal article of trade is corn; 10 miles S.E. of Naskov. N. lat. 54° 42′. E. long. 11° 24′.

RODDA, a town of Arabia, in the province of Yemen; 4 miles N.W. of Sana.—Also, a town of Egypt, on the Nile, at the mouth of one of the branches of the canal of Joseph; 115 miles S. of Cairo.

RODDEN, a river of England, in the county of Salop, which runs into the Tern, 3 miles W. of Wellington.

Rodden *Cribs*, in *Agriculture*, a sort of large wicker-work basket, for containing the hay or other fodder in farm-yards. It is observed by Mr. Marshall, in his "Rural Economy of the Vale of Gloucester," that these large baskets are made of the top wood of willow pollards, and are an utensil common to this county and to Lincolnshire, though situated on the opposite sides of the island: but they are alike grass-land counties, wherein cattle are fattened on hay. They are about six feet in diameter. The height of the basket-work is two feet and a half; of the stakes, three feet and a half; their heads rising about a foot above the basket. The width between the stakes twelve to fourteen inches. The size, that of large hedge-stakes. The thickness of the rods varies from that of a small hedge-stake, down to a well-sized edder.

And in making these hay-baskets, the stakes are first driven in a ring of the required size firmly into the ground. Some of the larger rods are then wound in at the bottom, in the basket-work manner. Upon these the smaller rods are wound; the middle part of the work requiring the least strength, reserving the largest for the top. In the winding and due binding of those the principal part of the art of withy crib making rests. Some makers warm these thick rods in burning straw: others wind them cold; one man drawing them with a rope, while another beats them at the stake with a wooden beetle, until they acquire a degree of suppleness. They are mostly made by men who go about the country, and who by practice make them very completely; winding in the top rods so firmly and so regularly, that it is difficult to know which has been the last put in.

When in use, the cattle lay their necks between the tops of the stakes. Each being thus kept in its place, the master cattle are in a degree prevented from running round and driving away the underlings. The closeness of these cribs prevents a waste of hay, either by the wind or by the cattle. On the whole they are useful, simple, cheap, and if well made, will last several years.

RODEBACK, in *Geography*, a town of the duchy of Holſtein; 10 miles E.N.E. of Braamſted.

RODELHEIM, a town of Germany, which gives title to a branch of the houſe of Solms; 3 miles W. of Francfort on the Maine.

RODEMACK, or RODEMACHERON, a town of France, in the department of the Moſelle; 7 miles N. of Thionville.

RODEN, a town of the duchy of Wurzburg; 8 miles S. of Gemunden.—Alſo, a town of Pruſſia, in the palatinate of Culm; 4 miles N.W. of Bretchen.

RODENBERG, a town of Weſtphalia, in the county of Schauenburg, annexed to Heſſe Caſſel; near which is a medicinal ſpring; 4 miles S. of Hagenburg.

RODENBURG. See ARDENBURG.

RODENTHALL, a town of Saxony, in the circle of Erzgeberg; 6 miles E. of Chemnitz.

RODEO *de Tala*, a town of South America, in the province of Tucuman; 100 miles N. of St. Miguel de Tucuman.

RODER, GROS, a river of Saxony, which runs into the Schwartz Elſter, 2 miles below Elſterwerda.

RODER, *Klein*, a river of Saxony, which runs into the Schwartz Elſter, near Hertzberg.

RODERICKE, a town of Switzerland, in the canton of Berne; 3 miles S. of Aarburg.

RODERODE, a town of Germany, in the county of Henneberg; 4 miles E.N.E. of Smalkalden.

RODERSDORF, a town of Saxony; 4 miles S.W. of Plauen.

RODES, or RHODEZ, a town of France, and principal place of a diſtrict, in the department of the Aveyron, and capital of that department; before the revolution the ſee of a biſhop, ſuffragan of Bourges; 32 miles N.N.E. of Alby. The place contains 6233, and the canton 12,168 inhabitants, on a territory of $247\frac{1}{2}$ kiliometres, in 33 communes. N. lat. 44° 21′. E. long. 2° 39′.

RODHEIM, a town of Germany, in the county of Hanau Munzenberg; 9 miles N. of Francfort on the Maine.

RODIA, a town of Naples, in Capitanata, on the coaſt of the Adriatic; 14 miles W.N.W. of Vieſte.

RODIALOWITZ, a town of Bohemia, in the circle of Boleſlau; 12 miles S.E. of Jung Buntzel.

RODIGA, a town of Italy, in the duchy of Mantua; 9 miles N.W. of Mantua.

RODING, or RODEN, a river of England, in the county of Eſſex, which runs into the Thames, below Barking.

RODITZ, a town of Germany, in the principality of Culmbach; 2 miles W. of Hof.

RODNEY, GEORGE BRYDGES, in *Biography*, a celebrated naval commander, was the ſon of Henry Rodney, eſq. of Walton on Thames, a naval officer, who commanded the yacht in which king George I., attended by the duke of Chandos, uſed to embark in going to or coming from Hanover, and who, in conſequence, aſked leave that his ſon might be called George Brydges. He was the ſecond ſon, and born in 1718. At the deſire, or by the command, of his royal and noble god-fathers, he entered early into the navy, and in 1742 he was lieutenant in the Namur, commanded by admiral Matthews. In November of the ſame year, he was promoted by the admiral to the command of the Plymouth, of ſixty guns; on returning home he was removed into the Sheerneſs, a ſmall frigate; and in 1744 he was appointed to the command of the Ludlow-caſtle, of forty-four guns. Captain Rodney was, during the war, very ſucceſsful, and attained to a conſiderable degree of profeſſional eminence. In 1753 he married Miſs Compton, daughter of Charles Compton, eſq. and ſiſter to Spencer, then earl of Northampton. In 1757 he was engaged, under the command of admirals Hawke and Boſcawen, to attempt a deſcent on the coaſt of France, near Rochefort: and in 1759 he was advanced rear-admiral of the blue. In this ſame year he was ſent to bombard Havre de Grace, where a large force was collected for the purpoſe of attempting an invaſion of this country. He executed the truſt committed to him ſo completely, that the town itſelf was ſeveral times on fire, and the magazines of ſtores and ammunition burnt with fury upwards of ſix hours, notwithſtanding the exertions uſed to extinguiſh it. Thus had admiral Rodney the happineſs of totally fruſtrating the deſign of the French court; and ſo completely did he deſtroy their preparations, that the fort itſelf, as a naval arſenal, was no longer, during the war, in a ſtate to annoy Great Britain. In 1761 admiral Rodney was very inſtrumental in the capture of the iſlands of St. Pierre, Granada, St. Lucia, and St. Vincent, when the whole Caribbees came into the poſſeſſion of the Engliſh. For his ſkill and bravery in the war, he was, after the concluſion of it, raiſed to the dignity of a baronet. In 1768, after an expenſive, and to ſir George Rodney a ruinous, conteſt with Mr. Howe, he was elected member of parliament for Northampton. His affairs were now ſo deranged that he exiled himſelf to France, the government of which had long ſince trembled at his name. The French king wiſhed to take advantage of his pecuniary embarraſſments, and through the duke de Biron made him the moſt unbounded offers, if he would quit the Engliſh for the French ſervice. In reply to this ſhameful propoſal, he ſaid, "my diſtreſſes, ſir, it is true, have driven me from the boſom of my country, but no temptation can eſtrange me from her ſervice. Had this offer been voluntary on your part, I ſhould have deemed it an inſult, but I am glad to learn it proceeds from a ſource that can do no wrong." The duke was ſo ſtruck with the patriotiſm of the admiral, that he became attached to him as a friend.

Before ſir George Rodney's arrival in England, the French had united with the Americans in a war againſt this country. Towards the cloſe of the year 1779, the chief command of the Leeward iſlands was given him; upon which he hoiſted his flag on board the Sandwich. From this time he was very ſucceſsful againſt his majeſty's enemies, but our limits do not allow us to particularize all the advantages that reſulted from his ſervices during the remainder of the war of which we are ſpeaking. In the firſt year he had done enough to obtain a vote of thanks from the houſe of lords; and the freedom of the cities of London and Edinburgh; but his great triumph, and that which muſt not be paſſed over, was on the 12th of April 1782, in an engagement in the Weſt Indies with count de Graſſe. This battle was fought among the iſlands of Guadaloupe, Dominique, the Saintes, and Marigalante. As ſoon as the day broke, admiral Rodney threw out the ſignal for cloſe action, and every veſſel obeyed it moſt ſcrupulouſly. The Britiſh line was formed at the diſtance of one cable's length between each ſhip. As the ſhips came up ſeparately, they ranged cloſe alongſide their opponents, paſſing along the enemy for that purpoſe, giving and receiving, while thus taking their ſtations, a moſt dreadful and tremendous fire. The action continued in this manner till noon, when admiral Rodney reſolved to carry into execution a manœuvre, which he expected would gain him a complete and deciſive victory: for this purpoſe, in his own ſhip, the Formidable, ſupported by the Namur, the Duke, and the Canada, he bore down with all the ſail ſet on on the enemy's line, within three ſhips of the centre, and ſucceeded in breaking through it in a moſt maſterly ſtyle. As ſoon as he had accompliſhed this, the other ſhips of his diviſion followed him, and they all wore round, doubled on the enemy, and thus they placed between two fires thoſe veſſels which, by the firſt part of the manœuvre, they had cut off from the reſt of the fleet. As ſoon as admiral Rodney, and the veſſels which followed him, wore, he made the ſignal for the van to tack, by which means they gained the windward of the French, and completed the diſorder and confuſion, in which the *breaking of the line* had thrown them. One conſequence of the breaking of the line was, that opportunities were given for deſperate actions between ſingle ſhips. The whole loſs of the enemy on this occaſion amounted to eight ſhips; one had been ſunk, and another blown up after ſhe had been taken, and ſix ſhips remained in poſſeſſion of the conquerors. It was eſteemed remarkably fortunate, and glorious for the victors, that de Graſſe's ſhip, the Ville de Paris, was the only firſt rate man-of-war that had ever, at that time, been taken and carried into port by any commander of any nation. And this ſhip was on the preſent occaſion fought ſo well, that when it ſtruck there were but three men left alive and unhurt on the upper deck.

The Britiſh nation were ſo ſenſible of the bravery diſplayed both by officers and men in this action, and of the importance of it as the only means of preſerving the remainder of the Weſt India iſlands, that they manifeſted the moſt exceſſive joy when intelligence of the victory arrived. It came extremely ſeaſonable in other points of view. Neither by land, nor by ſea, except where admiral Rodney had been engaged, had we been able to meet the enemy, on any occaſion, with great and deciſive advantage; and, in too many inſtances, we had retired from the conteſt not in the moſt honourable manner. As the means of obtaining more favourable terms of peace, this important victory was hailed with joy and exultation; and as admiral Rodney was looked up to as the cauſe of it, the gratitude of the nation towards him was deeply felt, and expreſſed in warm and glowing language. It was recollected that the fortune of ſir George Rodney had been peculiarly ſingular, as well as highly glorious in the war. Within little more than two years he had given a ſevere blow to each of our three powerful continental enemies, the French, Spaniards and Dutch. He had in that time taken an admiral of each nation; added twelve line of battle ſhips, all taken from the enemy, to the Britiſh navy; and deſtroyed five more. He received the unanimous thanks of both houſes of parliament; and his majeſty added dignity to the peerage of the realm, by calling the victorious admiral to a ſeat in the upper houſe.

It has been obſerved, that the victory of the 12th of April was gained by putting in practice an entirely new ſyſtem of naval tactics, the adoption of which formed an era in our naval hiſtory, and may be regarded as the cauſe of the glorious victories, by which the fame of Britiſh ſeamen has been raiſed to ſuch a pitch of glory; and the maritime power of our enemies in the late war, has not only been crippled, but abſolutely annihilated. It has been ſaid, in order to derogate from the honour of the admiral, that, in the inſtance of the 12th of April, it was the effect of chance, and not effected by the foreſight of ſir George Rodney. This idea has been ſatisfactorily expoſed and refuted. The only queſtion on the ſubject is, and into which we ſhall enter at large under the word TACTICS, *Naval*, whether the honour of the plan is due to admiral Rodney or Mr. Clerk, the author of a treatiſe on "Naval Tactics."

With the brilliant victory of the 12th of April ſir George cloſed his profeſſional career; to his title was added a penſion of 2000*l.* to deſcend to his heirs. He died in London the 24th of May, 1792. For his important ſervices to the Weſt Indian iſlands in particular, a temple was built to receive his ſtatue at Spaniſh Town, Jamaica.

A contemporary of the noble admiral ſaid, that as an officer of nautical abilities, none were his ſuperiors, and but few his equals. He poſſeſſed a bold and original genius, which always carried him directly to the object he had in view. As a man, he was benevolent, generous, and friendly. He has been known to be writing his private letters, and dictating to three ſecretaries at the ſame time. "In private life he diſplayed the manners of an accompliſhed gentleman; and he who, when called by his country, could hurl its thunders againſt the foes, and lead its navies to almoſt undeviating victory, was, in peace, the ornament of domeſtic ſociety, and a pattern of that elegant and poliſhed behaviour, which almoſt always diſtinguiſhes the higher orders among us." Stockdale's edition of Campbell's Lives of the Admirals.

RODNEY, *Cape*, a cape of New Zealand, being the N.W. point of the entrance into the river Thames. S. lat. 36° 15′. W. long. 184° 53′.

RODNEY *Point*, the N. point of Norton Sound, on the N.W. coaſt of North America, ſo called in honour of admiral Rodney. N. lat. 64° 30′. W. long. 166° 3′.

RODOE, a ſmall iſland near the coaſt of Norway; four miles E.N.E. of Chriſtianſand.

RODOLDESCO, a town of Italy, in the department of the Mincio; 10 miles S.E. of Mantua.

RODOLPH I., in *Biography*, emperor of Germany, founder of the imperial houſe of Auſtria, born in 1218, was the eldeſt ſon of Albert IV., count of Hapſburgh and landgrave of Alſace. He was brought up in the court and camp of the emperor Frederic II., and early diſtinguiſhed himſelf by his courage and dexterity in martial exerciſes. On the death of his father, in 1240, he ſucceeded to a territory of moderate extent, which he endeavoured to augment by military enterpriſe. He entertained a band of adventurers of different nations, whom he employed either in defending him from his enemies, or in attempts to aggrandize himſelf at their expence. In 1245 he married a daughter of Burcard, count of Hohenburgh, with whom he obtained ſome acceſſion of eſtates. Some years afterwards he ſerved under Ottocar, king of Bohemia, againſt the Pagan Pruſſians. In 1273, as he was encamped before the walls of Baſil, with whoſe biſhop he was at enmity, he received the very unexpected intelligence, that he was unanimouſly elected king of the Romans.

Rodolph, then in his 55th year, willingly accepted the offered elevation, though ſenſible of the arduous taſk he was undertaking againſt the oppoſition of two unſucceſsful candidates. He was crowned at Aix-la-Chapelle, and immediately ſtrengthened himſelf by marrying two of his daughters to the count palatine of Bavaria, and duke of Saxony. He alſo took meaſures for ingratiating himſelf with the pope, Gregory X., who gave his ſanction to the election. Alphonſo, one of the unſucceſsful candidates, was induced by the pope to renounce his pretenſions; but Ottocar, the other, king of Bohemia, refuſed to acknowledge the new emperor, and manifeſted the bittereſt animoſity againſt him. The king of Bohemia was, at this time, one of the moſt powerful princes in Europe, and was diſtinguiſhed by his abilities and military ſkill. Beſides Bohemia and Bavaria, he poſſeſſed territories in the north of Germany and Hungary; and had lately acquired Auſtria, with Carinthia and Carniola,

Carniola. Both parties having prepared for the conteſt, war broke out between the emperor and the king in 1275, and Rodolph commenced his operations with all the vigour of his character. He firſt marched againſt Henry, duke of Lower Bavaria, whom Ottocar had ſecured in his intereſt, and ſoon brought him to change his party. He then penetrated into Auſtria, and appeared under the walls of Vienna, before Ottocar thought of his danger. This prince, finding himſelf unable to ſave the Auſtrian capital, bent his haughty ſpirit to ſue for peace, which was granted upon the condition of his renouncing his claims upon the Auſtrian provinces, and conſenting to acknowledge the emperor, and do homage for Bohemia and his other fiefs. The Auſtrian provinces, as fiefs, devolved to the empire, and were taken poſſeſſion of by the emperor.

The mind of Ottocar was ſo much irritated by the loſs and diſgrace he had undergone, that he could not bring himſelf to a faithful execution of the treaty, and the war was renewed in 1277. A fierce battle enſued, in which Rodolph was beaten to the ground by a Thuringian knight, and brought into great danger; but, on the other hand, Ottocar was killed, and his army entirely defeated. Rodolph was prevented from taking poſſeſſion of Bohemia by Otho, margrave of Brandenburgh, and he entered into an accommodation, by which Wenceſlaus was acknowledged king of Bohemia, while he himſelf was to hold Moravia for five years, and was to retain the Auſtrian provinces. The ſecuring of theſe to his family was thenceforth a great object of his policy, in which he encountered many difficulties, but at length he ſucceeded in ſettling them upon his two ſons, Albert and Rodolph.

In the midſt of theſe tranſactions, the emperor, thinking it would be for his honour to revive the imperial authority in Italy, after the death of Gregory, during the ſubſequent ſhort-lived pontificate, ſent commiſſaries into that country to exact homage from ſeveral of the towns; but, on the acceſſion of Nicholas III. he found it expedient to confirm to the papal ſee its poſſeſſions in Romagna. He afterwards attempted to reſtore the authority of the empire in Tuſcany; but in this he alſo failed, and was obliged to content himſelf with drawing large ſums from Lucca and other cities for the confirmation of their privileges. No foreign foe now remaining, Rodolph turned his attention to the reſtoration of peace and order in Germany; and for this purpoſe it was neceſſary to enforce the laws againſt building private fortreſſes, which were the retreats of banditti, or the refuge of turbulent nobles, who defied all law and authority. Of theſe ſtrong-holds he razed ſeventy in one year, condemning to death many of their owners for their violations of the public peace. He made many progreſſes through the imperial cities, adminiſtering juſtice and making ſalutary regulations, ſo that he obtained the title of "a living law," and deſerved to be regarded as a ſecond founder of the German empire. In 1283 he engaged in a war againſt Philip, count of Savoy, who had appropriated ſeveral imperial fiefs in Helvetia; but in an action near Morat he was overpowered by numbers, unhorſed, and obliged, for ſaving himſelf, to ſpring into the lake, where he ſupported himſelf by the branch of a tree till reſcued by his followers. He was, however, victorious, and brought the count to terms of ſubmiſſion. He was likewiſe ſucceſsful againſt the count of Burgundy, who had tranſferred his homage from the empire to France; but he failed in an attempt to gain poſſeſſion of Bern, which had declared itſelf an independent republic. The troubles of Bohemia, in which the oppreſſions of the regent Otho had excited revolts, while the minor king, Wenceſlaus, was detained as a priſoner, called Rodolph into that country. He delivered Wenceſlaus, whom he married to one of his daughters, and left him at the head of the government, in a ſtate of tranquillity. The final object of this emperor was to ſecure the imperial crown to his only ſurviving ſon, Albert; but the electors were not to be perſuaded into this meaſure, and Rodolph was ſeverely mortified with the diſappointment. His ſtrength had already begun to fail, and as he was upon his way to Spire he was obliged to ſtop at Germerſheim, where he died in July 1291, in the ſeventy-third year of his age, and the nineteenth of his reign.

There is ſcarcely an excellency of body or mind which the biographers of the houſe of Auſtria have not attributed to its founder; and it appears from the hiſtory of his actions, that few princes have ſurpaſſed him in energy of character, and civil and military talents. In the beginning of his career, he ſeems to have been little ſcrupulous in the means of aggrandizement; but, as an emperor, he was in general moderate and equitable. In his ſixty-fourth year he married, for his ſecond wife, a princeſs of Burgundy, only fourteen years of age, but no iſſue proceeded from this ill-ſorted union. By his firſt marriage he had a numerous offspring, of whom ſix daughters were all united to powerful families. Mod. Univ. Hiſt.

Rodolph II., emperor of Germany, ſon of Maximilian II., was born in 1552. His father procured him the crown of Hungary in 1572, and that of Bohemia in 1575, together with the title of king of the Romans. On the death of Maximilian, in 1576, he ſucceeded to the imperial throne, being then regarded as a highly accompliſhed prince, converſant with various branches of knowledge. Unfortunately, his taſte and acquirements were ſo far from qualifying him for the ſtation to which he was elevated, that they diverted his attention from the principal duties of a ſovereign. He was attached to mechanical inventions, and ſpent whole days in the ſhops of clock-makers, turners, and other artiſts. Chemiſtry was alſo one of his favourite ſtudies, with its uſual attendant in that age, alchemy. Having been educated among the Jeſuits, his zeal for the Catholic religion rendered him unfriendly to thoſe tolerating principles upon which his father had acted. He had ſucceeded to the ſole poſſeſſion of the territories of the houſe of Auſtria, and finding that the Proteſtant religion had ſpread in them to a degree that threatened to ſubvert the ſuperiority of the Catholic, his firſt care was to reſtore the preponderance of the latter. His meaſures for this purpoſe occaſioned revolts, and a total alienation of the minds of his Proteſtant ſubjects. In the other parts of the empire, Rodolph took part againſt the Proteſtants, and his interference was a principal cauſe of the depoſition and expulſion of the archbiſhop and elector of Cologne, who had embraced the Proteſtant religion, and married. Troubles ſoon aroſe in his Hungarian dominions, where ſultan Amurath III. made various incurſions, in which he over-ran part of Hungary and Croatia. Theſe were, however, chaſtiſed by ſeveral defeats given to the Turks by the imperial generals. But Mahomet III., the ſucceſſor of Amurath, took the important town of Agria, in Upper Hungary, and war was maintained, with various fortune, in that kingdom, till a peace was concluded with ſultan Achmet, in 1606. Rodolph took little perſonal ſhare in theſe events, being chiefly occupied with his ſtudies; and his Hungarian ſubjects had contracted ſuch a contempt for his character, that they invited his brother, the archduke Matthias, to undertake the government, and in 1607 elected him for their king. Matthias prepared to take poſſeſſion of his kingdom, and, marching with an army through Auſtria, projected to make himſelf maſter of that duchy. The timid and pacific Rodolph was perſuaded to enter into a treaty with

with his brother, by which he ceded to him Hungary and Auftria, and Matthias was folemnly inaugurated as fovereign of thofe countries.

Soon after, difturbances arofe in the empire on account of the difputed fucceffion to the duchies of Juliers and Cleves, with which were affociated the caufes of diffention between the Catholics and Proteftants of Germany. Confederations were formed, and both parties prepared for war. The emperor convoked diets, and diligently exerted himfelf, in order to prevent extremities. He, however, gave his chief confidence to his coufin the archduke Leopold, who, at length, marched into Bohemia, to awe the Proteftants that had been rendered difcontented, by attempts to introduce the infernal inquifition into the country, and by violations of their privileges. In this emergency they applied for affiftance to Matthias, who entered Bohemia, and obliged Leopold to difband his troops. Not content with this fuccefs, he fo wrought upon his brother, that Rodolph refigned to him his remaining kingdom of Bohemia, of which Matthias received the crown in 1611. Rodolph was, at that time, in a declining ftate of health; he died in January 1612, in the fixtieth year of his age, and thirty-fixth of his reign. It is faid, that the predictions of the celebrated but fuperftitious aftronomer Tycho Brahe, had rendered him diftruftful of all his relations, fo that he finally fhut himfelf up in his palace, which he never quitted either for exercife or amufement. Among his various ftudies was that of aftronomy, his attachment to which induced him to invite Tycho Brahe to Prague, where he was patronized till his death; and the fame patronage was afterwards given to the more eminent Kepler. The Rodolphine tables, commenced by the former, and completed by the latter, have perpetuated the name of this emperor as a promoter of fcience. Mod. Univ. Hift. Gen. Biog.

RODOLPHE, ——, one of the moft celebrated profeffors on the French horn that ever exifted. Though he ufually played the fecond horn, he mounted as high as the firft ever went. His execution was truly wonderful! and he had found the means of producing founds with his inftrument that were never heard before.

This able mufician was equally powerful in compofition as in performance. In 1773 he fet "Jemona," a ferious opera, for the marriage of the compt d'Artois. For the Italian theatre he had previoufly fet, in 1765, the comic opera called "Marriage by Capitulation;" and, in 1767, "The blind Man of Palmyra."

RODOME, in *Geography*, a town of France, in the department of the Aude; 9 miles S.W. of Quillan.

RODON, a town of Sweden, in Jamptland, on lake Storfio; 7 miles N.W. of Ofterfund.—Alfo, a fmall ifland on the weft fide of the gulf of Bothnia. N. lat. 62° 23′. E. long. 17° 20′.

RODONDA, a fmall ifland at the entrance of the harbour of Rio Janeiro.

RODONI, Cape, a cape on the coaft of Albania, in the Adriatic. N. lat. 41° 55′. E. long. 19° 16′.

RODOPE, a mountain of Romania; 50 miles S. of Filippopoli.

RODOSTO, a town of European Turkey, in the province of Romania, on the north coaft of the fea of Marmora, where the Armenians have one church, and the Greeks five. The environs are fertile in corn and wine; 53 miles N.E. of Gallipoli.

RODRIGO. See Civdad *Rodrigo*.

RODRIGUEZ. See Diego *Ruis*.

Rodriguez *Key*, a fmall ifland on the coaft of Florida. N. lat. 25°.

RODRIGUEZIA, in *Botany*, a genus fo named in the *Flora Peruviana*, p. 105, after Emanuel Rodriguez, a Spanifh botanift, apothecary to the king of Spain. *De Theis*.

RODSEG, in *Geography*, a town of Iftria; 16 miles N.N.E. of Pedena.

ROE, *Sir* Thomas, in *Biography*, a diftinguifhed traveller and negociator, was born, in 1580, at Low Layton, in Effex. He was fent at an early age to Magdalen college, in Oxford: after he had left that feminary of learning, he paffed fome time at one of the inns of court. He was made an efquire of the body to queen Elizabeth, towards the clofe of her reign; and in 1604 he was knighted by king James. At the inftigation of Henry, prince of Wales, he undertook an exploratory voyage to Guiana. Having fitted out a fhip and pinnace at his own charge, and that of his friends, he failed in 1609 for the river Amazons, up which he proceeded to the diftance of 300 miles, landing in various places to examine the country. Having fpent thirteen months in a laborious furvey of this part of the American continent, in fearch of gold, no doubt, he returned to England in 1611. In 1614 he was fent, at the defire of the Eaft India Company, as ambaffador to the Mogul emperor, for the purpofe of concluding a treaty of peace and commerce. He arrived at Surat in the autumn of that year, and refided at the Mogul court till the beginning of 1618. His conduct in this ftation did honour to himfelf and his country; and he made a great number of curious obfervations on the court and people, of which we have fpecimens in Purchas's Pilgrims. On his departure from this country, he vifited the court of Schah Abbas in Perfia, with whom he made a treaty, by which the Eaft India Company obliged itfelf to affift him with a fleet, for the purpofe of expelling the Portuguefe from Ormus, on condition of being allowed a free trade with Perfia. After his return, fir Thomas Roe was elected in 1620 a reprefentative in parliament for Cirencefter; and in the following year he was nominated ambaffador to the Ottoman Porte, which poft he occupied under the fultans Ofman, Muftapha, and Amurath IV. He performed, in this capacity, fome moft important fervices for his country; and he was, at the fame time, very ferviceable to the Greek church, by protecting it from the oppreffions of the Turkifh minifters, and from the intrigues of the Jefuits, and other perfons attached to the Papal fee. In return for his various fervices, he was affifted in his collection of manufcripts in the Greek and Oriental languages, which he prefented to the Bodleian library; and to his care was entrufted the celebrated Alexandrian manufcript of the Bible, prefented to Charles I. by Cyril, patriarch of Conftantinople. During his embaffy, fir Thomas drew up "A true Relation of what lately happened in Conftantinople, concerning the Death of Sultan Ofman, and the fetting up of Muftapha, his Uncle," &c. This was printed in London in 1622. He alfo kept minutes of his negociations at the Porte, which remained in manufcript till 1740, when they were publifhed by the fociety for promoting learning, under the title of "The Negociations of fir Thomas Roe, in his Embaffy to the Ottoman Porte, from the Year 1621 to 1628 inclufive."

After his return from Conftantinople, he was fent, in 1629, to mediate a peace between Poland and Sweden. He was afterwards employed in negociating a treaty with the king of Denmark at Copenhagen; and he went a fecond time to that court, and alfo to thofe of feveral German princes; and was prefent at the congrefs of Hamburgh, and its removals to Ratifbon and Vienna. In 1640 he was a reprefentative in parliament for the univerfity of Oxford, and

and made feveral fpeeches upon very important occafions. While a member of parliament, he was fent, in 1641, to the diet at Ratifbon, to negociate for the reftoration of the late king of Bohemia's fon to the Palatinate; and after his return, the king created him a privy-counfellor, and chancellor of the order of the Garter. The view of the approaching national difturbances was thought to have fhortened his life, which was terminated in 1644. He left the character of a very able and upright minifter, a true patriot, and accomplifhed gentleman. Befides the works already referred to, he left in manufcript "A compendious Relation of the Proceedings and Acts of the imperial Dyet, held at Ratifbon in 1640 and 1641;" and "A Journal of feveral Proceedings of the Knights of the Garter." Biog. Brit.

Roe, in *Geography*, a river of Ireland, in the county of Londonderry, which rifing in the Cairntogher mountains, flows northward through Newtown Limavaddy into lough Foyle.—Alfo, the name of a fmall ifland in Clew bay, county of Mayo, Ireland.

Roe, *La*, a town of France, in the department of the Mayenne; 7 miles N.W. of Craon.

Roe of a fifh is that part which contains the fpawn or feed thereof.

That of the male fifh is ufually diftinguifhed by the name of *foft* roe, or milt; that of the female by *hard* roe, or fpawn.

The foft roe, when fqueezed, yields a liquor refembling milk; whence its name *milt*. The French call it exprefsly *milk, lait*.

M. Petit found 342,144 ovula, or little eggs, in the hard roe of a carp eighteen inches long.

Leuwenhoeck, tom. ii. p. 216, only found 211,629 eggs in a carp, but four times the number in a cod; and, p. 188, he fays, that a common cod contains 9,344,000 eggs; and that the eggs of a fifh of one year old are as big as thofe of a fifh of twenty-five years old. Mem. Acad. R. Scien. an. 1733, p. 290. See Milt and *Fecundity of* Fish.

Roe is alfo one of the beafts of chafe.

Roe-*Buck*, the Englifh name of the *cervus* with ramofe, cylindric, and erect horns. It is the fmalleft of the deer-kind, and has been called *capreolus* and *caprea*, though without the leaft refemblance of the goat-kind. See Cervus *Capreolus* and Deer.

The roe-buck is called a *hind* the firft year; *gyrle*, the fecond; *henufe*, the third; *roe-buck of the firft head*, the fourth; and a *fair roe-buck*, the fifth.

The roe-buck is a deer well known in Germany; and feems to have alfo been formerly found in England, though now the race be extinct.

Roe-*Buck Hunting*. See Hunting.

Roe-*Buck Ifland*, in *Geography*, a fmall ifland in the gulf of Mexico, near the coaft of Weft Florida. N. lat. 30° 17'. W. long. 88° 44'.—Alfo, a fmall ifland at the eaft extremity of lake Ontario.

Roe-*Stone, Oolite*, in *Mineralogy*, a variety of lime-ftone, fo called becaufe it is compofed of fmall round globules, fuppofed to refemble the roes of fifhes, imbedded in a calcareous cement. Thefe globules are compofed of concentric lamellæ, and are evidently the refult of cryftallization. They vary in fize from a grain of muftard-feed to that of a pea: when they are as large as the latter, it is called pea-ftone. Roe-ftone is one of the fecondary lime-ftones, which may be confidered as belonging to the chalk-formation. It lies under chalk in various parts of England, being feparated from it by beds of fand and clay. It is found alfo in many parts of Europe, but, according to Humboldt, is not met with in South America. Some of the ftrata of this ftone are extenfively ufed for purpofes of architecture: the moft diftinguifhed are the Ketten ftone in Northamptonfhire, the Bath fire-ftone in Somerfetfhire, and Portland ftone in the ifland of Portland. Portland ftone is of a yellowifh-white colour: the more compact varieties, when clofely infpected, fhew a tendency to cryftalline arrangement; it is compofed of carbonate of lime, with a fmall admixture of filex and alumine.

The ifland of Portland is properly an ifthmus, fituated in Weymouth bay, in the Britifh Channel. The ftone is got in every part of the ifland, but the quarries at Kingfton are the moft productive. According to Mr. Smeaton, the firft ftratum in the quarry is a dark coloured reddifh earth, about one foot thick. To this fucceed fix feet of ftone of an inferior quality, called cap. Immediately under this lies the roe-ftone or free-ftone, which is ten or twelve feet deep; and beneath this bed there is flint or clay. In fome parts, irregular veins of quartz run through the roe-ftone. The ftratum of ftone that is wrought for fale lies nearly parallel with the upper furface of the ifland; and, in general, the cover of earth and rubbifh upon it is thin. Several beds of ftone lie continuous one above another, varying in thicknefs from two to four feet, and fometimes more.

Portland ftone was brought into repute in the reign of James I., and was employed in the conftruction of the banquetting-houfe at Whitehall. After the great fire in London, this ftone was generally ufed by fir Chriftopher Wren in the conftruction of the new public edifices, as St. Paul's cathedral, the monument, and almoft every building of note in the metropolis. See Stone *for Architecture*.

The different beds of roe-ftone abound in marine organic remains, of which the pear encrinite is perhaps the moft remarkable. In the lower beds are found the hippocephaloides, or horfe-head mufcles, which, according to Mr. Townfon, are not cafts, but petrifactions of the fifh itfelf, and do not reprefent the interior furface of the fhells, from which they are perfectly diftinct. This ftratum alfo contains the anomia Spinofa of Linnæus. The fpines are extremely delicate, and in fome fpecimens are more than half an inch in length; from which circumftance we may infer, that the calcareous earth of this ftratum was depofited in an extremely comminuted ftate, and in a tranquil element, otherwife it is almoft impoffible to conceive that thefe fpines could have remained unbroken.

ROEDBACH, in *Geography*, a river of the duchy of Berg, which runs into the Rhine, two miles below Zons.

ROELL, Hermann-Alexander, in *Biography*, a celebrated Proteftant divine, and theological profeffor, was born in 1653 at Doëlberg, in Weftphalia. He received an excellent education in the languages and elementary branches of fcience. In 1670 he went to the univerfity of Utrecht, where he received lectures from the celebrated Francis Burmann on the fcriptures; and on his return to Germany, he ftudied for fome time at Marpurg, and after that at Heidelberg. From thence he went to Bafil and Zurich; and in 1676 he once more vifited the United Provinces, and fpent two years at the univerfities of Utrecht and Leyden. No fooner had he returned to his native country than he received an invitation to become paftor of the Proteftant church at Cologne, which he declined, owing to ill health; and he undertook the chaplainfhip to Elizabeth, abbefs of Hervorden, and daughter of Frederic, king of Bohemia; which poft he retained till the death of the princefs, in 1680. After this he was appointed preacher to Albertine, princefs of Orange, and widow of William of Naffau; in whofe houfehold, and at Deventer, he exercifed the

the miniſtry till the year 1686, when he was elected profeſſor of divinity at the univerſity of Franeker. In 1704 he accepted an invitation to fill the divinity chair at the univerſity of Utrecht, a poſt which he retained with great reputation till his death in 1718, when he was in the 66th year of his age. He was author of many works chiefly on theological topics, among which are "A Commentary upon the Epiſtle to the Epheſians;" "An Analyſis of the Epiſtle to the Coloſſians;" "An Analyſis and Abridgment of the Prophetical Books of the Old Teſtament;" "Two philoſophical Diſſertations on Natural Religion, and one on Innate Ideas."

ROELLA, in *Botany*, ſo named by Linnæus, in Hort. Cliff. 492, to commemorate William Roëll, profeſſor of anatomy at Amſterdam, who enriched Cliffort's garden with many rare plants, the ſeeds of which he had procured from Africa and Japan. Among thoſe from the Cape of Good Hope, was the firſt ſpecies of the preſent genus.—Linn. Gen. 88. Schreb. 118. Willd. Sp. Pl. v. 1. 918. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 353. Juſſ. 165. Lamarck Illuſtr. t. 123. Gærtn. t. 31.—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Campanaceæ*, Linn. Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, turbinate, permanent, in five large, deep, lanceolate, acute, toothed ſegments. *Cor.* of one petal, funnel-ſhaped, deciduous; tube rather ſhorter than the calyx; limb ſomewhat ſpreading, longer than the calyx, deeply five-cleft. Nectary of five converging ſcales, in the bottom of the corolla, permanent. *Stam.* Filaments five, awl-ſhaped, ſtanding on the nectary; anthers awl-ſhaped, converging, equal in length to the filaments, and on a level with the calyx. *Piſt.* Germen inferior, oblong; ſtyle thread-ſhaped, the length of the ſtamens; ſtigmas two, oblong, depreſſed, ſpreading. *Peric.* Capſule cylindrical, ſhorter than the calyx, crowned with its enlarged ſpreading ſegments, two-celled, burſting at the ſummit. *Seeds* numerous, angular.

Eſſ. Ch. Corolla funnel-ſhaped, cloſed at the bottom by valves bearing the ſtamens. Stigma in two ſegments. Capſule inferior, cylindrical, opening at the ſummit.

Obſ. Linnæus attributes two cells to the capſule; Gærtner only one. Probably one may be occaſionally abortive. The eſſential diſtinction ſeems to conſiſt in the capſule having a vertical opening, inſtead of diſcharging the ſeeds by torn lateral orifices, as in *Campanula*, to which genus this is certainly, in other reſpects, very nearly allied. All the known ſpecies are natives of the Cape of Good Hope, being green-houſe plants in England, and having blue flowers.

1. R. *ciliata*. Ciliated Roella. Linn. Sp. Pl. 241. Hort. Cliff. t. 35. Willd. n. 1. Ait. n. 1. Curt. Mag. t. 378. (Campanula africana fruteſcens aculeoſa, flore violaceo; Comm. Hort. v. 2. 77. t. 39.)—Leaves lanceolate, fringed, with a prominent point. Flowers terminal, ſolitary.—Found in various parts of ſouthern Africa. The Dutch have long cultivated it. Mr. Maſſon ſent ſeeds to Kew in 1774. The plant is not very common, though much to be admired for the beauty of its flowers, which are produced in ſucceſſion, throughout moſt part of the ſummer; but it is not eaſily increaſed, nor long preſerved, being impatient of our damp winters. The *ſtem* is ſhrubby, of humble growth, branching in a determinate manner; the *branches* ſlender, round, leafy. *Leaves* copious, alternate, ſmall, of a pale dull green, linear-lanceolate, fringed, each ending in a prominent, awl-ſhaped, rigid point. *Flowers* ſolitary at the ends of the branches, an inch and half, or more, in diameter, their colours well deſcribed by Curtis as follows. "The bottom of the *flower* is white, of a yellowiſh caſt; next ſucceeds a circle of deep blue, inclining to black, with a ſurface highly glazed; the next circle is greyiſh-blue, reſembling ſatin; the next nearly white, and the outermoſt, (or limb,) pale purple." Each *leaf* of the plant is accompanied by an axillary tuft of ſmaller, obtuſe, entire, naked ones.

2. R. *ſquarroſa*. Trailing Roella. Linn. Suppl. 143. Thunb. Prodr. 38. Willd. n. 2. Ait. n. 2.—Leaves ovate, recurved, toothed, fringed. Flowers terminal, aggregate. Stem herbaceous, diffuſe.—Gathered by Thunberg at the Cape, and ſent from thence to Kew garden, by Maſſon, in 1787. It bloſſoms in June. The *branches* are more ſpreading and decumbent, as well as of a leſs ſhrubby nature, than the former. The *ſquarroſa* of Bergius, from whom the younger Linnæus adopted the name, is deſcribed as a *ſhrub*, with ſolitary *flowers*. Ours, beſides the terminal tuft, has generally ſeveral ſcattered lateral *flowers*, on ſhort leafy ſtalks, or branches, which may explain this apparent diſagreement.

3. R. *decurrens*. Decurrent Roella. L'Herit. Sert. 4. t. 6. Willd. n. 3. Ait. n. 3.—Leaves lanceolate, entire, fringed, decurrent. Flowers ſolitary, terminal.—Sent from the Cape, by Mr. Maſſon, in 1787. This ſpecies is annual, flowering in September. The *root* is ſmall and tapering. *Stem* much branched from the very bottom, ſpreading and partly decumbent, hairy. *Leaves* ovato-lanceolate, fringed, for the moſt part entire; ſtrongly decurrent, ſo as to render the ſtem winged. *Flowers* terminal, ſeſſile, pale blue, ſolitary, except occaſionally on the moſt luxuriant branches.

4. R. *muſcoſa*. Moſſy Roella. Linn. Suppl. 143. Willd. n. 4. Thunb. Prodr. 38.—Leaves ovate, toothed, reflexed, ſmooth. Flowers terminal, ſolitary. Stem herbaceous, diffuſe.—Gathered at the Cape by Thunberg. A very ſmall annual ſpecies.

5. R. *ſpicata*. Spiked Roella. Linn. Suppl. 143. Willd. n. 5. Thunb. Prodr. 38.—Leaves lanceolate, fringed, nearly entire. Flowers terminal, ſomewhat ſpiked. Stem ſhrubby, erect.—Found by Thunberg at the Cape. We have ſeen no ſpecimen of this or the laſt.

Linnæus, in Sp. Pl. 241, has ? *R. reticulata*, adopted from Van Royen and Petiver, which appears to be no other than his own *Gorteria ciliaris*; *Cullumia ciliaris* of Brown, in Ait. Hort. Kew. v. 5. 137.

ROEMER, Olaus, in *Biography*, a Daniſh aſtronomer and mathematician, who flouriſhed in the 17th and 18th centuries, was born at Arhuſſen, in Jutland, in the year 1644. From an elementary ſchool at his native city he was ſent to the univerſity of Copenhagen, in 1662, where he diſtinguiſhed himſelf by the progreſs which he made in his academical ſtudies, and particularly in the mathematical ſciences, which were the favourite ſubjects of his purſuit. By diligent ſtudy he had, in 1671, become ſo expert an aſtronomer, that, being introduced to M. Picard of the Academy of Sciences at Paris, who was ſent by Louis XIV. to make aſtronomical obſervations in the northern regions, he was ſelected to accompany him when he returned to France. Here he preſented him to the king, who appointed him mathematical preceptor to the dauphin, and ſettled a penſion upon him. Roemer was united with Picard and Caſſini in making aſtronomical obſervations, and in 1672 he was admitted a member of the Royal Academy of Sciences at Paris. He reſided ten years at Paris, and acquired a high reputation by his many diſcoveries, among which was the very important one by which he aſcertained the velocity with which light moves, by means of the eclipſes of Jupiter's ſatellites. (See Light.) This diſcovery was afterwards confirmed by Dr. Bradley. In 1681 Roemer was recalled to his own country by Chriſtian V. king of Denmark, who

who appointed him professor of astronomy, at the university of Copenhagen, and gave him the flattering title of *his own mathematician*, with a considerable salary. He was also employed in reforming the coin; improving the public buildings; regulating the weights and measures; and in surveying and laying out the high roads throughout the kingdom. In 1687 the king directed him to travel through Germany, France, England, and Holland, in order to collect such information, on a variety of points, as might be applied to beneficial purposes in Denmark. Upon his return home in the following year, he was made counsellor of the chancellery, and in 1693, assessor of the supreme tribunal of justice.

Christian V. was succeeded by Frederic IV. who appointed Roemer, in 1705, burgomaster of Copenhagen, and in 1706, honoured him with the dignity of counsellor of state. Roemer died in 1710, just as he was about to give the world the result of his observations. These, however, were published under the title of "Basis Astronomiæ," in 1753, by Peter Horrebow, who had been his disciple, and was, at the time, professor of astronomy at Copenhagen. Accounts of Roemer's astronomical observations, and some other of his pieces, will be found in the different volumes of the "Memoires" of the Royal Academy at Paris, particularly vols. i. and x.

ROENBERG, in *Geography*, a town of Brandenburg, in the New Mark; 8 miles E. of Zullichau.

ROENENG, a long measure in Siam, equal to one league, containing 4204 English yards, or 2⅓ miles nearly.

ROENSEL, in *Geography*, a river of the county of Mark, which runs into the Wipper, about a mile above Wipperfurt.

ROER, a river of Germany, which rises near Winterburg, and runs into the Rhine at Roerort.—Also, a river of France, which rises S. of Montjoe, in the department to which it gives name, and runs into the Meuse at Ruremond.

ROER, one of the three departments of the region of France, called the Reunited country; composed of the duchy of Juliers and a portion of the electorate of Cologne, situated in N. lat. 51°, on the left hand of the Rhine. It contains 6697 kiliometres, or 259 square miles, and 516,246 inhabitants. It is divided into 4 circles or districts, 40 cantons, and 993 communes. The districts are Aix-la-Chapelle, including 165,261 inhabitants; Cologne, with 157,215; Crevelt, with 137,605; and Cleves, with 76,206 inhabitants. According to Hassenfratz, this department is 23 French leagues in length and 13 in breadth; and comprehends 4 circles, 40 cantons, and 324,960 inhabitants. Its capital is Aix-la-Chapelle. Its contributions, in the 11th year of the French era, were 4,564,150 fr. and its expences for administration and public instruction were 331,936 fr. 66 cents. Interspersed with heaths and marshes, this territory is, in general, fertile in grain, fruits, and pastures. It has mines of copper, iron, lead, and coal, with cold and hot mineral springs.

ROERMONT. See RUREMOND.

ROERORT, a town of the duchy of Cleves, at the conflux of the Roer and the Rhine; 15 miles N. of Dusseldorf.

ROESBACH, a river of the duchy of Berg, which runs into the Rhine at Dusseldorf.

ROESCHILD, ROSCHILD, *Roeskild*, or *Roskild*, a town of Denmark, in the island of Zealand, erected into a bishopric in the year 1012. In the year 1150 it was first encompassed with a rampart and ditch, and in 1268 or 1278 it obtained the privileges of a city. It gradually increased to such an extent as to contain 27 large churches and convents within its walls. Some of the churches of the neighbouring villages were included within its circuit, and its streets extended as far as the sea-shore. The kings of Denmark were formerly elected and crowned in this city, and made it the place of their residence. Its subsequent decay has been owing to frequent fires, to the tyranny of its bishops, and also to the flourishing state of Copenhagen. The reformation contributed also to its decline, as the monks and clergy who spent a great part of their revenues in this place, were obliged to quit the country. At present Roeschild is a mean place, containing about 200 houses; the cathedral, built A. D. 930, where the royal families of Denmark have for many ages been buried; and the ruins of a royal palace. Here are some monuments worthy of attention, particularly four elegant mausolea in alabaster, of late kings and queens. The first king who was buried here was Harol Blaacland, A. D. 980, and the last was Frederic V. surnamed the Great, A. D. 1766. The inhabitants support themselves chiefly by agriculture, and the planting of tobacco. In the year 1658, the famous peace of Roeschild, between the Swedes and Danes, was concluded here: 16 miles W. of Copenhagen. N. lat. 55° 39′. E. long. 12° 6′.

ROESCHULT, a town of Sweden, in the province of Smaland, said to be the native place of the famous Linnæus.

ROESENDAEL, a town of Brabant; 8 miles E. of Berg-op-Zoom.

ROESSEL. See ROSSEL.

ROETTVIK, or RAETTVIK, a mountain of Sweden, which, according to Bergman, is calcareous, and the height of which he estimates at 6000 feet above the sea; observing, as a singularity, that upon this mountain and that of Rodeberg, are found vast blocks of reddish felspar, mingled with quartz and brown mica.

ROEVAERT, a river of Brabant, which runs from Breda into the sea.

ROEULX, LA, a town of France, in the department of Gemappe; 8 miles N.E. of Mons.

ROEUX, a town of France, in the department of the straits of Calais; 9 miles E. of Arras.

ROFANI, a cape of European Turkey, on the S. coast of Romania. N. lat. 40° 35′. E. long 24° 14′.

ROFFENSIS TEXTUS. See TEXTUS.

ROFRANO, in *Geography*, a town of Naples, in Principato Citra; nine miles N.W. of Policastro.

ROGA, a town of Naples, in the province of Otranto; seven miles N. of Otranto.

ROGA, ῥογα, in *Antiquity*, a donative, or present, which the Augusti, or emperors, made to the senators, magistrates, and even the people; and the popes, or patriarchs, to their clergy.

The word is derived by some from the Latin *erogare, to give*, or *distribute*; according to others from *rogo, I ask*; hence, say they, it is that St. Gregory the Great calls such distributions *precaria*, as being to be demanded in order to be had. Others, again, derive it from the Greek ῥοξος, sometimes used for *corn*; because it anciently consisted in corn, distributed among the populace, the soldiery, &c.

The emperors used to distribute these rogæ on the first day of the year, or on their birth-day, or on the natalis dies of the cities. The popes and patriarchs in Passion Week.

This custom of rogæ, or largesses, was introduced by the tribunes of the people, to gain the populace more effectually over to their interest. The emperors at length took it up, and made such distributions to the people, and even to the soldiery, who are hence called by the Greek writers of the middle age ῥογατορες.

ROGA is also used for the ordinary pay of the soldiery.

ROGA-

ROGANELLO, in *Geography*, a river of Naples, which runs into the gulf of Tarento, near Civita Mendrino.

ROGATCHEV, a town of Ruſſia, in the government of Mogilev, on the Dnieper; 76 miles S. of Mogilev. N. lat. 52° 36′. E. long. 30° 14′.

ROGATIO, Rogation, in the *Roman Juriſprudence*, a demand made by the conſuls, or the tribunes, of the Roman people, when a law was propoſed to be paſſed.

The demand was made in theſe terms: *Do you will and appoint that* (for inſtance) *war be declared againſt Philip?* This was the *rogatio;* and what the people returned in anſwer, as, *The Roman people do appoint war to be made againſt Philip*, was the *decretum*, *decree*, or *reſolve*.

The word *rogatio* is frequently alſo uſed for the decree itſelf, to diſtinguiſh it from a ſenatus-conſultum, or decree of the ſenate.

Frequently, alſo, *rogatio* is uſed in the ſame ſenſe with *law*, becauſe there never were any laws eſtabliſhed among the Romans, but what was done by this kind of rogation. Otherwiſe they were null.

ROGATION Week, the week immediately preceding Whitſunday; thus called from three faſts therein; *viz.* on the Monday, Tueſday, and Wedneſday, before Holy Thurſday, or the Aſcenſion of our Lord; called alſo *Rogations*, or *Rogation days*, becauſe of the extraordinary prayers, and proceſſions then made, for the fruits of the earth.

Dr. Godolphin ſays, the Rogation days derive their name from certain ordinances for abſtinence, or days of faſting, which the biſhop of Rome recommended to be obſerved by the Weſtern churches, before he aſſumed the power of compulſion; and which he, therefore, called by the gentle name of *Rogation*, the time of abſtinence being appointed at the beginning by that ordinance, which was called *Rogatio*, and not *lex*, or *decretum*.

The firſt who appointed theſe rogations was St. Mamertus, biſhop of Vienne, who, in 474, aſſembled ſeveral biſhops, to implore the mercy of God by a faſt of three days, on occaſion of an incurſion then made into the country by a number of wild beaſts. Others ſay, it was firſt ſet on foot by the ſame Mamertus, in 463, on occaſion of ſome great public calamities.

His example was ſoon followed, firſt by the church of Clermont, in Auvergne, then by all their neighbours, and afterwards throughout all Gaul.

In 801, Leo III. confirmed this faſt, and made it univerſal.

ROGATORES, among the Romans, thoſe who in the comitia centuriata brought the cheſt into which the people threw the ballots containing their votes.

ROGE, in *Geography*, a town of Sweden, in the province of Skone; 28 miles N.W. of Chriſtianſtadt.

ROGEHAUSEN, a town of Pruſſia, in the palatinate of Culm; 21 miles N.E of Culm.

ROGELGRUBE, a town of Pruſſia, in the Friſche Nerung; 15 miles N.W. of Elbing.

ROGELIM, in *Scripture Geography*, a place of Judea, in the tribe of Gad, the reſidence of Barzillai; mentioned in the book of Kings.

ROGER, in *Biography*, firſt king of Sicily, born in 1097, was ſon of Roger, count of Sicily, and grandſon of the Norman Tancred of Hauteville. He ſucceeded in his fourth year to the ſovereignty of Sicily, under the guardianſhip of his mother Adelaide. As ſoon as he aſſumed the reins of government, he endeavoured to obtain the undivided poſſeſſion of Palermo, of which a half belonged to the elder branch of his family, and alſo to enlarge the bounds of his eſtates in Calabria. On the death of his relation, William, duke of Apulia, he was proclaimed at Reggio duke of Apulia and Calabria; but the pope, Honorius II., refuſed for ſome time to grant him an inveſtiture to thoſe duchies; at length, however, an accommodation was effected, and the pope became his friend. He was now a powerful prince, and being urged by ſome of his ſubjects to aſſume the regal title, he readily complied with their wiſhes. In 1130 he convoked an aſſembly of his barons at Palermo, and received with great pomp and ceremony the royal crown of Sicily from the hands of a cardinal, delegated for the purpoſe. He was inveſted at the ſame time with the principality of Capua and the dukedom of Naples. A rebellion broke out among his new ſubjects in Italy, which obliged him to retire to Salerno, and thence to Sicily. Roger, at this period, had eſpouſed the cauſe of Anacletus, while the emperor Lothaire had eſpouſed the cauſe of Innocent II., who was likewiſe acknowledged by ſeveral of the Italian ſtates. A formidable confederacy was formed againſt Roger, in which the republic of Piſa, then a powerful maritime ſtate, took a leading part. An active war was carried on for ſeveral years with various ſucceſs in the ſouth of Italy. In 1137 the emperor reduced the whole of Apulia, of which a new duke was created, while Roger was excommunicated by Innocent II. In 1139 he took the pope priſoner, who was obliged to purchaſe his liberty by the abſolution of the king, and his inveſtiture in Sicily, Apulia, and Capua. From this period the affairs of Roger became proſperous, and the ſucceſſors of Innocent, who had refuſed to acknowledge his regal title, were brought to comply by the terror of his arms. About the year 1146, Roger carried his arms into Africa, and after reducing Malta, which from this period was annexed to the crown of Sicily, he made himſelf maſter of Tripoli, Tunis, and other extenſive tracks along the ſea-coaſt, which he rendered tributary. About the ſame time he avenged himſelf of the injuſtice of the Greek emperor, Manuel, who had impriſoned his ambaſſadors, and offered him other indignities, by ſending a powerful fleet, which took the iſland of Corfu, and cruelly ravaged the coaſt of Morea. One reſult of this expedition was, the carrying off a number of ſilk manufacturers, and ſettling them in Apulia and Sicily, where they introduced their art. His admiral advanced as far as Conſtantinople, the ſuburbs of which he pillaged and burnt; and he had the honour of ſetting at liberty Lewis VII. of France, who, on his return from the Holy Land, had been intercepted by a Grecian ſquadron. Manuel, however, aſſiſted by the Venetians, purſued and in part deſtroyed the Sicilian fleet, and recovered Corfu. Roger now aſſociated his only ſurviving ſon with him on the throne, and after employing the laſt years of his life in erecting monuments of his munificence and piety, he expired at Palermo in the year 1154, in the 58th year of his age, and 25th of his reign as king, leaving the character of one of the ableſt, moſt vigorous, and fortunate princes of his time. Gibbon, vol. x. Mod. Univer. Hiſt.

Roger de Hoveden, a learned hiſtorian of the 13th century, was probably born at the town of Hoveden or Howden, in Yorkſhire, ſome time in the reign of Henry I. Having received the early parts of his education, he began to ſtudy the civil and canon law, which were then become the moſt faſhionable branches of learning. He was appointed domeſtic chaplain to Henry II., who employed him in many eccleſiaſtical affairs, in which he acquitted himſelf with high honour. He is, however, beſt known by his Annals of England, from the year 731, where Bede's Eccleſiaſtical

Hiſtory ends, to 1202. This work, which is one of the moſt voluminous of our ancient hiſtories, is more valuable for the ſincerity with which it is written, and the great variety of facts which it contains, than for the neatneſs of its ſtyle, or the regularity of its arrangement.

ROGERS, John, an Engliſh divine, was educated at Cambridge, and became chaplain to the factory at Antwerp, where he aſſiſted Tindal and Coverdale in tranſlating the Bible into Engliſh. In the reign of Edward VI. he returned to England, and obtained a prebend in St. Paul's cathedral, where he was a frequent and zealous preacher. He was the firſt perſon executed in the reign of the bloody Mary, being burnt in Smithfield in 1555. In the former reign he had been, at leaſt, an abettor of the ſame ſort of perſecution of which he himſelf became the victim. This fact deſerves to be recorded. When the Proteſtant biſhops had determined to burn Joan of Kent, a friend of Rogers, the divinity reader in St. Paul's church, came to him, earneſtly deſiring him to uſe his intereſt with the archbiſhop, that the poor woman's life might be ſpared, and other means uſed to prevent the ſpreading of her opinions, which might be done in time; urging, though that while ſhe lived ſhe infected few with her opinion, yet ſhe might bring many to think well of it by ſuffering death for it; he pleaded, therefore, that it was better ſhe ſhould be kept in ſome priſon, without an opportunity of propagating her notions among weak people; and ſo ſhe would do no harm to others, and might live to repent herſelf. Rogers on the other hand pleaded, ſhe ought to be put to death. Well then, ſays his friend, if you are reſolved to put an end to her life, together with her opinions, chooſe ſome other kind of death more agreeable to the gentleneſs and mercy preſcribed in the Goſpel, there being no need that ſuch tormenting deaths ſhould be taken up in imitation of the Papiſts. Rogers anſwered, that burning alive was no cruel death, but eaſy enough. His friend, then hearing theſe words, which expreſſed ſo little regard to the poor creature's ſufferings, anſwered him with great vehemence, and ſtriking Rogers's hand, which he before held faſt, ſaid to him, "Well, it may perhaps ſo happen, that you yourſelves ſhall have your hands full of that mild burning." And ſo it came to paſs. Mr. Pierce, who has recorded this anecdote, conjectures with great probability, that the friend of Rogers was the hiſtorian himſelf.

Rogers, captain Wood, a famous Engliſh navigator in the early part of the eighteenth century, of whoſe private hiſtory little is known, ſailed in the Duke, a private ſhip of war, of 30 guns and 170 men, in company with the Ducheſs, a ſmaller veſſel, commanded by captain Stephen Courtney, on an expedition into the South ſeas againſt the Spaniards. Theſe ſhips were fitted out by a company of merchants at Briſtol, and they ſet ſail on the 1ſt of Auguſt, 1708. On board one of them as pilot was the afterwards celebrated captain Dampier, (ſee his article.) In paſſing the ſtraits of Magellan, they not only captured ſeveral ſhips, but likewiſe took ſeveral towns upon the coaſt, and on the 22d of December 1709, they met with the famous Acapulco ſhip, which was the leſſer of two ſhips, which at that period ſailed annually from the Eaſt Indies to Mexico. She carried 20 guns, and would not ſurrender until ſhe was overcome: an action began and laſted about half an hour, when the Spaniard hauled down her colours; and ſhe was found to be a moſt valuable prize, worth 2,000,000 pieces of eight. After this they met with the larger Acapulco ſhip, but having ſkirmiſhed two days, they found it impoſſible to capture her. They therefore determined to return by the Eaſt Indies, and arrived in the Downs after having circumnavigated the globe, on the 2d of October, 1711. This voyage, which was abundantly ſucceſsful, led to the foundation of the South Sea Company; which ſee. In 1718, captain Rogers having been appointed governor of the Bahama iſlands, proved himſelf well adapted to the ſituation, by the vigorous meaſures which he adopted againſt the pirates, who had become moſt inimical to the trading intereſts of the country. He arrived at Providence, after a ſhort and eaſy paſſage, on the 11th of April, took poſſeſſion of the town of Naſſau, and the whole iſland, much to the ſatisfaction of the inhabitants, and many of the pirates, who had ſettled themſelves there, ſubmitted at once to his authority. He proceeded ſoon after in forming a council, and ſettling the government of thoſe iſlands, appointing civil and military officers, raiſing militia, and taking every other ſtep neceſſary for procuring ſafety at home, and ſecurity from any thing that might be attempted from abroad, in which by degrees he completely ſucceeded. Some of the pirates at firſt rejected the terms, and continued to do a good deal of miſchief on the coaſt of Carolina; but when they ſaw that captain Rogers had thoroughly ſettled himſelf at Providence, and was not to be trifled with, and that the inhabitants of the Bahamas found it to be to their intereſt to be honeſt, they thought proper to ſolicit mercy; ſo that by the 1ſt of July, 1719, to which day the king's proclamation had been extended, there were not above three or four veſſels of thoſe pirates which continued to trade, two of theſe being captured, and their crews executed, the reſt diſperſed. "Thus," ſays the judicious Campbell, "in a ſhort time, and chiefly through the ſteady and prudent conduct of governor Rogers, this herd of villains was in ſome meaſure diſſolved, who for many years had frighted the Weſt Indies and the northern colonies, coming at laſt to be ſo ſtrong that few merchantmen were ſafe, and withal ſo cruel, that ſlavery among the Turks was preferable to falling into their hands." See Campbell's Lives of the Admirals, Stockdale's edition, vols. iii. and iv.

Rogers, Benjamin, doctor of muſic, an eccleſiaſtical compoſer, whoſe works are ſtill contained in our cathedral ſervice, and for whoſe fame Anthony Wood has manifeſted great zeal. This muſician was born at Windſor, and brought up in that college under Dr. Nath. Giles; being employed there, firſt as a ſinging boy, and afterwards in the capacity of lay clerk or ſinging man. Thence he went to Ireland, and was appointed organiſt of Chriſt-church in Dublin, where he continued till the breaking out of the rebellion, in 1641; at which time, being forced to quit his ſtation, he returned to Windſor, where he was again reinſtated as choirman; but being ſoon after ſilenced in conſequence of the civil wars, he procured a ſubſiſtence by teaching in the neighbourhood. And during this time, according to his friend Ant. Wood, having addicted himſelf much to ſtudy, he acquired great credit as a compoſer, and produced ſeveral ſets of airs in four parts for violins and an organ, which being then imagined the beſt that *could* be compoſed of that kind, were ſent as great rarities to the archduke Leopold, afterwards emperor, and himſelf a great muſician; and, upon their being performed by his band, they were very much admired.

In 1658, by the favour of his friend Dr. Ingelo, he obtained the degree of bachelor in muſic at Cambridge, and acquired great reputation in that univerſity by his exerciſe. Soon after, on Dr. Ingelo going chaplain to Bulſtrode lord Whitelock, into Sweden, he carried with him ſome of Ben. Rogers's beſt compoſitions, which, upon being repeatedly

peatedly performed in the presence of Christiana, queen of Sweden, were very much applauded.

At the Restoration he was appointed to compose the music that was performed at Guildhall, on the day his majesty and his brothers, the dukes of York and Gloucester, dined there with the lord mayor, by which he greatly increased his reputation.

About this time he was chosen organist of Eton college, which he resigned soon after, on being invited to Oxford, where he was appointed to the same office in Magdalen college. And in 1669, upon opening the new theatre in that city, he was created doctor in music. He continued, says Ant. Wood, in the university, where he was much esteemed, till the year 1685, when he was ejected, in company with the fellows of his college, by king James II. after which he long resided in the skirts of the town, wholly disregarded.

"His compositions for instruments," says Ant. Wood, "whether in two, three, or four parts, have been highly valued, and were thirty years ago always first called for, taken out and played as well in the public music schools, as in private chambers: and Dr. Wilson, the professor, (the greatest and most curious judge of music that ever was,) usually wept when he heard them well performed, as being wrapt up in an ecstacy; or, if you will, melted down: while others smiled, or had their hands and eyes lifted up, at the excellence of them."

It is to be feared, that instead of *weeping*, the wicked lovers of modern music would now *laugh*, if they were to hear the quaint and starched strains, and see on paper the ruffs and roll-ups of honest Ben. Rogers at the Opera-house, or professional concert, Hanover-square. But, alas! what is the secular music, that thirty years have not wrinkled, withered, and rendered superannuated!

ROGERS'*s Point*, in *Geography*, a cape on the W. side of lake Huron. N. lat. 44° 19'. W. long. 82° 45'.

ROGERSVILLE, the chief town of Hawkins county, in the state of Tenessee, pleasantly situated in Carter's valley, with a prospect agreeably variegated by some round hills at a distance. It contains about 20 dwelling-houses, some public buildings, stores, &c. It has a number of perennial springs, and one above the level of the streets.

ROGETS, a town of the duchy of Magdeburg, at the conflux of the Oura and Elbe; 16 miles N. of Magdeburg.

ROGGENDORF, a town of Austria; 8 miles W. of Aggspach.

ROGGEWELD, a transmontane division of the district of Stellenbosch and Drakenstein, at the Cape of Good Hope, called the Rye-grass country, and divided into Upper, Middle and Little. These are the summit of a long extended Table mountain, whose western front rises out of the Karroo plains, behind the Bokkeweld, almost perpendicularly, to the height of two or three thousand feet. Stretching to the eastward, this summit becomes more broken into inequalities of surface, and rises at length into the mountains of Nieuweld, the Camdeboo, and the Seeuwberg, which may be considered as one extended chain. The great elevation of the Roggeweld, and its being surrounded by the Karroo plains, make the temperature in winter so cold, that for four months in the year, the inhabitants are under the necessity of descending to the feet of the mountains, with their horses, cattle, and sheep. The strongest and largest breed of horses in the whole colony is that of the Roggeweld. See NIEUWELD.

ROGIERS, a town of France, in the department of the Var; 4 miles S. of St. Maximin.

ROGLIANO, a town of Naples, in Calabria Citra; 9 miles S.S.E. of Cosenza.—Also, a town of the island of Corsica; 20 miles N. of Bastia.

ROGME, in *Surgery*, a rupture or fracture.

ROGNES, in *Geography*, a town of France, in the department of the Mouths of the Rhone; 13 miles N.W. of Aix.

ROGO, an island of Sweden, near the E. coast, in the Baltic. N. lat. 57° 53'. E. long. 16° 36'.

ROGONATGUNGE, a town of Bengal; 30 miles S.W. of Rogonatpour. N. lat. 23° 17'. E. long. 86° 21'.

ROGONATPOUR, a town of Bengal, and capital of the circar of Pachete; 150 miles S.S.E. of Patna. N. lat. 23° 33'. E. long. 85° 44'.—Also, a town of Bengal; 31 miles S.E. of Kishenagur.

ROGOSNO, a town of the duchy of Warsaw; 16 miles N. of Posen.

ROGOWA, a town of Prussia, in the palatinate of Culm; 7 miles E. of Thorn.

ROGSTA, a town of Sweden, in Helsingland; 2 miles N.E. of Hudwickwall.

ROGUE, in *Law*, an idle and sturdy beggar, who, by ancient statutes, for the first offence, is called a *rogue of the first degree*, and punished by whipping, and boring through the gristle of the right ear, with a hot iron, an inch in compass; and, for the second offence, is called a *rogue of the second degree*, and ordered to be put to death as a felon, if he be above eighteen years of age. For the description and punishment of rogues, as they are established by 17 Geo. II. cap. 5, see VAGABOND.

ROGUES, or *Whores' March*, in *Military Language*, a beat of the drum, accompanied by the fifes, when a soldier is drummed out of the regiment, or common prostitutes are drummed out of camp or garrison.

ROGUES *Yarn*, a name given to a rope-yarn, which is placed in the middle of every strand, in all cables and cordage in the king's service. It differs from all the rest, as being untarred and twisted in a contrary manner, by which it is easily discovered. The use of this contrivance is to examine whether any cordage, supposed to be stolen or embezzled, has been formed for the king's service, the possessor of which is subject to a heavy fine. Falconer.

ROGUINS, in *Geography*, a town of France, in the department of the Rhone and Loire; 6 miles E. of Roanne.

ROGUN, a town of European Turkey, in Albania; 6 miles W.N.W. of Arta.

ROHACZOW, a town of Lithuania, in the palatinate of Minsk, on the Dnieper; 85 miles S.E. of Minsk. N. lat. 52° 50'. E. long. 29° 33'.

ROHALE, a small island on the W. side of the gulf of Bothnia, N. lat. 60° 37'. E. long. 17° 49'.

ROHAN, HENRY, *duke of*, in *Biography*, second of the name, but one of the first rank, talents, and character of the French nobility of his time, was born in 1579, at the castle of Blein, in Britanny. At the age of sixteen he distinguished himself at the siege of Amiens, under the eye of Henry IV., to whom he was presumptive heir, before the birth of the dauphin. After the death of Henry, he was at the head of the Calvinist party in France, a station which he retained during three religious wars against the authority of Lewis XIII. In the first, in 1621, he defended Montauban in person: the siege was raised, and in the following year a favourable peace was granted to the Protestants. The war was rekindled in 1625, but was soon terminated by a peace. At length Richelieu resolved entirely to subdue a party which had become a sort of separate republic

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in France, allied for its own defence with her enemies. He besieged and took Rochelle, the ſtrong hold of the Calviniſts; and though the duke of Rohan vigorouſly maintained the war in Languedoc, he was at length obliged, in 1629, to make his ſubmiſſion, and the party was deprived of all its fortreſſes, but ſtill allowed the public exerciſe of its religion. To ſome of the moſt violent, who were enraged at the terms of accommodation, and accuſed their chief of having ſold them, he preſented his naked breaſt, ſaying, "ſtrike! I am content to die by your hands, after having ventured my life in your ſervice." As it was one of the conditions that he ſhould quit the kingdom till it pleaſed the king to recall him, he retired to Venice, and it is affirmed, that, during his reſidence in that city, the duke engaged in a negociation with the Ottoman Porte, for the purchaſe of the iſland of Cyprus, with a view of ſettling in it Proteſtant refugees from France and Germany, and that it failed principally through the death of the patriarch Cyril, by whoſe mediation it was carried on. The Venetian republic nominated him its general in chief againſt the Imperialiſts; but the king of France took him from its ſervice to ſend him ambaſſador to the Swiſs and Griſons. At the head of the troops of the latter, he drove the Germans and Spaniards out of the Valteline in 1633. He after this defeated the Spaniards on the banks of the lake Como, but the Griſons becoming ſuſpicious that it was not intended to withdraw the French troops from their country, roſe in arms, and the duke was obliged to make a ſeparate treaty with them in 1637. He now retired to Geneva, and from thence went to join his friend, the duke of Saxe-Weimar, with whom he fought againſt the Imperialiſts at Rheinfeld, in 1638. He was ſeverely wounded in the action, and died ſome weeks after, at the abbey of Konigfeld, in Switzerland, at the age of fifty-nine. His body was interred in the church of St. Peter, at Geneva, where a magnificent monument was erected to his memory. The duke was author of ſeveral works, military and political. Theſe are, "Les Interets des Princes;" "Le parfait Capitaine, ou l'Abrège des Commentaires de Cæſar;" "Un Traitè de la Corruption de la Milice ancienne;" "Un Traitè du Government des Treize Cantons;" "Memoires," containing the tranſactions in France from 1610 to 1629; "Recueil des quelque Diſcours politiques ſur les Affaires de l'Etat, depuis 1612 juſqu'en 1629;" "Memoires et Lettres de Henri, duc de Rohan, ſur la Guerre de la Valtelin." The duke was one of the greateſt captains of his time, and poſſeſſed all the qualities requiſite in the head of a party, together with diſintereſtedneſs, generoſity, and gentleneſs of manners. His wife, Margaret of Bethune, daughter of the great duke of Sully, warmly eſpouſed the intereſts of her huſband and party, and was greatly celebrated for her courage. His brother alſo, Benjamin de Rohan, lord of Soubiſe, acted a diſtinguiſhed part in the Calviniſt wars, and finally took refuge in England, where he died in 1690.

Rohan, in *Geography*, a town of France, in the department of the Morbihan, and chief place of a canton, in the diſtrict of Ploërmel; 10 miles N.W. of Joſſelin. The place contains 422, and the canton 9951 inhabitants, on a territory of $267\frac{1}{2}$ kiliometres, in 9 communes. N. lat. 48° 6′. W. long. 2° 40′.

ROHAN-ROHAN, a town of France, in the department of the Two Sevres; 6 miles S.S.W. of Niort.

ROHAULT, James, in *Biography*, a French philoſopher and mathematician, was born at Amiens, in Picardy, in 1620. Having received the early part of his education at his native place, he was ſent to Paris, to ſtudy mathematics and philoſophy. In his enquiries he appears to have been poſſeſſed of an ardent love of truth, and to have ſought after it with the utmoſt diligence and impartiality. He ſtudied both the ancients and moderns, but Des Cartes was the author which engaged moſt of his notice, and of that celebrated philoſopher he became a zealous follower. His attachment to the ſyſtem of Des Cartes introduced him to the acquaintance of Claude Clerſelier, who gave him his daughter in marriage, in oppoſition to the remonſtrances of his family. He engaged his ſon-in-law to draw up an abridgment and explanation of the philoſophical works of Des Cartes, and to illuſtrate the ſame with notes. The reſult of his labours, which he entitled "Phyſics," was taught by him at Paris, during ten or twelve years before he gave it to the public. Rohault died in the year 1675, at the age of fifty-five, leaving behind him the character of an amiable, as well as very learned man. His Phyſics were tranſlated from the French into Latin by Dr. Samuel Clarke, who accompanied his verſion with notes that overſet the ſyſtem of Des Cartes, in order to make way for that of the illuſtrious ſir Iſaac Newton. The beſt edition of this tranſlation is that of 1718. Rohault alſo publiſhed "Elements of Mathematics," and "Dialogues concerning Philoſophy:" and after the author's death, a collection of pieces was made from his manuſcripts, and printed firſt at Paris, and afterwards at the Hague, in 1690, in two vols. 12mo. containing the firſt books of Euclid, Trigonometry, Practical Geometry, Fortification, Mechanics, Perſpective, &c.

ROHBA, in *Geography*, a town of Arabia, in the province of Hedsjas; 10 miles S. of Vadelkora.

ROHEETA, a town of Hindooſtan, in the circar of Gohud; 20 miles S.E. of Gohud.

ROHILCUND, or Rohilla, a circar or province of Hindooſtan, ſituated on the E. ſide of the Ganges, and N.W. of the ſubah of Oude. The territory of the Rohillas was formerly called Catheir, and recently derived its name from the conquerors of that tribe, who, about the year 1720, left Afghaniſtan, and the mountains which they occupied between India and Perſia, and came thither in purſuit of military ſervice. Theſe emigrants were firſt entertained by Madar Saha, the Hindoo chief of Serowly, a ſmall town in the N.W. quarter of Rohilcund, who, by robbery and predatory excurſions, maintained a large party of banditti. Some time afterwards, the Rohillas quarrelled with Madar Saha, and aſſociated with the chief of Bareilly; but, ſeparating from this chief, they made incurſions into the territory of the rajah of Kemaoon. In this expedition they at firſt ſucceeded, but were afterwards defeated; their leader, who was an original emigrant from Afghaniſtan, being taken priſoner and put to death. After his death, his aſſociate, Ali Mahomet, a youth of the ſect of Jats, whom he had captured in one of his excurſions, and brought up in the Mahometan religion, became the chief of the party; and being brave and enterpriſing, though young, he availed himſelf of every opportunity that occurred for advancing his power, and enlarging his territory. Ali, chiefly by the aſſiſtance of the vizier Kummer ud Dein, obtained a commiſſion for collecting the revenue of the penſion land, which, it is ſaid, he punctually remitted. From this period we may date the firſt eſtabliſhment of the Rohilla power in Rohilcund, the name by which they diſtinguiſhed the Cuttera or Kutterah diſtricts, and their other territories on the eaſt ſide of the Ganges. Ali Mahomet fixed his reſidence at Owlah, and eſtabliſhed throughout his territory a permanent ſyſtem of government, which, though occaſionally rigorous, afforded protection to the lower claſs of people. In proceſs of time, and in conſequence of ſeveral predatory acts which he committed, Ali was attacked by the prince Mahomet

Shah, who entered Rohilcund with a powerful armament, and took possession of the open country. At length he was compelled to surrender himself to the king, but by the intercession of Kummer ud Dein he was pardoned. With this event, which happened in the year 1745, the power of the Rohillas was annihilated in Rohilcund; and all their officers and principal people were removed to Delhi. Ali, having remained about a year at Delhi, under the protection of the vizier, was, by his recommendation, appointed the military governor of Sirhind, who, during his residence in this place, was joined by a body of 2000 or 3000 marauding Afghans; so that his party was computed to consist of 10,000 cavalry, and 15,000 or 20,000 infantry, of various denominations. Whilst the Mogul and Afghan armies were preparing for action, he quitted the Panjab and retired to Hurdwar, from whence he penetrated, in 1747, into Rohilcund, which he rapidly conquered, and soon after died at Owlah. The last army that might be reckoned *imperial*, was, in 1749, defeated by the Rohillas; by which their independency was firmly established in the eastern part of the province of Delhi. About the year 1750, the territory which had been personally possessed by Ali Mahomet, was, by the deliberation and agreement of the principal Rohilla officers, divided among his sons. At length, however, Hafiz Ahmed, who possessed military talents, in the exercise of which he had acquired influence in Rohilcund, superseded the authority of Saud Ullah, the third son of Ali Mahomet, and was advanced to the supreme administration of affairs; and at the death of Saud Ullah, which happened at Owlah in 1761, the power of Hafiz was established. The form of government adopted by the Rohillas in India, similar to that which subsisted in their native country, may be denominated feudal. The successors of one of the first invaders, *viz.* Daoud Khan, possessing very moderate hereditary pretensions, and surrounded by persons who had afforded essential assistance in the first conquest, held but a limited sway. Two of the most respectable of the Rohillas never ceased to oppose the progress of Hafiz Rhamut, who aimed at sovereign authority; but zealously attached to the interest of the widow of Saud Ullah, they formed a counterpoise to the encroaching power of that chief. The Afghan conquerors of Rohilcund, were a bold, rapacious, and lawless set of men; and after they had established a kind of government in India, they adopted the more effeminate vices of the south, and became intriguing, deceitful, and treacherous. The Rohillas, particularly those of the lower class, were, with few exceptions, the only Mahometans in India who exercised the profession of husbandry, and their attention to agriculture was amply recompensed by the abundance and superior qualities of the productions of Rohilcund. This country is said to have yielded to the Rohillas one million sterling, a sum which, in later times, has been very considerably reduced. According to Mr. Hamilton, the Rohillas themselves have been the great cause of the ruin of the country which bears their name; it was parcelled out among their chiefs, who had afterwards but a feeble connection with each other; while their dependence on Hafiz (Hasley) Rhamut, their prince, was more nominal than real. In the year 1773 the Mahrattas crossed the Ganges to invade the Rohilla country; but a brigade of the British marched to the western frontier of that country, and drove the Mahrattas across the river. For this protection the Rohilla chiefs had stipulated to pay Sujah Dowlah, nabob of Oude, 40 lacks of rupees; but when this essential service was performed by the British army, which moved as the allies of Sujah Dowlah, the payment of the money was evaded. This breach of treaty led to the invasion and conquest of the Rohilla country in the following year, 1774; and it was then added to the subah of Oude. Since this conquest, the country has rapidly degenerated into a waste, under the deleterious politics of the ministers of Oude. The natives are said to be a tall, handsome race of people; and when compared with the other inhabitants, are white and well featured. They continued for a considerable time to carry about in triumph some couches and palankeens of European officers that were killed by their army in the fatal action of 1774, by which we purchased a victory at a greater expence of European lives than was ever suffered by the same number of troops in India. The capital of Rohilcund is *Bereilly* or *Barelly*, which see. The district of Rampour, situated at the foot of the Northern mountains, and possessed by a Rohilla chief, is included in Rohilcund, but it was secured to Fizzoolah Cawn, the chief, by the treaty of Loldong, in 1774. It is valued at 30 lacks of rupees *per annum*; but he is, in effect, tributary to *Oude*, (which see,) by being bound to furnish his quota towards an establishment for the common defence.

ROHILLAMOW, a town of Hindoostan, in Oude; 21 miles S.S.E. of Kairabad.

ROHINI, in *Astronomy*, the Sanskrit name of a star, supposed to be that designated on our globes by α Tauri. In mythology it is an asterism that furnishes more poetical allusion than any other in the zodiac. Rohini is one of the sixty daughters of Daksha, and one of the twenty-seven espoused by Soma, or the moon; the lunar regent being male among the Hindoos, as it is with some European mythologists. (See SOMA.) Under the article NAKSHATRA, which means the asterisms marking the moon's path, mention is made of the poetical derivations from this fruitful source, and we will here add another instance of it, relating to Rohini, the favourite consort of the fickle Soma. In one of their terrestrial journies, arriving at the southern mountain Sahyadri, they unwarily entered the forest of Gauri, or Parvati, where some men, having formerly surprised Mahadeva caressing that goddess, they were punished by a change of their sex, and the forest had retained a power of effecting a like change on all males who should enter it. Soma, or Chandra, instantly becoming a female, (Chandri,) was so afflicted and ashamed, that she hastened far to the west, sending Rohini to her seat in the sky, and concealed herself in a mountain, afterwards named Somagiri, where she performed acts of the most rigorous devotion. Darkness then covered the world each night, the fruits of the earth were destroyed, and the universe was in such dismay, that the Devas, or divinities, with Brahma at their head, implored the assistance of Mahadeva, who, placing Chandri on his head, she became male again. Mahadeva, in statues and pictures, is usually seen with the moon on his head and forehead, and one of his names is Chandra-sekra, or *moon-crowned*. (See SIVA.) Another fable states that she was visited in her retreat by Surya, or the sun, from which conjunction arose a numerous progeny. Mahadeva is the sun; and this sol-lunarian progeny is, perhaps, vegetation. Under the article ILA is another lunarian fable, probably connected with these. Siva's spouse, Parvati, is as jealous as Juno.

These fables, taken from the Asiatic Researches, vol. iii. are related by Mr. Wilford, from Puranic authority; and were thus explained to him by an ingenious Pandit. To the inhabitant of the countries near the source of the Kali, or Nile, the moon, being in the mansion of Rohini, or the Pleiades, seemed to vanish behind the southern mountains. Now when the moon is in opposition to the sun, it is the god Chandra; in conjunction, the goddess Chandri. The moon is believed, by Hindoo naturalists, to have a powerful

ful influence on vegetation, especially on certain plants, and, above all, on the Somalata, or moon-plant. (See SOMALATA.) This mode of interpretation, Mr. Wilford adds, may serve as a clue to the intricate labyrinth of the Puranas, which contain all the history, physiology, and science of the Indians and Egyptians, disguised under similar fables. See PURANA.

ROHITZ, in *Geography*, a town of Stiria, in which is a medicinal spring; 20 miles E. of Cilley.

ROHL, a small island in the gulf of Finland. N. lat. 59° 55′. E. long. 26° 26′.

ROHLA, a river of Bohemia, which runs into the Egra, near Carlsbad.

ROHN, a town of Germany, in the county of Henneberg; two miles N.N.W. of Salzungen.

ROHN. See PULO *Ron*, and POOLARON.

ROHND, a town of Bengal; 15 miles N. of Toree.

ROHOB, a town of Judea, in the tribe of Asher, mentioned in the books of Joshua and Numbers. To this place Moses sent twelve men to reconnoitre the land of promise. It was assigned to the Levites of the family of Gershon.

ROHOSSETZ, a town of Bohemia, in the circle of Boleslaw; eight miles N.W. of Turnau.

ROHR, a town of the duchy of Stiria; nine miles W. of Gnaa.—Also, a river of the duchy of Bremen, which runs into the Weser near Carlsburg.—Also, a town of Germany, in the principality of Culmbach; five miles S.E. of Culmbach.—Also, a town of Germany, in the county of Henneberg; two miles E. of Meinungen.

ROHR, *Inn*, a town of Austria; 10 miles N.W. of Neustadt.

ROHRBACH, a town of Germany, belonging to the priory of Odenheim; 10 miles W. of Heilbronn.

ROHRBECK, a town of Saxony, in the principality of Querfurt; two miles S. of Juterbock.

ROHRIA, in *Botany*, a genus of Schreber's, has been supposed, by De Theis, to commemorate Julius Bernard von Rohr, a German botanical writer of the middle of the 18th century, whose works are little known out of his own country. We rather presume, with professor Martyn, that the author of this name had in view a more recent, and very eminent, practical botanist, long resident in South America, Julius Philip Benjamin von Rohr, perhaps a relation of the former, whose discoveries are often mentioned by Vahl, and who has written on *Quassia amara*, the culture of Cotton, and other subjects. Thunberg has also a *Rohria*, adopted from Vahl; which having been previously called *Berckheya*, by Ehrhart, is now retained under the latter name in Willd. Sp. Pl. v. 3. 2269.—Schreb. Gen. 30. Willd. Sp. Pl. v. 1. 186. Mart. Mill. Dict. v. 4. (Tapura? Aubl. Guian. v. 1. 126. Juss. 419. Lamarck Illustr. t. 122.)—Class and order, *Triandria Monogynia*. Nat. Ord. uncertain, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, bell-shaped, in five deep, ovate, concave, obtuse, fringed, coriaceous segments, the two interior ones rather longest. *Cor.* Petals five, erect, longer than the calyx, the two uppermost rather largest, the three lower smallest; claws narrow, dilated at the base, woolly on the inside, a little bent outwards under the border; which in each petal is ovate, erect; in the larger petals hooded inwards; in the smaller expanded and bluntish. *Stam.* Filaments three, one between the two larger petals, two at their sides, connected below with their claws, all thread-shaped, longer than the corolla, woolly at the inside; anthers roundish, erect, directed inwards. *Pist.* Germen superior, turbinate, downy; style thread-shaped, villous, the length of the stamens; stigmas three, revolute. *Peric.* and *Seeds* unknown.

Eff. Ch. Calyx bell-shaped, in five deep segments. Petals five, unequal. Stigmas three, revolute.

Obs. Schreber doubted whether his plant were the same with Aublet's, because the latter describes the corolla as monopetalous, and the three long stamens as accompanied by two short ones besides. This last circumstance may be accidental; the corolla seems more material. The flowers however are so minute, that Schreber, having seen them in a dried state only, might easily be mistaken. As he is the author of the name *Rohria*, we prefer his description, as Aublet's plant, if different, must have another generic appellation.

1. R. *petioliflora*. Willd. n. 1. (Tapura guianensis; Aubl. Guian. v. 1. 126. t. 48?)—The plant of Aublet was found in forests, near the Serpent mountain, in Guiana, flowering in August. It is a shrub, 12 feet, or more, in height, with many flexible, roundish, smooth *branches*. *Leaves* alternate, on short thick stalks, elliptic-lanceolate, pointed, entire, smooth and shining, about four inches long; paler beneath. Of *stipulas* we can perceive no traces in Aublet's specimen, except a slight intrafoliaceous abrupt border. *Flowers* yellow, small, five, seven, or more together, on very short stalks, springing from the summit of each *footstalk*, at the base of the leaf.

We presume Schreber received his specimens from von Rohr; and as they agreed with Aublet's in the very remarkable mode of inflorescence, and must have come from the same country, there can be little reason to suspect any real difference.

ROI *des Violons*, or king of the fidlers, in France. Each profession, or incorporated company, had formerly a superior, who was dignified with the title of king. The masons, carpenters, barbers, lawyers' clerks, cross-bow-men, the principal soldiers called *ribauds*, even the poets, and many other orders of men, had their particular kings; but their exactions and tyranny, by degrees, occasioned the abolition of these phantoms of sovereignty.

The minstrels, religious observers of ancient usages, were the last to relinquish this precious relic of antiquity. The king at arms, and king of the minstrels, were the only surviving monarchs of their calling. But the first has few tributaries, and his functions are only exercised occasionally; the other, on the contrary, was always in power, and pretended to exercise his empire over the whole realm.

The history of the first kings of the minstrels is unknown; it is only recorded that, after the decease of Constantin, the famous violin of the 17th century, the crown passed, in 1630, to Dummoir I., then to Dummoir II., who relinquished the crown by a voluntary abdication, occasioned by an anarchy, in 1685. Louis XIV. saw with indifference the extinction of this royalty, and declared that it was not his intention it should be restored.

This monarchy had been long agitated by internal troubles, and civil and foreign wars. The dancing-masters, originally incorporated with this company, had been 50 years soliciting its extinction; indignant at being united with such vile artizans, who dishonoured their faculty by playing at alehouses (cabarets) and places of debauchery; or if not totally silenced, that one of the strings of their fiddles should be cut off, and they reduced to their ancient level, and be allowed to play on no instrument but the three-stringed rebec.

They had commenced a suit against the city dancing-masters, and obtained a solemn sentence against them, January 14th, 1667. No company was ever more discordant, more tumultuous; all the courts of juſtice rang with their diviſions and quarrels, by which the law was enriched, and the public amuſed, at their expence. The interregnum laſted from 1685 to 1741, when the celebrated Guignon, the violiniſt, was ambitious of having the royalty revived in his favour. The king had the goodneſs to comply with his requeſt, and honoured him with the minſtrel crown, on the 15th of June the ſame year. But his election awakening a deſire to revive certain prerogatives, which he pretended to be inherent in his crown, he had ſuits and actions to defend againſt a hoſt of muſicians, particularly the organiſts, who obtained a complete victory; and Guignon, willing to give a proof of his love for the arts and diſintereſtedneſs, generouſly, and voluntarily, reſigned his ſovereignty of king of the minſtrels.

ROIDALK, in *Geography*, a town of Norway; 48 miles N.N.E. of Stavanger.

ROIHA. See OURFA.

ROIOC, in *Botany*, a barbarous South American, or perhaps Spaniſh, name, for one of Plumier's genera, rightly referred by other botaniſts to MORINDA; ſee that article.

ROISELLE, in *Geography*, a town of France, in the department of the Somme, and chief place of a canton, in the diſtrict of Péronne; ſix miles E.N.E. of Péronne. The place contains 1122, and the canton 14,428 inhabitants, on a territory of 190 kiliometres, in 23 communes.

ROKEJECA, in *Botany*, an Arabic name, inadmiſſible in ſyſtematic language, applied by Forſkall, Fl. Ægypt-Arab. 90, and adopted by Juſſieu, Gen. 313, for a ſuppoſed genus of the natural order of *Portulaceæ*, found in ſandy waſte ground about Cairo. Juſſieu ſuppoſes it akin to *Trianthema*. The *capſule* however is ſaid to have only one cell, and there is a *corolla* of five petals. We know not that thoſe who have ſeen Forſkall's ſpecimens, have thrown any light on this ſubject.

ROKETNITZ, a town of Bohemia, in the circle of Konigingratz; ſeven miles N. of Geyerſberg.

ROKHAGE. See AROKHAGE.

ROKIT, CAPE, a cape on the N. coaſt of Africa, at the entrance into the ſtraits of Babelmandeb; 60 miles W. of cape Guardefai.

ROKITNO, a town of Lithuania, in the palatinate of Brzeſk; 72 miles E.S.E. of Pinſk.

ROKITZANY, a town of Bohemia, in the circle of Pilſen; eight miles E. of Pilſen.

ROKOL, an iſle, or rather large rock, which, according to M. Kerguelen, is ſituated in N. lat. 57° 50', and long. 16° W. of Paris; or about 5° S.W. of St. Kilda.

ROKOSNIA, a town of Poland, in the palatinate of Braclaw, on the Bog; 16 miles W.N.W. of Braclaw.

ROLAND, DE LA PLATIERE, J. M., in *Biography*, born at Villafranche, near Lyons, of a family diſtinguiſhed in the profeſſion of the law. He was the youngeſt of five brothers, left orphans and without fortune. To avoid entering into the church, like his elder brothers, he left home at the age of nineteen, alone, without money, or friends; he traverſed a part of France on foot, and arrived at Nantes, intending to embark for India. He was, however, diſſuaded from this project, by a merchant who had ſeen him throw up blood, and who was aware that the climate of the Eaſt would infallibly kill him. He accordingly went to Rouen, engaged in the direction of ſome manufactories; diſtinguiſhed himſelf there by his love of ſtudy, and his taſte for economical and commercial purſuits; and obtained the place of inſpector-general at Amiens, and then at Lyons. Having travelled in Italy, Switzerland, and other countries, he accumulated a great maſs of valuable information, particularly in what related to the arts, which, on his return, gained him admiſſion into a great number of learned ſocieties. Early in the revolution he became a member of the municipality of Lyons, and founded there a club, which he connected with the Jacobin club of Paris. In 1790 he went to the capital, took a decided ſhare with the popular party, and in March 1792, was raiſed to the adminiſtration of the interior. He ſeems now to have poſſeſſed an enthuſiaſtic love and attachment to a republican form of government. The firſt day that he appeared before the king, he went with ſtraight undreſſed hair, a black coat, and ſhoes without buckles; his behaviour was, at the ſame time, ſo very uncourtly, that his majeſty diſmiſſed him a very ſhort time before he himſelf was reduced to ſcenes of adverſity and the moſt poignant diſtreſs. From this time Roland attached himſelf more than ever to the Jacobins, and was probably deeply implicated in the buſineſs of the 20th of June and 10th of Auguſt of that ſame year. He deprecated, however, the cruelties of the 2d of September, and denounced the horrors that were tranſacting under the maſk of patriotiſm. As the violent gained aſcendency, Roland was declining in credit. On the 20th of January 1793, he, as member of the proviſional executive council, ſigned the order for the execution of the king: this was one of his laſt official acts: yielding to the voice of the Mountain faction he reſigned, and was involved in the proſcription which iſſued againſt the Briſſotines; but he contrived to eſcape from Paris, and conceal himſelf among his friends at Rouen: as ſoon, however, as he heard of his wife's execution, he determined not to ſurvive her. He ſtabbed himſelf near the high road, leaving a paper containing the following lines; "whoever you may be that find me lying here, reſpect my remains; they are thoſe of a man who devoted his whole life to being uſeful, and who died, as he lived, virtuous and honeſt." Roland was kind and obliging to his friends, but the iraſcibility of his temper made him many enemies. He was deeply read in the learned, and in ſeveral modern languages, and was author of the following works: "An Eſſay on the Rearing of Flocks and the Improvement of Wool;" "The Art of the Woollen-Cloth Printer, of the Cotton-Velvet Maker," &c. This work forms the Compendium of Mechanical Arts, publiſhed by the Academy of Sciences. "Letters written from Switzerland, Italy, Sicily, and Malta, in 1782." A new edition of this work was publiſhed in 1800. They are addreſſed to a lady whom he ſoon after married, and are filled with uſeful views and intereſting accounts of the manufactories of various countries. See the next article.

ROLAND, MARIE-JEANNE PHILEPON, wife of the preceding, was born at Paris in 1754. She was the daughter of an eminent engraver, who, though highly diſtinguiſhed in his profeſſion, had brought himſelf to ruin by extravagance and diſſipation. The daughter, brought up in the midſt of the fine arts, ſurrounded by books, pictures, and muſic, became learned and ſkilled in muſic and painting. Though not what might be called regularly handſome, her perſon was attractive, and her character excited general admiration in the circle in which ſhe moved. Her mother dying while ſhe was young, ſhe was obliged, owing to the ruined fortunes of her father, to ſeek an aſylum in a convent. Here ſhe lived in honourable ſolitude, ſubmitting cheerfully to the privations which were found neceſſary in her reduced ſituation, while ſhe took every means to improve her mind by ſtudy. In 1780, Roland addreſſed to her, as we have ſeen, his letters on Italy, and offered her his hand. She accepted the offer, and when married they went to Amiens, where ſhe ſtudied botany, and made an herbal of the plants of Picardy. She afterwards, in 1787, viſited Switzerland

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ROLANDRA, in *Botany*, ſerves to commemorate Daniel Rolandra, a pupil of Linnæus, who viſited Surinam, and communicated an account of the *Doliocarpus* to the Academy of Stockholm, which appeared in the 17th volume of the Tranſactions of that learned body, publiſhed in 1756. Several of his papers on Entomology are to be found in the ſame collection. He was almoſt the only naturaliſt, educated by Linnæus, whoſe character diſappointed the hopes of his preceptor; but he is ſaid to have been ſtill more unfortunate, than negligent or ungrateful. We know no particulars of his hiſtory. The name was given by Rottböll, in the Collectanea of the Medical Society at Copenhagen, v. 2. 256. —Schreb. Gen. 593. Willd. Sp. Pl. v. 3. 2400. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 186. Swartz Prodr. 116. Ind. Occ. v. 3. 1388. (See Juſſ. 176.)—Claſs and order, *Syngeneſia Polygamia-ſegregata*. Nat. Ord. *Compoſitæ capitatæ*, Linn. *Cinarocephalæ*, Juſſ.

Gen. Ch. *Common Calyx* none. Florets cluſtered into a roundiſh head, the cluſters diſtinct, ſtalked, ſeparated by numerous, ovate or lanceolate, awned ſcales, ſhorter than the florets. Partial perianth chaffy, of two unequal, compreſſed, preffed, keeled valves; the upper one largeft, awned, enclofing the other, which is pointed. *Cor.* of each floret very minute, of one petal, funnel-fhaped; tube long, thread-fhaped; limb in five very fhort, erect, acute fegments. *Stam.* Filaments in each floret, five, fhorter than the tube; anthers united into a cylinder, below the throat. *Pift.* Germen, in each floret, triangular, compreffed, acute at the bafe, abrupt at the fummit; ftyle the length of the tube, divided at the top; ftigmas tumid, erect. *Peric.* none, the feed being enclofed in the unchanged partial calyx. *Seed* triangular, crowned with a toothed border.

Eff. Ch. Common Calyx none. Perianth of two valves, fingle-flowered. Florets all perfect. Seed with a toothed crown.

Obf. Rottböll defcribes the corolla of each floret as four-cleft; Swartz found it always five-cleft, with five ftamens.

1. R. *argentea.* Silver-leaved Rolandra. Swartz Ind. Occ. v. 3. 1389. Willd. n. 1. Ait. n. 1. (Echinops fruticofus; Linn. Sp. Pl. ed. 1. 815? Amaranthoides fruticofum, foliis longis, anguftis, fubtùs niveis; Sloane Jam. v. 1. 43. t. 7. f. 3.)—Native of Jamaica, Cayenne, and Surinam. Cultivated in Chelfea garden, before the year 1714, and faid to flower in the ftove in July. We have never met with the living plant. The *ftem* is fhrubby, erect, branched, round, reddifh; the young branches whitifh and downy. *Leaves* ftalked, alternate, ovato-lanceolate, minutely ferrated, about two inches long, ribbed; green and fhining, but roughifh to the touch, on the upper fide; fnow-white and downy beneath. There are ufually axillary tufts, of a few much fmaller leaves. *Flowers* in fmall, round, feffile, folitary, axillary, whitifh heads.—Plumier's Echinops, t. 125. f. 1, which Linnæus adopted from him under the name of *fruticofus*, without feeing a fpecimen, but afterwards rejected, bears too little refemblance to Sloane's plant to be confidered, with any probability, as the fame.

ROLAS, in *Geography*, a fmall ifland in the Atlantic, near the S.W. coaft of the ifland of St. Thomas.

ROLDUC, a town of France, in the department of the Lower Meufe, and chief place of a canton, in the diftrict of Maeftricht; called, in the language of the country, "Hertogenrode," formerly well fortified, but greatly demolifhed by wars, and the capital of a county, which contained a great number of villages; 10 miles S.W. of Juliers. The place contains 940, and the canton 11,196 inhabitants, on a territory of 100 kiliometres, in 12 communes. N. lat. 50° 52′. E. long. 6° 5′.

ROLE, a town of Bengal; 25 miles S.S.E. of Palamow.

ROLEPARA, a town of Hindooftan, in Oriffa; 25 miles S.E. of Boad.

ROLL, in the *Manufactories*, fomething wound and folded up in a cylindrical form.

Few ftuffs are made in rolls, except fattins, gauzes, and crapes, which are apt to break, and take plaits not eafy to be got out, if folded otherwife. Ribbands, however, and laces, galloons, and paduas of all kinds, are thus rolled.

The ancients made all their books up in form of rolls, or little columns; and, in Cicero's time, the libraries confifted wholly of thofe rolls. The dearnefs of parchment, and the cheapnefs of papyrus, of which the rolls were made, was the reafon that fcarcely any but paper rolls were ufed.

Voffius fays, they pafted feveral fheets end to end, when filled on one fide, and rolled them up together, beginning with the laft, which they called *umbilicus*, and to which they faftened an ivory or boxen ftick, to fuftain the roll. To the other extremity they pafted a piece of parchment, to cover and preferve it.

Thefe rolls were placed in the libraries perpendicularly to the horizon. The Jews ftill preferve the ancient ufage of rolls for the books they read in the fynagogues.

Roll, *To*, in *Military Language*, is to continue one uniform beat of the drum, without variations, for a certain length of time. When a line is advancing in full front, or in echellons, for any confiderable diftance, the mufic of one regulating battalion may, at intervals, be permitted to play for a few feconds at a time, and the drums of the other battalions may be allowed occafionally to roll: drums likewife roll when troops are advancing to charge. For the method of performing the roll, fee *Roll*, under Drum.

Roll, *Long*, a beat of drum by which troops are affembled at any particular fpot of rendezvous or parade.

Roll, *Short*. See *Ruffle* under Drum.

Roll *of Tobacco*, is tobacco in the leaf, twifted in the mill, and wound twift over twift, about a ftick or roller.

The generality of tobacco in America is there fold in rolls of various weights; and it is not till after its arrival in England, Spain, France, and Holland that it is cut. Roll tobacco is what is chiefly ufed, both for chewing and rafping. See Tobacco.

Roll *of Parchment* contains 20 fkins.

Roll, *Rotulus*, in *Law*, denotes a fchedule of paper or parchment, which may be wound up by the hand into the fafhion of a pipe.

Of thefe there are, in the Exchequer, feveral kinds; *viz.* the great *wardrobe-roll*, the *cofferer's-roll*, the *fubfidy-roll*, &c.

The word is formed from the French *rolle*, of the Latin *rotulus*; becaufe moft inftruments and expeditions in law were anciently written on papers, or parchments, fewed or glued together, and thus rolled up: whence the word *enrol*, and the like.

Rolls *of Parliament*, are the manufcript regifters of the proceedings of our ancient parliaments.

Before the ufe of printing, and till the reign of Henry VII. our ftatutes were all engroffed in parchment, and (by virtue of the king's writ for that purpofe) proclaimed openly in every county.

In thefe rolls we have alfo a great many decifions of difficult points in law, which were frequently, in former times, referred to the decifion of that high court.

Roll, *Rider*, a fchedule, or fmall piece of parchment, frequently fewed, or added to fome part of a roll, or record.

Noy obferves, that the court ex-officio may award a certiorari ad informandam confcientiam; and that which is certified fhall be annexed to the record, and called a *rider-roll*.

Roll is alfo ufed for a lift of the names of feveral perfons of the fame condition, or entered in the fame engagement.

Roll, *Court*. See Court-*Roll*.

Roll, *Mufter*. See Muster-*Roll*.

Roll, *Size*, a lift containing the names of all the men belonging to a troop or company, with the height or ftature of each fpecifically marked. Every ferjeant keeps a regular fize-roll, and every captain of a troop or company ought to have one likewife.

Roll, *Squad*, a lift containing the names of each particular fquad. Every non-commiffioned officer and corporal, who are entrufted with the care and arrangement of a fquad, muft have a roll of this kind.

Roll-*Calling*, is the calling over of the foldiers of a troop, or company, by their names, to fee that they are all prefent.

 This

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See Burney's Hiſt. of Muſic, vol. ii. p. 277.

ROLANDINO, an early Italian hiſtorian, was the ſon of a notary at Padua, in which city he was born, in the year 1200. He ſtudied at Bologna, and in 1220 received the honorary title of maſter and doctor in grammar and rhetoric. He had kept a chronicle of memorable events as they occurred, and put his papers into his ſon's hands after he returned from Bologna, with a charge to continue them. This he executed with care and fidelity to the year 1260, when he was urged to reviſe and complete his work. He employed two years in this reviſion; and in 1262, his chronicle, in twelve books, in the Latin language, was read publicly before the univerſity of Padua, ſubmitted to an attentive examination, and ſolemnly approved. Rolandino died in 1276. His hiſtory is accounted one of the moſt exact and faithful records of that time. Though his ſtyle is not free from barbariſms, his narrative is clear and well arranged. Voſſius affirms, that he ſurpaſſed all the writers of his age in perſpicuity, order, and judgment, and that he ſhewed himſelf well verſed in ſacred and profane literature. An edition of his work, with other chronicles, was given at Venice in 1636, by Felix Oſius, and it has been reprinted by Muratori, in the 7th volume of his Italian hiſtorians.

ROLANDRA, in *Botany*, ſerves to commemorate Daniel Rolandra, a pupil of Linnæus, who viſited Surinam, and communicated an account of the *Doliocarpus* to the Academy of Stockholm, which appeared in the 17th volume of the Tranſactions of that learned body, publiſhed in 1756. Several of his papers on Entomology are to be found in the ſame collection. He was almoſt the only naturaliſt, educated by Linnæus, whoſe character diſappointed the hopes of his preceptor; but he is ſaid to have been ſtill more unfortunate, than negligent or ungrateful. We know no particulars of his hiſtory. The name was given by Rottböll, in the Collectanea of the Medical Society at Copenhagen, v. 2. 256.—Schreb. Gen. 593. Willd. Sp. Pl. v. 3. 2400. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 186. Swartz Prodr. 116. Ind. Occ. v. 3. 1388. (See Juſſ. 176.)—Claſs and order, *Syngeneſia Polygamia-ſegregata*. Nat. Ord. *Compoſitæ capitatæ*, Linn. *Cinarocephalæ*, Juſſ.

Gen. Ch. *Common Calyx* none. Florets cluſtered into a roundiſh head, the cluſters diſtinct, ſtalked, ſeparated by numerous, ovate or lanceolate, awned ſcales, ſhorter than the florets. Partial perianth chaffy, of two unequal, compreſſed,

5

preffed, keeled valves; the upper one largeft, awned, enclofing the other, which is pointed. *Cor.* of each floret very minute, of one petal, funnel-fhaped; tube long, thread-fhaped; limb in five very fhort, erect, acute fegments. *Stam.* Filaments in each floret, five, fhorter than the tube; anthers united into a cylinder, below the throat. *Pift.* Germen, in each floret, triangular, compreffed, acute at the bafe, abrupt at the fummit; ftyle the length of the tube, divided at the top; ftigmas tumid, erect. *Peric.* none, the feed being enclofed in the unchanged partial calyx. *Seed* triangular, crowned with a toothed border.

Eff. Ch. Common Calyx none. Perianth of two valves, fingle-flowered. Florets all perfect. Seed with a toothed crown.

Obf. Rottböll defcribes the corolla of each floret as four-cleft; Swartz found it always five-cleft, with five ftamens.

1. R. *argentea.* Silver-leaved Rolandra. Swartz Ind. Occ. v. 3. 1389. Willd. n. 1. Ait. n. 1. (Echinops fruticofus; Linn. Sp. Pl. ed. 1. 815? Amaranthoides fruticofum, foliis longis, anguftis, fubtùs niveis; Sloane Jam. v. 1. 43. t. 7. f. 3.)—Native of Jamaica, Cayenne, and Surinam. Cultivated in Chelfea garden, before the year 1714, and faid to flower in the ftove in July. We have never met with the living plant. The *ftem* is fhrubby, erect, branched, round, reddifh; the young branches whitifh and downy. *Leaves* ftalked, alternate, ovato-lanceolate, minutely ferrated, about two inches long, ribbed; green and fhining, but roughifh to the touch, on the upper fide; fnow-white and downy beneath. There are ufually axillary tufts, of a few much fmaller leaves. *Flowers* in fmall, round, feffile, folitary, axillary, whitifh heads.—Plumier's Echinops, t. 125. f. 1, which Linnæus adopted from him under the name of *fruticofus*, without feeing a fpecimen, but afterwards rejected, bears too little refemblance to Sloane's plant to be confidered, with any probability, as the fame.

ROLAS, in *Geography*, a fmall ifland in the Atlantic, near the S.W. coaft of the ifland of St. Thomas.

ROLDUC, a town of France, in the department of the Lower Meufe, and chief place of a canton, in the diftrict of Maeftricht; called, in the language of the country, "Hertogenrode," formerly well fortified, but greatly demolifhed by wars, and the capital of a county, which contained a great number of villages; 10 miles S.W. of Juliers. The place contains 940, and the canton 11,196 inhabitants, on a territory of 100 kiliometres, in 12 communes. N. lat. 50° 52′. E. long. 6° 5′.

ROLE, a town of Bengal; 25 miles S.S.E. of Palamow.

ROLEPARA, a town of Hindooftan, in Oriffa; 25 miles S.E. of Boad.

ROLL, in the *Manufactories*, fomething wound and folded up in a cylindrical form.

Few ftuffs are made in rolls, except fattins, gauzes, and crapes, which are apt to break, and take plaits not eafy to be got out, if folded otherwife. Ribbands, however, and laces, galloons, and paduas of all kinds, are thus rolled.

The ancients made all their books up in form of rolls, or little columns; and, in Cicero's time, the libraries confifted wholly of thofe rolls. The dearnefs of parchment, and the cheapnefs of papyrus, of which the rolls were made, was the reafon that fcarcely any but paper rolls were ufed.

Voffius fays, they pafted feveral fheets end to end, when filled on one fide, and rolled them up together, beginning with the laft, which they called *umbilicus*, and to which they faftened an ivory or boxen ftick, to fuftain the roll. To the other extremity they pafted a piece of parchment, to cover and preferve it.

Thefe rolls were placed in the libraries perpendicularly to the horizon. The Jews ftill preferve the ancient ufage of rolls for the books they read in the fynagogues.

Roll, *To*, in *Military Language*, is to continue one uniform beat of the drum, without variations, for a certain length of time. When a line is advancing in full front, or in echellons, for any confiderable diftance, the mufic of one regulating battalion may, at intervals, be permitted to play for a few feconds at a time, and the drums of the other battalions may be allowed occafionally to roll: drums likewife roll when troops are advancing to charge. For the method of performing the roll, fee *Roll*, under Drum.

Roll, *Long*, a beat of drum by which troops are affembled at any particular fpot of rendezvous or parade.

Roll, *Short*. See *Ruffle* under Drum.

Roll *of Tobacco*, is tobacco in the leaf, twifted in the mill, and wound twift over twift, about a ftick or roller.

The generality of tobacco in America is there fold in rolls of various weights; and it is not till after its arrival in England, Spain, France, and Holland that it is cut. Roll tobacco is what is chiefly ufed, both for chewing and rafping. See Tobacco.

Roll *of Parchment* contains 20 fkins.

Roll, *Rotulus*, in *Law*, denotes a fchedule of paper or parchment, which may be wound up by the hand into the fafhion of a pipe.

Of thefe there are, in the Exchequer, feveral kinds; *viz.* the great *wardrobe-roll*, the *cofferer's-roll*, the *fubfidy-roll*, &c.

The word is formed from the French *rolle*, of the Latin *rotulus*; becaufe moft inftruments and expeditions in law were anciently written on papers, or parchments, fewed or glued together, and thus rolled up: whence the word *enrol*, and the like.

Rolls *of Parliament*, are the manufcript regifters of the proceedings of our ancient parliaments.

Before the ufe of printing, and till the reign of Henry VII. our ftatutes were all engroffed in parchment, and (by virtue of the king's writ for that purpofe) proclaimed openly in every county.

In thefe rolls we have alfo a great many decifions of difficult points in law, which were frequently, in former times, referred to the decifion of that high court.

Roll, *Rider*, a fchedule, or fmall piece of parchment, frequently fewed, or added to fome part of a roll, or record.

Noy obferves, that the court ex-officio may award a certiorari ad informandam confcientiam; and that which is certified fhall be annexed to the record, and called a *rider-roll*.

Roll is alfo ufed for a lift of the names of feveral perfons of the fame condition, or entered in the fame engagement.

Roll, *Court*. See Court-*Roll*.

Roll, *Mufter*. See Muster-*Roll*.

Roll, *Size*, a lift containing the names of all the men belonging to a troop or company, with the height or ftature of each fpecifically marked. Every ferjeant keeps a regular fize-roll, and every captain of a troop or company ought to have one likewife.

Roll, *Squad*, a lift containing the names of each particular fquad. Every non-commiffioned officer and corporal, who are entrufted with the care and arrangement of a fquad, muft have a roll of this kind.

Roll-*Calling*, is the calling over of the foldiers of a troop, or company, by their names, to fee that they are all prefent.

This neceffary duty is performed by the ferjeants of companies, morning and evening, in every well-regulated corps. Hence we have "morning roll-call," and "evening roll-call," on critical occafions; and in fervices that require promptitude and exertion, frequent roll-calls fhould be made.

ROLL, *Calves-head*, is a roll in the two Temples, in which every bencher is taxed yearly at 2*s*., every barrifter at 1*s*. 6*d*., and every gentleman under the bar at 1*s*. to the cook, and other officers of the houfe, in confideration of a dinner of calves-heads, provided in Eafter term.

ROLL, *Ragman's*, or *Ragimund's Roll*, is a roll denominated from *Ragimund*, a papal legate in Scotland; who, calling before him all the people who held benefices in that kingdom, caufed them, upon oath, to give in the value of their eftates, according to which they were taxed in the court of Rome.

ROLLS, or *Office of Rolls*, in Chancery-lane, London, is an office appointed for the cuftody of the rolls and records in chancery.

The mafter of this office is the fecond perfon in that court; and, in the abfence of the lord chancellor, he fits as judge. See MASTER *of the Rolls*.

This houfe, or office, was anciently called *Domus Converforum*, as being appointed, by king Henry III., for the ufe of converted Jews; but their irregularities occafioned king Edward II. to expel them thence: upon which, the place was deputed for the cuftody of the rolls.

ROLLS, *Clerk of the*. See CLERK *of the Rolls*.

ROLLS, or *Roul*, among *Military Men*. See ROUL.

ROLL, *Bead*. See BEAD-*Roll*.

ROLL, *Check*. See CHECK-*Roll*.

ROLL, *Counter*. See COUNTER-*Roll*.

ROLL, in *Antiquity*. From the time of Anaftafius, we find in the hands of the emperors, on medals, a kind of narrow long roll, or fachel; the meaning of which has greatly puzzled the antiquaries.

Some imagine it to be a roll or bundle of papers, memoirs, petitions, &c. prefented occafionally to princes, confuls, and the like. Others take it to be a plaited handkerchief, which the perfons who prefided at the games caft forth as a fignal for their beginning. Others will have it a bag of duft and afhes, prefented the emperor at the ceremony of his coronation, and called *akakia*, *q. d.* a means of preferving innocence, by the remembrance of duft, &c.

ROLL, or *Roller*, is alfo a piece of wood, of a cylindrical form, ufed in the conftruction of feveral machines, and in feveral works and manufactures; though fometimes under other names.

It is on fuch rolls, properly called *beams*, that the woollen, filken, and other threads are wound, of which the weaver's works confift. For which end, each loom has ufually two, and that of the gauze-weavers three.

In the glafs manufacture, they have a running-roll, being a thick cylinder of caft brafs, ferving to conduct the melted glafs to the end of the table, on which large looking-glaffes are to be caft.

The founders alfo ufe a roller to work the fand which they ufe in making their moulds.

The preffes called calenders, as ferving to calender ftuffs, confift, among other effential parts, of two rollers.

It is alfo between two rollers that the waves are given to filks, mohairs, and other ftuffs proper to be tabbied.

Prints, or impreffions, from copper-plates, are alfo taken by paffing the plate and the paper between two rollers. See *Rolling-prefs* PRINTING, and COPPER-*Plate Work*.

ROLLS, in *Coining*, are two iron inftruments, of a cylindrical figure, which ferve to draw or ftretch out the plates of gold, filver, and other metals, of which the planks or pieces are to be formed for the fpecies.

ROLLS, in *Printing*, are two large cylinders or barrels of wood faftened in the middle of what they call the cradle or gallows of the prefs; and which, by means of a cord or girt paffing over each, and a handle which gives motion to one of them, draw the carriage of the prefs backwards and forwards. See PRINTING.

ROLLS, in the *Sugar-Works*, are two large iron barrels, which ferve to bruife the canes, and exprefs the juice. They are caft hollow, and their cavities are filled up with wood, the cylinders of which are properly the rollers.

ROLLS, or *Rollers*, among *Carpenters*, *Mafons*, &c. are plain cylinders of wood, feven or eight inches in diameter, and three or four feet long; ufed for the removing of beams, huge ftones, and other like burdens, which are cumberfome, but not exceedingly heavy.

Thefe rollers are placed, fucceffively, under the fore-part of the maffes to be removed; which, at the fame time, are pufhed forward by levers, &c. applied behind.

ROLLS, *Endlefs*. When blocks of marble, or other exceffive heavy loads, are to be removed, they ufe what they call *endlefs* rolls.

Thefe, to give them the greater force, and prevent their burfting, are made of wood joined together by crofs-quarters; they are about double the length and thicknefs of the common roller, and, befides, are girt with feveral large iron hoops at each end. At a foot's diftance from the ends are four mortifes, or rather only two, but pierced through and through, into which are put the ends of long levers which the workmen draw by ropes faftened to the ends, ftill changing the mortife, as the roll has made a quarter of a turn.

ROLL-*rich Stones*, in *Antiquity*, a feries of huge ftones, ranged in a circle, near Morton in the Marfh, in Oxfordfhire. There are many fabulous traditions about them. Among the antiquaries, fome take them to be a monument of a victory; others, a burying place; and others, a place for the coronation of the Danifh kings.

Near Penros, in Cornwall, is a like monument.

ROLLAND, in *Geography*, an ifland in the South Indian fea, difcovered by Kerguelen in the year 1773, fo called by him after the name of the veffel in which he failed; about nine miles in circuit. N. lat. 48° 37′. E. long. 68° 43′.

ROLLE, MICHAEL, in *Biography*, a French mathematician, was born at Ambert, a fmall town in Auvergne, in the year 1652. His father was in rather low circumftances, and placed him to gain his livelihood, at firft with a notary, and afterwards with different country attornies. Difgufted with an occupation fo little fuited to his genius, at the age of 23 he went to Paris, depending for his fupport on his penmanfhip. At firft he taught writing and the early rules of arithmetic: from arithmetic he advanced by gradual fteps to algebra, to which he became fo enthufiaftically attached, that he fpent every leifure moment in the ftudy till he became diftinguifhed in that branch of fcience. In 1682, the learned Ozanam having propofed a difficult mathematical problem to exercife the ingenuity of mathematicians, M. Rolle fent him a very clear folution of it, together with methods which he had invented of folving other problems, attended with ftill greater difficulty. The minifter Colbert, always the patron of talent, having heard of Rolle, determined to draw him out of the obfcurity in which he had hitherto been concealed, and fettled on him a penfion. He now gave up the occupation of a writing mafter, and devoted himfelf entirely to the ftudy of algebra, and the other

other branches of pure mathematics; and so great was his success, that in 1685, three years only after his name was first known in the mathematical world, he was chosen a member of the Academy of Sciences. In the year 1690, M. Rolle published a treatise on Algebra, which was followed by a new work, entitled "A Demonstration of a Method for the Resolution of Equations of all degrees;" to which succeeded two other methods; by the first of which the same equations are resolved geometrically; and by the second, several unresolved questions of Diophantus are answered. In the year 1699 he published a work, entitled "A Method of resolving indeterminate Questions in Algebra," and he was appointed second geometrical-pensionary of the Academy of Sciences. About this time he united with that party in the Academy which opposed the new geometry, and carried on a controversy against the marquis de l'Hôpital, on the subject of infinitesimals, till the society imposed silence on all the disputants. M. Rolle thought that his favourite science, algebra, was capable of almost indefinite improvement, and he announced his design of drawing up entirely new elements, but death put an end to his plans. He died in 1719, in the 68th year of his age, having uniformly borne an excellent character for piety, probity, and amiable manners. Besides the works already mentioned, many curious papers were communicated by him to the Academy of Sciences, and may be found in their "Memoirs," from the year in which he took his seat in that body till 1714. The higher branches of the mathematics are the subjects of almost all these papers.

Rolle, Johann Heinrich, the youngest of three brothers, all eminent musicians, and sons of a father who, as music director at Magdeburg, had rendered the name illustrious. Henry, who succeeded his father as music-director in his native city, was born in 1718, and died in 1785. He was an excellent composer for the church, as well as author of pieces for the organ and harpsichord of great merit. His oratorio of "Thirsa and her Sons," is full of good taste, new passages, pleasing effects, and true pathos.

Rolle, Fr. a part in *Music* and *Dramatic Works*. The French have a distinct term in music for a vocal and instrumental part in an opera or concert. The singer's or the actor's part in an opera or play, is equally termed *rolle;* in a concert or opera each instrumental part is called *partie.* We make no distinction, in England, between a vocal or instrumental part in an opera or concert: each is called part: as the part of Hamlet, in a play, of Mandane, in an opera; the first violin, tenor, or violoncello part needs no other distinction than the name of the character, or instrument.

Rolle, in *Geography*, a town of Switzerland, and capital of a lordship, situated on the N.W. side of the lake of Geneva; 14 miles S.W. of Lausanne.

ROLLER. See Roll.

Roller, in *Gunnery*, a round piece of wood of about nine inches diameter, and four feet long, which serves in moving mortars from one place to another, when near. This is done by raising the fore-part of the bed so high that a roller may be laid under it; then pushing the bed forwards, and laying another in its way, and another before that, and so on, the mortar is easily moved.

Roller is also a small wheel placed at the foot of the hammer of a gun, or pistol-lock, in order to lessen the friction of it against the hammer or feather-spring.

Roller, in *Agriculture*, a well-known implement formed of wood, cast-iron, or stone, so as to turn upon its axis, and be drawn over the surface of the land by means of horses, for the purpose of reducing the lumpy or cloddy state of tillage lands, and rendering these, as well as those of the grass kind, smooth and even. They are constructed in different ways for different purposes, and of different sizes and weights to suit different uses in husbandry. They are, however, in general distinguished into the tillage and grass kind. It has been a matter of dispute, whether rollers with large or small diameters have the advantage, in point of effect upon the land. It is probable that there may be inconveniencies in both extremes. The roller should not, however, be so small as to require much loading, as by such means much time and labour are lost. A late practical writer, however, advises that in constructing heavy rollers, the workmen should be careful that they have not too great a diameter, whatever the material be of which they are formed, as the pressure is diminished where the implement is of very large size, by its resting on too much surface at once, except an addition of weight in proportion be made. By having the roller made small, when loaded to the same weight, a much greater effect will be produced, and a considerable saving of expence be made in the construction of the implement. And he recommends that all the larger sorts of rollers should have double shafts, in order that they may be drawn by two horses abreast; and such as are employed for arable lands should have a scraper attached to them. This addition, he thinks, saves much time, and prevents the driver the trouble of constantly scraping the machine, especially in wet seasons, and clayey tenacious lands. Strong frames are also necessary for rollers, so that proper weights may be put upon them; and open boxes or carts placed upon them may sometimes be requisite, in order to contain any additional weight that may be thought proper, as well as to receive stones or other matters that may be picked up from the ground. Pieces of wood or stone, as heavy as a man can lift, are the most suitable substances for loading these implements with, where they have not the advantage of boxes for the purpose of containing such weighty substances.

There has been much inconvenience experienced in the use of this sort of implement in turning at the ends of ridges, fields, or other places, from their not moving upon their axes, but being drawn along the surface of the ground, by which they are liable to tear it up, and make deep holes and depressions before they come again into the direct line of draught, and are not brought round without great exertion in the teams: it has therefore been attempted, in order to obviate these inconveniencies, to construct rollers in two pieces, and by the division in the middle to enable the different parts to twist round on their proper axes, one forward and the other in a retrograde direction. When formed in this way, the cylinders are best made of cast-iron, as they turn with greater ease and readiness.

Roller, *Common.* This is a sort of roller which is employed for the common purposes of tillage, and which is mostly used for rolling wheat in the spring, and grass-seeds; they are generally about five or six feet long, and from fifteen to thirty inches in diameter; but those employed for flattening one-bout ridges, in order to prepare them for drilling turnips upon, are commonly shorter and of much less diameter, and frequently attached to the drilling implement.

But of the various kinds of these rollers that are made use of, Mr. Morley of Newark thinks that those of the best construction, and which answer the most perfectly in practice, are such as are made of cast-iron, and divided into two parts: the length from three feet to three feet six inches, covering a surface of from six to seven feet, and being above ten hundred weight: the frame should be made in a ſtout manner, with ſhafts for one horſe, to be fixed on the near ſide, and hooks put in on the other ſide in order to have recourſe to an additional horſe when it may be neceſſary. The gudgeons or pivots ſhould act upon ſmall caſe-hardened friction-wheels, two to be fixed upon each ſide the frame; with a ſmall roller made of hard wood, about nine inches long and three inches in diameter, bound at each end with iron, and to be fixed to the back part of the frame, ſo that both rollers may act with each other in the centre wheel, which will be a means of keeping the great roller ſteady, and at the ſame time very much diminiſh the draught of the implement.

And it is obſerved in the Agricultural Report of Norfolk, that Mr. Prieſt of Beſthorpe uſes a roller that is divided in two parts, riſing and falling in the centre, for the purpoſe of rolling the ſlopes of ridges. And that the ſame uſeful tool is in practice in Suffolk by the Rev. Mr. Hill.

In Dengey and Rochford hundreds, in the county of Eſſex, where the wire-worm has long been ſo very deſtructive to the grain crops, an extremely heavy ſtone roller is a common implement on every farm; they are made ſix or ſeven feet long, and eighteen inches, and ſome more, in diameter, weighing from one and a half to two tons.

In Devonſhire they uſe heavy granite and moor-ſtone rollers with two horſes, which are from five to eight feet in length, and of proportionate diameters, for rolling wheat and paſture grounds, as well as for aiding the operation of ſeparating the ſpine from the mould on the burn-beat-lands, in preparation for the former crop and turnips.

In many other diſtricts heavy ſtone rollers, of the freeſtone and other kinds, are preferred to all other ſorts for tillage uſes.

Roller, *Compound.* This is an implement of the roller kind, conſtituted of the plane or common and ſpike kinds united in the ſame frame; but it is capable of being uſed ſeparately, and its weight varied according to the nature or circumſtances of the land. It is the ingenious invention of Mr. Amos of Lincolnſhire, in which the ſpike part of the roller is made of a piece of oak wood, ſeven feet long, and fifteen inches and a quarter in diameter, hooped with iron at each end. The inventor adviſes in conſtructing it to divide the circumference of this roller into twelve equal parts, from which to draw parallel lines, one diviſion oblique the whole length of the roller. On the firſt of theſe lines to ſet off two inches at each end, and divide the remainder into twenty equal parts, of four inches each. On the ſecond line to ſet off four inches at each end, and divide the remainder into nineteen equal parts; and ſo of all the other lines alternately. In every diviſion to fix an iron ſpike, ſo that there will be twenty ſpikes in one row, and nineteen in the other, throughout the whole circumference, making in all two hundred and thirty-four ſpikes. That part of the ſpike which projects out of the wood is four inches long, one inch ſquare at the circumference of the roller, and three-quarters of an inch ſquare at the point. The tongue, which goes into the wood, is four inches long, ſeven-eighths of an inch ſquare at the circumference of the roller, and tapers to a point at the end. The plain roller is made of a piece of oak wood, ſeven feet long and eighteen inches diameter. In the centre of each end of both rollers are fixed iron buſhes of two inches diameter. The bow part of the left-hand ſide of the frame is made of iron, four inches broad, half an inch thick, and is a ſegment of a circle twenty-ſeven and a half inches radius, fixed for turning the roller upſide down. The ſtring part of the bow is five feet two inches long, and eight by three inches ſquare, made of oak wood. In theſe pieces are fixed gudgeons of two inches diameter, on which the rollers move, and at four feet one and a half inch aſunder. The four ſhafts are eleven feet long, ſix by three and a half inches ſquare at the hinder ends, through which the centre-bolt paſſes. There are four bars four by one and a half inches ſquare, and three and a half feet long, for bracing the ſhafts together. And two bars eight feet long, and three by eight inches ſquare, with double tenons at each end, for bracing the outſide frames together. In the outer ends of theſe tenons are linchpins for the convenience of taking the machine to pieces. The centre-bolt is made of hammered iron, two and a quarter inches diameter; at one end is a round head, at the other a linchpin. The principal uſe of this bolt is to give the uppermoſt roller inclination forward when working, and the degree of inclination is governed by the breadth of, and the diſtance between the two braces, which reſt upon the ſhafts when the roller is at work, ſo as to make the horſes carry a little weight on their backs, otherwiſe it would be in danger of endeavouring to fall backward. The diſtance between them is twelve or ſix inches from the centre-bolt. This implement is found of vaſt uſe in reducing the ſtubborn ſorts of ſoil to a fine ſtate of mould, or what is termed tilth by farmers. The ingenious inventor remarks, that it affords the farmer a command over dry ſeaſons, and enables him to ſow his ſpring and fallow crops in proper time. It likewiſe, he thinks, furniſhes him with the means of cleaning his tillage lands from weeds, whether of the root or ſeed kind. After paſſing this ſort of roller two or three times over the land, with drag harrowing in the intervals, he ſuppoſes it would be rendered ſufficiently fine for any purpoſe that it may be wanted for. And that when the cloddy ſurface is reduced to ſuch a condition as to be incapable of being longer acted upon by the ſpike roller, the plane roller may be had recourſe to with the dry harrow. It is likewiſe ſtated to be of great advantage in reſtoring ſuch graſs-lands as have the ſward in a degenerated ſtate. See Rolling.

Roller, *Concave.* The bellying or furrow-rollers have been in common uſe ſome length of time, in moſt tillage parts of the country; but the concave ones have perhaps never yet been met with, except about Bradwell, in the county of Eſſex. They are there made the ſmalleſt in the middle, ſwelling out to a large circumference at each end. The whole of the farmers thereabouts highly approve of this kind of roller, having very generally adopted it. It is made of ſuch lengths as to ſuit the differences of the ridges or ſtitches, which are made uſe of in cultivating the ground. And it has a ſcraper attached to it, for taking away the cloggy mould that hangs upon it. The moſt uſual length of the roller part is ſeven feet two inches; to the extremities or outſides of the frame, ſeven feet nine inches; the length of the ends of the frame, four feet three inches; the diameter of the roller at the ends, one foot ten inches; in the concave part in the middle, one foot four inches; the circumference in the ſame place, four feet. A repreſentation of it may be ſeen in the firſt volume of the Agricultural Report of Eſſex.

Roller, *Drill.* This is a roller originally contrived for the purpoſe of forming drills in dry light ſoils, for putting the grain in; but which is likewiſe found uſeful in reducing cloddy rough tillage land into a ſtate of pulverization and fineneſs. The invention of it has by ſome been aſcribed to the Norfolk farmers; but the writer of the Agricultural Survey of that diſtrict ſays, that he has at different periods made many inquiries for the inventor of this tool, but could not aſcertain it thirteen years ago. Mr. Sillis, of Hartford Bridge, near Norwich, was mentioned to him as a perſon who had improved it. It is deſcribed as a cylinder of iron,

about

about ſeven feet in length, around which are fixed cutting wheels of caſt-iron, that each turn independently of the others around the common cylinder, weighing from a ton to a ton and a half, being drawn by four horſes, and is heavy work. It is obſerved, that the cutting wheels, being moveable, may be fixed by waſhers at any diſtance, commonly at four inches. By paſſing over a freſh ploughed layer, the ſoil is cut into little channels, four inches aſunder; the ſeed is then ſown broad-caſt, and the land buſh-harrowed in the direction of the drills: thus the ſeed is depoſited at an equal depth. George, earl of Orford, gave the writer one, but the ſoil was too heavy for it: for breaking clods in a dry ſeaſon, no tool he ever beheld comes near to it. It is ſuppoſed by ſome, that the main object of the practice is to ſave the trouble and expence of dibbling, though it is not near ſo good a practice.

And it is remarked by the author of the above Agricultural Report, that they are much in uſe in Lodden hundred. Mr. Burton, of Langley, puts in a great deal of corn thus, and approves the method ſo much, that hitherto he has drilled little; but thinks dibbling a vaſt improvement. It is, however, added, that the implement was more commonly uſed in the county ten or twelve years ago than it is at preſent; for the drill machine has been adopted by many, who formerly had a good opinion of this tool. It muſt, however, be found beneficial in its original intention, in many caſes, on the very light friable ſoils; and as a pulverizing machine on thoſe of the heavy kind, when uſed in ſuitable ſeaſons.

Roller, *Furrow*. This is a tool of the roller kind, contrived for the purpoſe of rolling the furrows in ſteep hilly ſituations, and other places where the common ſort cannot be employed. It is the invention of Mr. Pinchard, and is an uſeful contrivance for the purpoſe for which it was intended.

Roller, *Graſs*. This is a heavy ſort of roller, made uſe of for the purpoſe of rendering the ſurface of graſs-lands ſmooth and even. It has been ſuggeſted, that the wooden rollers of this ſort, which are frequently employed with great propriety on graſs and paſture lands, are in many caſes made too large to produce that powerful effect which is wanted, without the aid of additional weight being given, If made leſs, and well loaded, it is ſuppoſed that a greater degree of preſſure will be afforded. A medium ſize is probably the moſt effectual in giving the requiſite preſſure in ſuch caſes. A powerful implement of this ſort, which is uſed in the beſt graſs diſtrict of the kingdom, weighs ſomething leſs than half a ton. It is, however, made of wood; but iron or ſtone, where they can be had, are much better materials. It is ſtated in the Norfolk Agricultural Report, that Mr. Coke has the moſt powerful roller for graſs-land that the writer has ſeen: it was caſt at the Carron foundery. It is five feet ſix inches high, and five feet ſix inches long; weighs three and a half tons; is drawn by four horſes, and coſt ſixty pounds. It is obſerved, that it leaves the ſurface of graſs-lands in the order that it ought always to be in.

Roller, *Jointed*, ſuch a one as is made with a joint or joints, in order to conform to the nature of the ridges. Theſe kinds of rollers are conſtructed by ſome farmers in the county of Eſſex. Mr. Tweed has invented one, which he finds of very great uſe. He rolls all his clover-land for drilling wheat with it, and employs it for whatever ſort of tillage-rolling is to be performed. The great object of it is to prevent the horſes from poaching, by their going only in the furrow, two of them at length.

Roller, *Spike*. This ſort of roller is conſtructed much in the ſame way as thoſe of the common kind, only inſtead of being plain, it is ſtudded or ſet with a conſiderable number of ſpikes, by which it is ſuppoſed to break the ſoil more effectually. It is moſtly employed on the heavy, ſtiff, lumpy tillage lands, for the purpoſe of reducing and bringing theſe into a better ſtate of pulverization. In ſome caſes it may be a good implement: it may be connected with the compound roller. When the drill-roller is in uſe, this ſort of roller is unneceſſary.

Roller, in *Gardening*, a very uſeful implement in many different intentions, and for ſeveral different purpoſes. The kinds which are moſt commonly employed in this way are thoſe of ſtone and caſt-iron, for compreſſing the more hard ſurfaces; and thoſe of the ſmaller wood ſort, for removing worm-caſts and other protuberances on ſhort graſs-lawns, and other deſcriptions of pleaſure-grounds, in the ſtate of turf or ſward. They are never required to be of any great weight for theſe uſes, but to be capable of being readily managed by the labourer without difficulty or inconvenience.

No unuſual peculiarity of form is here ever neceſſary, as the main object is conſtantly that of rendering the ſurfaces, over which they may paſs, as ſmooth and even as poſſible.

Moderate or middle-ſized common caſt-iron rollers are now moſt uſually made uſe of, for the purpoſes of gardening.

Roller, in *Inland Navigation*, a term applied to an inclined plane, with rollers on it.

Roller, in *Ornithology*, the common name of a bird of the mag-pie kind, called *garrulus argentoratenſis* by authors, and ſuſpected to be the ſame with the bird deſcribed by Geſner, under the name of the *blue crow, cornix cærulea*, and by Aldrovand under the name of *pica marina*. It is the Coracias *Garrula* of Linnæus; which ſee.

Roller is alſo the name by which ſome call the *ampelis*, or *garrulus Bohemicus*. This, in the Linnæan ſyſtem, is a ſpecies of the *ampelis*. See Garrulus.

Roller, in *Block-making*, a cylindrical pin turning on its own axis, which is uſed in ſome blocks, inſtead of a ſheave.

Rollers, *Cylindrical*, pieces of timber, revolving on an iron axis, and ſo fixed above the deck, either perpendicularly or horizontally, as to prevent the chafing of the meſſenger or cable againſt the jeer and topſail-ſheet bitts, &c. Thoſe fixed forward in the manger are to facilitate the meſſenger to the capſtan.

Rollers, *Friction*, are made of two parallel circular plates of braſs, about a quarter of an inch thick. Four or more ſolid braſs cylinders are placed at equal diſtances round theſe plates, and work upon their own axes, between them, at right angles. Thus any pin working through theſe plates of braſs muſt touch the rolling ſurfaces of the ſolid braſs cylinders, by which the friction is conſiderably leſſened.

Roller, in *Surgery*, a long and broad ligature, uſually of linen cloth, uſed for binding, ſurrounding, and containing, the parts of the human body, and keeping them in, or diſpoſing them, to a ſtate of health.

A roller conſiſts of two parts; the *body*, and the two extremities, which ſome call *heads* or *chiefs*, and others *tails*. There are ſingle-headed rollers, that is, ſuch as are rolled at one head only, double-headed rollers, &c.

Again: ſome are equally rolled and gathered together; as thoſe applied to fractures and diſlocated joints. Others are cut into ſeveral chiefs or heads; as thoſe for the head, chin, &c. Others are compoſed of ſeveral ſwaths, gathered and ſtitched together; as thoſe for the teſticles, &c. Some again

again are broad; as thofe for the breaft, belly, &c. Others narrow; as thofe for lips, fingers, &c.

Guidon directs the roller for the fhoulder to be fix fingers broad; that for the thigh, five; for the leg, four; for the arm, three; and the finger, one. See BANDAGE.

ROLLFELD, in *Geography*, a town of Germany, on the Maine; 2 miles S. of Clingenberg.

ROLLI, PAOLO, in *Biography*, a Roman poet, born in 1687, the fon of an architect. He was a difciple of the celebrated Gravina, who infpired him with the love of poetry and literature. The earl of Burlington having brought him to England, which he commemorates in the dedication of his opera of "Aftarte" to his noble patron, who attached him to the court as mafter of the Tufcan language to the princeffes.

Rolli did not fpend an inactive life in England; for, befides being opera poet to the Royal Academy of Mufic till it was broke up, teaching his language to the royal family, and many of the firft nobility, he publifhed Italian odes, fongs, elegies, endeca fillaba in the manner of Catullus, which were much admired. Befides thefe he publifhed epigrams, and fine editions in London of the Satires of Ariofto, the complete works of Berni, Varchi, &c. 2 vols. 8vo. much efteemed; the Decamerone of Boccaccio, the Lucretius of Marchetti, Odes of Anacreon, and a tranflation of Milton's Paradife Loft, in Italian verfe, folio.

Upon the death of queen Caroline, his royal protectrefs, in 1737, he left England, and returned into Italy, where he died in 1767, leaving behind him a very curious cabinet, and a rich library of well-chofen books.

ROLLIN, CHARLES, an eloquent writer and profeffor, was born at Paris in 1661. He was intended for the fame trade as that of his father, namely, a cutler; but a Benedictine, who had watched the opening of his mind, and clearly perceived in him a genius for learning, procured for him an exhibition at the college of Pleffis; and he was immediately taken under the protection of the principal, M. Charles Gobinet. He went through, with much applaufe, a courfe of claffics and philofophy; and then ftudied theology for three years at the Sorbonne. A way feemed now open to him in the college of Pleffis, and in 1683 Rollin entered that feat of learning. In 1687 he was made profeffor of rhetoric, and in 1688 he obtained the chair of eloquence in the Royal College. He became rector in 1694, and occupied that poft two years. During his adminiftration, he revived the ftudy of the Greek, fubftituted academical exercifes for the reprefentation of tragedies, and introduced the cuftom of obliging the fcholars to get the holy fcriptures by heart. In 1698 he was appointed coadjutor of the college of Beauvais, an office which he held till 1712. In the year 1720 he was again rector of the univerfity; after which he entirely devoted himfelf to the compofition of the works for which his name is particularly celebrated, and of which the following is an enumeration of the principal: "Traité de la Manière d'enfeigner et d'étudier les Belles Lettres par Rapport, à l'Efprit et au Cœur," 4 vols. 12mo., publifhed at different times between the years 1726-8, with a fupplement relative to the ftudies of children, and the education of females. Several editions of this work have been publifhed. "L'Hiftoire Ancienne des Egyptiens, des Carthaginois, des Affyriens, des Babyloniens," &c. 13 vols. 12mo., publifhed between 1730-38. Voltaire fpeaks in terms of high refpect of this work: while he admits that the latter volumes are not written with fo much care as the earlier ones, yet he fays it is the beft hiftorical compilation in any language; becaufe the compilers of fuch works are feldom eloquent, which Rollin always was. It has been thought, and with probability, that Rollin wrote hiftory chiefly for the opportunity of throwing into the narrative abundance of ufeful reflections. He paid too much credit to the exaggerations of the ancient hiftorians, and is in a good meafure void of that critical fagacity, which fhould be characteriftic of the writer of hiftory. This quality could fcarcely be expected from the man who gave implicit creed to the miracles, as they were called, of the abbè de Paris, and who was accuftomed to pray kneeling before his tomb. The other principal work of Rollin was "Hiftoire Romaine depuis la Fondation de Rome jufquà la Bataille d'Actium," 8 vols. 12mo. This was continued by Crevier to the reign of Conftantine. Rollin died with a character univerfally efteemed, at the age of 80, in the year 1741. His writings have been popular both in France and in other countries. Voltaire fays, that he was the firft member of the univerfity who wrote with purity and dignity. He began with eftablifhing his reputation as a claffical fcholar, by a number of Latin harangues and poems, which have been printed; and by an edition of Quinctilian, intended for the ufe of fchools, which he illuftrated with fhort notes, and a preface. This edition of Quinctilian has been feveral times reprinted, in 2 vols. 12mo.; that in our poffeffion was publifhed at Paris in 1774.

ROLLING, ROTATION, in *Mechanics*, a kind of circular motion, in which the moveable turns round its own axis, or centre, and continually applies new parts of its furface to the body it moves upon.

Such is that of a wheel, a fphere, or the like. Such, particularly, are the motions of the earth, the planets, &c.

The motion of rolling is oppofed to that of *fliding;* in which the fame furface is continually applied to the plane it moves along.

It muft be noted, that in a wheel it is only the circumference that properly rolls; the reft proceeds in a compound angular kind of motion, and partly rolls, partly flides. The not diftinguifhing between which two, occafioned the difficulty of that celebrated problem, the *rota Ariftotelica, Ariftotle's wheel.*

The friction of a body in rolling, or the refiftance made to it by the roughnefs of the plane it moves on, is found to be much lefs than the friction in fliding.

Hence, the great ufe of wheels, rolls, &c. in machines; as much of the action as poffible being laid thereon, to make the refiftance the leffer.

For the laws of bodies rolling on inclined planes, fee *Inclined* PLANE and DESCENT. See alfo ROTATION.

ROLLING, in *Gardening*, the work of rendering any furface level by means of the roller. It is practifed equally for the purpofe of bringing the furfaces of the gravel and other kinds of hard walks and roads into an exact and even order, as well as thofe of pleafure-grounds, which are in the condition of fhort or mown grafs. And it is fometimes applicable in other intentions, as thofe of rolling in particular forts of feeds, inftead of putting them in by means of treading the beds by the feet, and the rolling down and rendering more clofe the too loofe and open grounds of gardens, &c.

The rolling down of garden-walks and roads fhould always be done, when poffible, immediately after flight falls of rain, the gravel or other kinds of materials being previoufly put in fuitable order by fweeping and raking with proper rakes for the purpofe. The roller is then to be carefully drawn up on one fide and down the other of them as clofe as poffible to the grafs verges, and afterwards along the middle parts, in a forward and backward direction, which moftly completes the work.

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In rolling and rendering ſhort-graſs pleaſure-grounds ſmooth and even, it is uſual to go over them, in the firſt place, when they are to be mown, as ſoon as poſſible after a good fall of rain, with a ſmall wooden roller, in order to take up and remove the worm-caſts, and then to follow with the iron one, beginning at one ſide and going on in a regular manner over the whole, in a cloſe up-and-down direction. The rolling, in theſe caſes, is ſometimes alſo performed for the purpoſe of mowing only, which is always done by the wooden roller, as it clears the graſs in the beſt manner; the iron roller being run over afterwards, when the mown graſs has been removed.

Rolling ſhould be frequently practiſed in caſes of this nature, in order that the walks, roads, and lawns, may be kept in a neat, proper condition, and never be ſuffered to run into a ruinous and diſorderly ſtate.

Rolling, in *Huſbandry*, the action or operation of drawing a roller over the ſurface of the ground, with the view of breaking down the clods, rendering it more compact, and bringing it even and level; or for only levelling the ſurface, as in graſs-lands. This is a practice that becomes neceſſary both upon the tillage and graſs-lands, and which is of much utility in both ſorts of huſbandry. In the former caſe, it is made uſe of with different intentions, as for the purpoſe of breaking down and reducing the cloddy and lumpy parts of the ſoil in preparing it for the reception of crops. It is alſo of great uſe in many caſes of light ſoils, in rendering the ſurface more firm, even, and ſolid, after the ſeed is put in. It is likewiſe found beneficial to the young crops in the early ſpring, in various inſtances. And it is ſtated by the author of Practical Agriculture, that in the caſes of ſtiff, heavy, and adheſive ſoils of different kinds, it may frequently be made uſe of with the firſt-mentioned intention with very great advantage; but it ſhould only be employed when ſuch lands are tolerably dry, for when drawn over the ground under the contrary circumſtances, little benefit can be afforded in the way of pulverization, while much miſchief muſt be produced by the poaching of the horſes, and the plaſtering the earth round the implement. But by uſing it in the manner juſt directed, all the lumpy or cloddy parts of the ſurface ſoil may be effectually cruſhed and reduced into a fine powdery ſtate, fit for the reception of the ſeed. And that if, in ſuch ſorts of ſoil, it be applied, in the intervals between the different harrowings, it may contribute much in the ſame way, not merely by reducing a great number of the lumps by the preſſure that it cauſes, but by forcing others ſo much into the ground that they may be acted upon, and further broken down by the fermentation that moſtly takes place in the ſoil after the land has been ſtirred. In all the light and more porous ſorts of ſoil very beneficial conſequences may alſo be derived from this operation by the conſolidation of ſurface that is thus produced, and the more perfect retention of moiſture, by which the ſeed, eſpecially if of the ſmall kind, is enabled to vegetate more equally, as well as in a more expeditious manner than would otherwiſe be the caſe. It is likewiſe ſuppoſed, that, in caſes where lands have been left rough after ploughing, for the purpoſe of more effectually deſtroying weeds, it may be of utility, by being employed before the harrows, to give them more power in laying hold of and reducing the ſoil, and by the pulverization that it affords, and the more perfect retention of moiſture that it cauſes, in conſequence of the ſurface being rendered more cloſe and compact, the ſeed-weeds are produced more abundantly, and more readily deſtroyed. It is likewiſe in theſe laſt methods, Mr. Donaldſon ſays, that it proves ſo highly beneficial in all caſes where graſs-ſeeds are ſown; as well as by the equality and ſmoothneſs of ſurface that are thereby produced; and it is well obſerved by the ſame writer, that if no other benefit were derived from rolling lands in tillage, than ſmoothing the ſurface, even that in harveſt is of material conſequence, more eſpecially where the crops are cut down with the ſcythe, which is general in moſt of the ſouthern diſtricts of the kingdom, and which the increaſing ſcarcity of labourers muſt ſoon, in all probability, introduce into thoſe of the north. It is alſo remarked by Mr. Morley, in the fourth volume of Communications to the Board of Agriculture, that old ſward, or graſs-ſeeds, upon firſt breaking up, ſhould always be rolled before dibbling for either wheat, beans, or peaſe, as it makes the land more ſolid, and the grain, when it vegetates, will form a ſtronger root. Wheat ſhould always be rolled in the ſpring after froſt, as it will make the ſoil adhere more cloſely to the roots of the plants, which very much encourages vegetation, and will cauſe the ſtem to be much ſtronger, and the grain will be brought to greater perfection. Barley and oats ſhould always be rolled when the blades are about an inch above the ground, if the weather permits; and turnips ſhould be rolled at night, ſoon after the plants make their appearance, which will be a means of deſtroying a great number of ſlugs and ſnails, that are very deſtructive to the young plants. And it is ſuppoſed by Mr. Somerville, in his Agricultural Survey of Eaſt Lothian, that rolling, when conducted in a judicious manner, is highly beneficial, and admits of being much extended, eſpecially upon all winter crops after that ſeaſon has been ſevere, and without any regard to ſoils, as both loams and clays, after much naked froſt, have their coheſion ſo much broken as to leave the plants quite looſe, and almoſt without any eſtabliſhment. It has alſo been ſtated, that the rolling of wheat, rye, barley, &c. with a roller of good length, and half the weight of the common ones above deſcribed, may be advantageous in other ways, as it preſſes down the ſoil that has been raiſed by the froſts about the minute ramifications of the attracting veſſels or ducts, and augments the quantity of mould upon them by breaking the little lumps of ſod; which, indeed, were very ſerviceable in winter by affording ſhelter, but in ſpring will ſtill be of greater uſe, by ſuch imminution in filling up the fiſſures, and preventing, in a great meaſure, the ill effects droughts have on light ſoils, by retaining and filtering rain-water; whereby the ſoil imbibes whatever is nutritive, and what is ſuperfluous of the ſimple fluid only eſcapes.

But it is added, that although theſe are ſome of the many advantages rolling produces in agriculture, notwithſtanding it amounts to no more than mere conjecture, that, in general, rolling corn may do more damage than it can good, if ſuch cautions as the following be not carefully attended to; *viz.* never to roll corn but in dry freſh weather; by no means to uſe heavy rollers, nor to roll too early, as before the blades be pretty ſtrong, for the wounds that the blades may receive, the roots, being then tender, will be unable ever to recover; nor too late, as, when the ſtalks are hardened and grown to any height, for the roller will break them, which injury can hardly be repaired, and the crop is thereby greatly hurt; that none but light lands are proper to be rolled with this view, and thoſe which have been manured that or the preceding year with dung only: in ſhort, none but rich, light ſoils, in general, can be improved by rolling in this intention; for in poor lands it oppoſes the moſt active principles, and undoes all that has been done for the crop by ploughing, &c. It is conſequently concluded, that the ſoil, the condition, the growth of the corn, the weather, and the weight of the roller, are all to be moſt ſcrupulouſly regarded: when all coincide, the advantages of rolling may be great; but when they do not, the

the disadvantages may be insuperable. Rolling, then, is neither the least critical, nor the most insignificant piece of the husbandman's profession; therefore ought not to be performed at random and without circumspection, in cases where young crops are concerned.

Mr. Marshall, in his Rural Economy of Norfolk, in speaking of rolling, remarks, that one circumstance requires to be mentioned, which is, that the roller, notwithstanding the lightness of the soil, and its proneness to be injured by dry weather, is never used in Norfolk for the purpose of compression. He never saw one used by a farmer either upon fallow or upon a lay; not even upon the first year of a clover-lay, to smooth the surface for the scythe. The only uses to which he has seen a roller put, in that district, are that of smoothing the surface before sowing, to prevent the seed from running down too low, and that of smoothing it afterwards as a preparation for the scythe; and even this operation is performed with a roller not more perhaps than seven or eight inches in diameter; a circumstance which he confesses he is no way able to account for; nevertheless, it would be rashness to condemn an established practice, unless he could, from his own experience, or from adequate observation on the experience of others, prove it to be ineligible. And it is stated, that there is a sort of land which, when clover is sown upon it, throws out the young plants after a frost. Rolling in the beginning of winter, and immediately after the frost is gone, will, in some measure, prevent this. The first rolling hinders the frost from penetrating so deep as it would otherwise do; and the second makes the land firm, after having been loosened by the change from frost to open weather. In the latter case, or that of grass-land, this is also a process that is of much advantage, especially where such lands are kept under the scythe. And it is probable, that in many cases of pasture lands it may be found of great benefit. In the former it is found beneficial in keeping the surface free from hills, and in a more even state, as well as the grass from becoming in so tussocky a condition, as is often the case where the practice is neglected, or not well understood. And in the latter it may perhaps have a similar effect, and keep the grass more free from tufts, and in a more regular condition, which is a circumstance of great consequence in the practice of grazing. It has been remarked, that the impression of the roller not only renders the surface more level and fine, but at the same time induces the grass plants to spread more laterally, and in that way to form a better and more close sward, which may be highly beneficial in both cases. Its importance on new laid-down grass-lands is therefore extremely obvious, as it must be highly serviceable in these different intentions. And the worm-casts are by this means reduced and brought into order, by which means the mowing can be performed with greater facility, and in a closer manner. Besides, it may be useful in other views, as by pressing the mould, as well as the manure, more closely round the roots of the grass plants; and in consequence of such means, they may not only be better established in the soil, and their vigorous growth more effectually promoted, but, from the moisture being more fully preserved in the ground, be in less danger of injury from the effects of heat in the summer months, and of course better crops be afforded at the period of cutting them down. In order to perform this business in the most complete and effectual manner, a roller of considerable weight is necessary, such as has been already described; and it has been advised, in order to prevent as much as possible the ground from being injured by the feet of the animals that draw it, as may frequently be the case where they follow each other in the same part, it may be the best practice to have them yoked double, as by that means there will be less treading on the same portion of the surface; and that where two horses are sufficient to execute the work, more should never be made use of; but if a third should be found necessary, it may be attached as a leader in the middle, before the other two: a greater number of horses can seldom or ever be of any material advantage in this sort of work. It is also suggested as necessary, to be very careful in executing this operation, to see that every part receives the due impression of the implement. On lands where this sort of work is regularly performed, it will seldom be requisite to pass more than once in a place, but in other cases it may often be done more frequently with benefit; and in particular cases, a more frequent repetition of the operation is absolutely requisite, in order to bring the ground into a proper state. It is necessary, in the execution of this business on grass-lands, to attend in a particular manner to the season, as it cannot be performed with advantage, either when the surface is in too dry or too moist a condition. It is stated, that in these cases the work of rolling may be advantageously performed at different seasons, as in the beginning of the autumn, and in the commencement of the year, or very early spring months; but the latter is the most common period. But in order to its being executed with the greatest possible benefit, a time should always be chosen, if possible, when the ground is in a suitable state for receiving the impression of the implement. In the drier descriptions of land it may frequently be performed in the most beneficial manner, after the land has been rendered a little soft by a moderate fall of rain; but in those of the contrary sort, it may be necessary to wait till the superabundant moisture be so much dried up, as to admit the animals employed in drawing the machine, without poaching or otherwise injuring the surface of the ground while the process is going on. It has been remarked by Mr. Boswell, that the rolling of watered meadows should be executed towards the latter end of February or beginning of the following month, after the land has been left in a dry state for a week or ten days. And that the work should be performed lengthwise of the panes, going up one side of the trenches, and down the other. And in the case of rolling the common hay lands, it is a good mode to proceed up one side the field, and down the other, somewhat in a similar manner, as by that means the work may be the most completely executed, and with the least trouble.

Also a writer, in the Communications to the Board of Agriculture, mentioned above, has remarked, that sward and meadow land should always be rolled in April or the beginning of May, and when the ground is in a moist state, as it causes the grass to be of a more kind nature, and reduces the hills raised by the ants to a proper state of being mown over.

Likewise on such new grass-lands as have been just restored to the state of sward, and which are often thin and patchy, when seeds are sown over such parts, the roller may frequently be run over them in order to force in the seeds; but a better practice is to turn sheep upon the lands, confining them upon such patches by means of hurdles, in order that they may tread them in. In either case, a rather moist time should be chosen for the purpose. In cases of this nature, where there is a degenerate sward, Mr. Amos, in his Minutes on Agriculture, advises the use of his compound roller, which should be run over the ground early in March, when the sward will admit the spikes without being injured by the feet of the horses, the land being previously covered with well-rotted dung, or compost, in the proportion of from about eight or ten tons to the acre. It should be well rolled in different

different directions, till the surface sward is pretty much broken, then sowing the grass-seed over the land, and after letting it be well dressed with the sward-dresser, and all the rubbish collected cleared away, rolling it well down with the plain roller, and admitting no sort of live-stock afterwards upon it. In this method of using the roller, vast improvements may, in many cases of degenerated or worn-out grass-lands, be effected, without incurring any very heavy expences, or much trouble. See SWARD-*Dresser*.

ROLLING-*Bridge* signifies, among *Canal-Makers*, an INCLINED *Plane*; which see.

ROLLING-*Carts*. See CARTS.

ROLLING-*Mill*, in *Metallurgy*, and particularly in the *Iron Manufacture*, is a mill for reducing masses of iron or other metals into even parallel bars, or flat thin plates: this is effected by passing the metal, whilst red-hot, between two cylindrical rollers of iron or steel, which are put in motion by the power of the mill; and being so mounted in a strong metal frame, that they cannot recede from each other, they compress the metal which is passed between them, and reduce it to a thickness equal to the space between their surfaces.

It requires a most enormous power to put in motion the rollers which are employed for laminating iron in the large way; and for this reason, the greatest number of rolling-mills are situated upon the banks of rivers which have the advantage of a sufficient fall to turn the machinery. Of late years, the improvements of steam-engines have been carried to such a high perfection, as to put them on a par with water, for most purposes, and particularly for rolling-mills, as the waste heat of the furnaces used for heating the metal may be employed, in part, to raise steam for the engines which turn the rollers.

Rolling-mills were not very generally used in the iron manufacture till within these sixty years. The old mills which were first used are extremely simple; two separate water-wheels are placed on the opposite sides of the mill, with their axles in the same direction, but at different heights, so that one wheel can be connected with the upper, and the other with the lower roller: it therefore requires the two wheels to have the water delivered at opposite sides, to make them revolve in different directions, in order that the upper surface of the lower roller, and the under surface of the upper roller, may move in the same direction, and pass the iron between them. The construction of the rollers generally used in such mills is shewn at *figs*. 3, 5, and 6, of *Plate* V. *Iron Manufacture*, except that the two rollers, F and G, are there shewn with equal pinions, *d* and *e*, fixed upon the ends of their pivots, to compel the two to revolve equally together; whereas, in the mills with two separate wheels, no provision is made to ensure the equal motion of the two. The gudgeons, or necks, of the lower roller, G, are supported in brasses, fitted into strong carriages of iron E, E, which have holes through their ends, to receive four strong iron bolts, A A, B B; these stand perpendicular, and form the frame, to retain the rollers at the proper distance, being fitted through the carriages E with heads below, so that they cannot draw out. The upper ends of the bolts are cut with screws, upon which nuts, *a*, *a*, are fitted; and these being turned round by iron handles or wrenches, screw down the pieces D, D, and advance the rollers nearer together; or, by a contrary motion, increase the distance between them: *i* (*fig*. 6) is a strong iron bar, extended from one bolt, A, to the other, B, and fixed fast; it supports an iron plate, forming a kind of table before the rollers, to guide the iron through them. The rollers have square heads upon the ends of their gudgeons; and upon these squares, large cast-iron sockets or boxes, as L, are fitted, and these, at the other ends, are fitted upon similar squares on the ends of the water-wheel axis. A little play or looseness is admitted in all these squares, because the upper roller is set at different heights, according to the thickness of the work which is to be rolled between them: this play is required to allow the rollers to move freely, when they are not exactly in the line of the water-wheel axis: it is to accommodate this circumstance that the principal care is required in constructing a rolling-mill. Our readers will gain a good idea of the best proportions of a mill, with two independent water-wheels, from the following directions for building one in Northumberland, which were given by Mr. Smeaton near 40 years ago. The two water-wheels are to be under-shot, and of different sizes, *viz*. 15 ft. 4 in. and 14 ft. 8 in., the mean diameter being 15 ft. The breadths in their float-boards are to be three feet each, the small wheel being laid lower than the other by seven inches; this, with the differences of their diameters, will make the centre of the large wheel 11 inches higher than the other. The different heights of the crowns of the falls or breasts, down which the water descends to act upon the wheels, and the positions of the water-shuttles, are to be so adjusted, that the gates or shuttles being equally drawn up by their starts, the wheels will, as near as possible, revolve in equal times, and with equal power. The rings of the water-wheels are to be made of cast iron, that their weight may act as flies: the ring of the lesser wheel is to be made six inches in thickness by six inches deep, while that of the larger is to be only five by six. The greater quantity of matter in the lesser wheel, therefore, will give it nearly the same momentum as the larger wheel.

The rings of the water-wheels are each to be formed by eight pieces or fellies, the exterior circle of the greater wheel being thirteen feet diameter, and that of the less twelve feet four inches: the length of the fellies is to be about half an inch shorter than their true length, in order to admit an oak wedge of one inch thick to be introduced into every joint after the rings are screwed together by the joint-plates of wrought iron, which unite the fellies. These plates are to lay upon the plain surface of the felly, and not to be let in as the common wooden rings of water-wheels, in order that the oak wedges may completely fill the joints at the ends of the fellies. The wheels are to have wooden arms, and it must be observed, that the mortises through each of the iron fellies, for receiving the ends of the arms of the wheels, are to be about two inches and a half in width, and that they are to be a little dove-tailed, in their length only, so that the mortises being longer on the outside of the ring, and the wood of the arm being spread into them with wedges, will produce firm ties to the centre; but as a farther security, pins are to be put in after the wedging is completed. The mortises in the rings for the starts, which support the float-boards, are to be four inches by two, without dove-tailing, or rather they should be larger outside than inside. The breast or float-boards will fix by nails into the joints and arms, where they fall; but that the breast-boards for the intermediate floats may also have a fastening, holes of about one inch diameter, and about four inches deep, must be cast in the ring, at the places for every other float; these holes, being filled up with pieces of oak, will afford places to drive the nails for securing the boards. The axles of the water-wheel are to be of cast-iron, with flaunches to screw the arms of the wheel against. The total length of each axis is to be seven feet one inch, and the diameter throughout the axis is to be a circle of nine inches. The manner of fixing the arms upon flaunches is to be found in *Plate* XXXIV. *Mechanics*, in our article MILL.

The

The braffes upon which the necks of the water-wheel axles are fupported, are intended to be let into caft-iron ftocks, which are again fupported upon wooden bed-planks, and thofe upon the cap-ftones of the walls, which (under thefe at leaft) are fuppofed to reach all acrofs the thicknefs of the walls, thofe necks being firft truly and fmoothly turned; at each end, beyond the neck, is formed an aftragal or moulding, to keep the wheel in its place from moving endways. The ends of the axis are terminated by an indented head, fhaped fomewhat like a fquare citadel in fortification, and an iron box is fitted upon this to communicate the motion to the rollers, the furface lines of the indented head being formed a little rounding, that the box may not only be certain of taking its bearing in the middle, but likewife be capable of complying with the motion of the rollers: and in order to give ftill more liberty, the end of the box which is fartheft from the water-wheel, is formed into a fquare of eight inches, which is again furrounded by another box, whofe external furface is round. This box is formed at the end of a round fpindle or axis three feet long, and terminated at the other end with a fquare of eight inches, which enters one end of a fquare box, and at its other end receives the fquare of the roller, fuppofed to be of fix inches, but may be of any other fize which is thought neceffary. It is to be noted, that all the fquares are to be made larger than thofe of the rollers, in order that they may wear longer; and all the infertions are to be lefs than thofe at the end of the water-wheel axles, that the axis may not be rendered ufelefs by the wear or failure of the citadel heads which are introduced, as they are expected to laft many years; and if any thing fhould happen to them, the axes are made alike on both fides of the water-wheels, that they may change ends; therefore, there is nothing of confequence likely to fail by wear or breakage, except the fmaller intermediate work between the axis and the rolls, which is eafily replaced. Holes are to be made through the boxes and joint parts for iron bolts to pafs through rather loofely, fo as to prevent the boxes and fquares feparating, but not to confine the joints from yielding to the motion of the rolls. The water-wheels are fuppofed to be clofely adapted to their conduits, and their axes to remain immoveable as to height, at the difference of eleven inches in level, while the rolls are fuppofed to vary in their diameter from twelve inches to nine. This will be allowed for, by the diftance that the fquares upon the rolls are from the end of the axis; for though the houfe is fuppofed no more than ten feet wide between the walls, the diftance between the middle of the citadel heads at the end of the water-wheel axis, and the middle of the fquares of the rolls refpectively, is upwards of four feet; and in that length no lefs than four joints are introduced, every one of which complying a little, a fmall difference in the height of the roll will produce no fenfible difference in the communication of the motion from that of a right line; all the joints being kept oiled or greafed, which will be not lefs proper on that account than to keep the parts from wearing. In order to preferve the directions as near as poffible to a right line, Mr. Smeaton propofes that the lower roll fhall be placed originally half an inch below the centre of the axis which turns it: fuppofe the rolls were firft made of twelve inches diameter, while the difference of the height of the axis is only eleven, the upper roll will be juft half an inch too high, fo that the compliance in each will be equal, and no more than half an inch in four feet length. Thus it appears, that when the rolls are reduced by wearing from twelve inches to eleven each, then the upper roll as well as the lower will be half an inch too low for its axis; ftill neither will need to comply or vacillate more than half an inch. The roll being now of a juft diameter to anfwer the different heights of the axis, let the lower roll be raifed to its juft height, and then both the rolls will work true till they are further reduced; but when they become reduced to ten inches and a half diameter, the upper roll will become half an inch too low; then raife the under roll half an inch above the line, and the upper roll will then be truly in the line; fo that when the upper roll is come down to be half an inch below the line, the rolls will be reduced to ten inches; then raifing the under roll a quarter of an inch more, it will be three quarters above the line, and the upper roll will be a quarter of an inch under the line; and when it comes down to three quarters below the line, the rolls will be reduced to nine inches and a half; therefore, laftly, raife the under roll another quarter, fo as to be an inch above the line, and the upper roll will be reduced to half an inch below it, fo that when it is come down to an inch below it, the rolls will be reduced to nine inches. In this way the departure of the rolls from a right line will never become more than half an inch, while they are reducing from twelve to ten inches; nor more than three quarters, while they are reducing from ten to nine and a half inches; at the worft they will be no more than an inch, while they are reducing from nine and a half to nine inches. The greateft inequality is purpofely made at this place, both becaufe the purchafe of the wheels is then greateft and moft able to overcome an addition of friction, and becaufe the time that they will continue in this ftate is the leaft. If the axles are placed at ten and a half inches diftance inftead of eleven, the vacillation each way will never exceed three quarters of an inch; nor more than one inch to reduce the rolls to eight and a half diameter.

The raifing of the under roll is not to be done by raifing the whole of the bed of the roller-frame; this is to be fet originally half an inch lower than the true line; and when the lower roll requires raifing, it is to be effected by putting iron plates under the carriages of the lower roll gudgeons, fo that they will ftand as much higher than before, and not to make the feveral rifes by additional plates, but to have plates of the different gages, fo that each will lay in one folid piece.

Mills, on this conftruction, are ftill ufed in many iron-works for rolling coarfe iron bars, but are unfit for any better purpofe, from the difficulty of adjufting the two water-wheels to an equal velocity; and if one roller moves quicker than the other, the metal becomes more extended on that fide than upon the other, and is thus rendered convex. Another defect is, the want of proper fly-wheels to regulate the mill; for the caft-iron rims to the water-wheels by no means anfwers the purpofe of fly-wheels, unlefs they are made to revolve fo quickly that the water lofes much of its effect upon the floats. Fly-wheels are, perhaps, more ufeful for rolling than in any other kind of mills, becaufe the refiftance to be overcome is fo variable; being at one moment very great for a large piece of iron, then fmaller whilft it is paffed through a fecond time, becaufe the iron is to be lefs reduced: and in the interval of returning the iron, to put it through again, there is no other refiftance than that of the friction of the machinery. Again, when the iron has been paffed through feveral times, the refiftance is greateft of all, becaufe the metal has become harder, both by the compreffion it has undergone, and from being gradually cooled; alfo, the metal, being thinner, will not yield fo readily to the preffure, as when in a larger mafs. By the proper addition of a heavy fly-wheel, great advantages, in point of power, are gained, as it tends to equalize all these irregularities; and in every interval, when the resistance is removed, the water-wheel gives a rapid motion to the fly, the force of which will be returned when the work is applied: in such a mill, if the workmen have an extraordinary large piece of metal to roll, they suffer the mill to work for a few seconds without any resistance, then putting in the iron, it is carried through at once by the momentum of the fly, though requiring a power far beyond the ordinary force of the water-wheel. The most approved method of applying a fly-wheel to a rolling-mill, is to have a large cog-wheel upon the axis of the water-wheel, to give motion to a pinion, upon the axis of which a heavy iron fly-wheel is fixed: the wheel and pinion are of such a size as to make the fly revolve about three times to one of the water-wheel: at the opposite side of the great cog-wheel another pinion, of about half its size, is placed, and to the extremity of its axis produced, the rollers are connected, the two rollers being made to turn together by means of pinions upon the ends of their gudgeons, in the manner shewn at *d e*, *fig*. 6. *Plate* V. If more than one pair of rollers is to be worked, a cog-wheel is fixed upon the axis which turns the rollers, and works another equal wheel upon the axis of the second pair, placed parallel to the former; in this case the lengths of the two axes must be different, so that the lines in which the bars will come through the different rollers, will not interfere with each other, but leave sufficient room between for the men to work. In most common mills, rollers, such as are represented at *figs*. 3, 5, 6, of *Plate* V. are employed; but to these there are some objections; first, the four nuts *a*, *a*, cannot all be turned at once with such precision as to bring the upper roller exactly parallel to the other; the means the workmen use for this, is to have a small iron wrench, or handle, fitted upon two of the nuts, *a*, *a*, and these they turn round a small quantity every time the metal has passed through, in the interval whilst it is returned to be put through again. The workman who stands in front to introduce the metal between the rollers, turns the nut on his left-hand side which is nearest to him; whilst his comrade, who receives the metal, and hands it back again to him over the roller, turns the nut on the opposite corner of the frame: by this means, as only two, instead of four, of the nuts are turned, the pieces D are constantly put out of the horizontal position, in which alone they can take a proper bearing; also, in these frames there is no support for the weight of the upper roll; but when there is no metal beneath it, it falls down, and rests upon the other; when the metal is suddenly introduced, it lifts the roll up to its bearing with a jerk, which endangers the breaking of some of the parts, and generally causes the nuts to start a little before they settle themselves to the strain. In the modern mills, the frames for the rollers are made of cast-iron, as shewn at *figs*. 1 and 2. *Plate* V. The cheeks, A, are cast in one piece, and form a bed for the reception of the brass of the lower roller H; a piece, C, is fitted upon the top of the cast-iron cheeks, and is held down by two strong wrought-iron bolts, with nuts, *a*, *b*, to screw it down, and regulate the distance between the two rollers, the gudgeon of the upper roller, G, being confined by a brass let into the piece C, but to bear it up from falling: when there is no iron between the two rollers, another brass is placed beneath the gudgeon, G, and suspended by bolts, *d*, *d*, from the piece C; by this means the two rollers are retained always at a proper distance asunder. The two standards A, B, *fig*. 2, at the opposite ends of the rollers, have broad feet at bottom, by means of which they are bolted down to massive ground-sills, which extend all across the mill-house. The rollers E and F are caused to move together equably by means of pinions *a*, *b*, which, that they may work well, are made with accurate teeth, of not more than 1½ or 2 inches pitch, or distance asunder; and, to give the requisite strength, they are made of considerable breadth, as the figure shews. Two large flat iron plates, I and K, are screwed to the two standards, both to strengthen them, and to form a table, upon which the masses to be rolled are laid to be presented to the rollers, and having passed through, are received on that at the opposite side.

The rollers shewn in *figs*. 1 and 2, have a number of grooves in them, which being opposite to each other, leave openings of a determinate figure for the purpose of rolling square bars, with the angles upwards; they do not therefore require to be adjusted in distance, as other plain rollers do, but are always, after the first erection, retained at the same distance; in this case the pinions *a* and *b* serve very well to connect the motions of two rollers together; but when the rollers are required to be adjusted during the working, as in the *Plate Rollers*, *fig*. 6, the pinions must necessarily have very coarse and long cogs, that they may not be so much affected by increasing or diminishing the distance between their centres; in this case they work very indifferently, and frequently break by the awkward manner in which such coarse teeth always meet each other when upon wheels or pinions of small radius, particularly when the proper distance between their centres is not preserved. As a partial remedy for this difficulty, the pinions are, in some mills, made very broad, with fine teeth, and mounted in a separate frame, exactly similar, except in its strength, to that of the rollers; this is placed at a distance of three or four feet from the rollers; then a coupling, or short shaft, being interposed between the squares at the ends of the axis of the pinions, and those of the rollers, they permit the latter to be adjusted without disturbing the pinions; and the length of the shafts will accommodate for the differences between them.

In *Plate* IV. of *Iron Manufacture*, we have given three figures of a very capital rolling-mill in Messrs. Walker's extensive iron-works at Rotherham, in Yorkshire, where they have several mills worked by the same river. The one in question is employed in reducing iron to small rods for nail-making, by first rolling the pieces to flat bars, and then passing them through a pair of slitting rollers, which divides each into several small square rods: it is, therefore, much smaller in its dimensions than the great mills used for rolling thick iron plate; but we have selected it on account of the arrangement of its wheels, which renders it superior to the mills in common use, as it works without the pinions of which we have spoken. A A, in the plan, (*fig*. 1.) is the water-wheel, 17 feet diameter, and five feet six inches broad: it is of the under-shot or rather breast-kind, the water being delivered below the centre, but confined to act upon the wheel by a breast of masonry, curved to correspond with the wheel very exactly. The pivots or gudgeons, *n*, of its axis rest on bearings, supported by the walls N. At one end of the axis a clutch-piece, M, is fixed, to give motion to a second axis *k*, which, being in the same line as that of the water-wheel, may be considered as a continuation thereof. It is carried under the floor of the mill. It has two large cog-wheels, one marked *b*, and another of the same dimensions at the opposite end, which is only seen in *fig*. 2, as it is concealed in *fig*. 1, beneath the wheel *f*, which it turns. The first of these wheels, *b*, gives motion to two wheels, *a* and *c*, which are on the axes I and H, and give motion to the lower of each of the two pair of rollers, situated in the frames at E F and C D. This wheel-work is shewn in

fig.

fig. 3. The wheel at the other end of the ſhaft, *k*, (ſee *fig.* 2.) turns the wheel *f*, ſituated directly above it; and this gives motion to two wheels, *e* and *g*, of the ſame dimenſions as *a* and *c*. Their axles, L and K, are connected with the upper of each pair of the rollers. By the introduction of the wheel *f*, the ſmall wheels, *e* and *g*, are made to revolve in a contrary direction to the wheels *a* and *c*; and, at the ſame time, the centres of the former are raiſed a ſufficient height above the latter, to allow for the difference in height of the centres of the upper and lower rollers of each pair. The coupling-boxes, L K and *pp*, which unite the axles of the wheels to their reſpective rollers, have ſufficient play in the joints to allow for that ſmall deviation which takes place in ſeparating the rollers, to adjuſt them to different thickneſſes of the metal they are intended to roll; though theſe ſhanks ſhould be repreſented longer than the limits of our plate have allowed, the ſpace between the frames for the wheels being in reality eight feet, inſtead of five feet nine inches, as given in the drawing.

By this arrangement of the wheels of the mill, the contrary motions of the two rollers are communicated from the ſame water-wheel, without the intervention of ſmall pinions, which, in works requiring ſuch heavy ſtrains as that of rolling iron, always work with difficulty and enormous friction; ſo that they break and wear out conſtantly, making great interruptions to the work. In the preſent inſtance, the wheels are all of conſiderable ſize, and, therefore, tranſmit the power more equably, at the ſame time that they give the two rollers preciſely the ſame velocity, which is a circumſtance of ſome importance in making good rolling for plates or bars, which will be irregular, if one roller turns faſter than the other, in conſequence of one ſide of the metal being more expanded. The framing of the mill (*Plate* IV.) is very clearly expreſſed by the drawing. The axles H and I, of the wheels *a* and *c*, are ſupported in bearings, ſcrewed down to iron frames, which are ſecurely fixed to the ſolid maſonry. On the other ſide, the iron frame, O O, is erected to ſupport the axles of the wheel L K, and alſo that of the wheel *f*, as ſhewn in *fig.* 2. The main axis *k*, and the wheels upon it, are carried under ground, and ſupported on the walls, as ſhewn by the plan. The roller-frames, C D and E F, (*fig.* 1.) are fixed down upon ſtrong beams, extended acroſs from the frame, O, to the frame on the oppoſite ſide. The poſition of one of theſe beams is ſhewn by dotted lines on the right-hand ſide, in *fig.* 1. The rollers, C, D, are exactly the ſame as ſhewn in *Plate* V. *figs.* 3, 5, and 6, except that the pinions, *d* and *e*, are omitted, being unneceſſary, from the arrangement of the wheels, which we have deſcribed. The other rollers at E F are made on a very different conſtruction, and are called ſlitters, becauſe they ſlit or cut up a bar of iron into ſeveral ſmall ſquare bars, of a ſize proper for nail-makers, or to form hoops for barrels. Theſe ſlitters conſiſt of two ſtrong axles, mounted in a ſimilar frame to the other rollers; but inſtead of carrying plain cylindrical rollers, they have rollers compoſed of ſteel rims or edges, of the ſame breadth as the rods they are to ſlit, and leaving between them deep grooves. The two ſlitters, or cutters, are ſo placed in their frame, that the rims of one roller will enter into the grooves between the rims of the other. This will be underſtood by an examination of *fig.* 4. *Plate* V.; though the rollers there ſhewn are for a totally different purpoſe, ſtill the manner in which the rings of one roller enter the grooves of the other is the ſame as the ſlitters: but the proportion of breadth is different, the ſlitters being made with grooves of half an inch, three quarters, or one inch wide, and many intermediate ſizes, correſponding to the rods to be cut; and they are not made from a ſolid roller, but are formed of ſeparate circular plates of ſteel of the juſt thickneſs, fitted ſide by ſide upon the axis, with circular iron plates of equal thickneſs between them, which form the ſpaces; and being of a leſs diameter than the ſteel plates, or cutters, they leave deep grooves between the edges. A number of crooked guide-bars are extended acroſs the frame, and paſs through the grooves, between the cutters; but lying at the very bottom of the grooves, and not being very thick, they do not fill up the grooves, the circles of the cutters projecting through theſe bars, which appear like a grate, and one is applied to each roller. Thoſe which are called the guides of the ſlitters are intended to prevent the iron adhering in the grooves between the rims, or cutters, when preſſed down into them; for the action of the ſlitters is to divide the iron which is paſſed through them into ſeparate pieces, by the rim of one roller (for inſtance, the lower) forcing one piece of the bar down into the groove of the lower roller, whilſt the adjacent part is forced up, by the rim of the lower roller, into the groove of the upper: the bar is thus divided into as many rods as there are grooves in the width which it covers. The angle at which the circles of the cutters interſect each other, is that in which the edges of a pair of ſhears are found the moſt favourable for cutting; and the ſlitters cut upon the ſame principle, but with ſeveral edges at the ſame time.

A rolling-mill generally contains a pair of ſhears, of a ſufficient ſtrength to clip off the ends of the largeſt iron bars, to reduce them to lengths or pieces of a ſufficient ſize for laminating into thin plates. Theſe are made different from other kinds of ſhears, in the circumſtance that the cutting parts, or edges, are ſituated between the centre pin or joint, and the part or handle where the power is applied: the latter is of great ſtrength, and made exceeding ſtrong in iron. The ſhears are fixed in a vertical poſition, the upper blade being firmly fixed by the framing, and the lower one, which is the long lever, is lifted up by the mill when the cut is to be made; therefore it deſcends when the ſhears are to open, and its own weight is ſufficient for that purpoſe. The frame conſiſts of a very large and thick iron plate, which is ſecurely bolted down to the foundations: at one end is an upright, which has a groove through it, to receive the moving blade, and guide it; alſo the end of the handle of the ſtationary or upper blade is ſupported by the upper end of this upright. The joint-pin of the two blades is ſupported in a ſtrong ſocket, or iron frame, alſo erected from the ſame large plate, which carries the upright guide at its other end. The two blades, therefore, lie ſide by ſide, and having cutters, or blades, of ſteel, let into the adjacent ſides of the iron levers or blades, the edges of theſe paſs by each other when the cut is made, and will thus cut any thing which is interpoſed between them, in the ſame manner as ſhears or ſciſſars; and in this circumſtance is their only reſemblance to thoſe inſtruments. The lower or moving blade, which is a long lever, reſts at the extremity, upon the periphery of an elliptical wheel, or camm, (*figs.* 1, and 3.) fixed upon the axis, I, of the rollers, (or, in other caſes, upon the ſhaft of the water-wheel,) in an excentric manner, ſo that, in turning round, it will lift up the lever, and cloſe the ſhears; but when its oppoſite or ſhorteſt radius comes beneath the lever, it is ſuffered to deſcend, and open the blades. At this moment the workman introduces the end of the iron-bar between the blades, puſhing the end of it up to a ſtop, which regulates the length to be cut off; then as the camm turns, it cloſes the blades, and cuts at once through the bar, although ſome of the largeſt are as much as three inches broad, and an inch thick.

Rollers

Rollers are usually made of cast-iron, and are very exactly turned on their surfaces, and also their necks, that they may turn truly when put in their places. The most common way of turning them is, first to mount the roller in a strong turning lathe, by holes or centre points made in its ends; then to turn the two necks truly cylindrical; and afterwards putting the roller in its proper place in the roller-frame, and placing brasses over the necks, they are held down by blocks, fitted under the pieces which retain the gudgeons of the upper roller: in this situation it is put in motion by the mill, and a bar of iron being fixed up for a rest, the surface of the roll is turned true, in the same manner as if it was in a lathe, and will be certain to be exact, being formed from the same necks on which it is afterwards to work. In casting a roller, the mould should always be placed at a considerable depth beneath the orifice where the metal is poured in, so that the pressure of a column of the fluid metal may be obtained to consolidate the casting, and render it free from those air-holes, or porous places, which will sometimes occur in metals cast without the pressure of a column. The long piece of metal which filled the aperture through which the metal ran, is left adhering to the roller, and is cut off afterwards. This is the same mode of casting that is practised for *cannon* (see that article). Case-hardened rollers must be used when it is required to have a very fair surface; *viz.* for such purposes as rolling iron to make thin plates for tinning; also the large rollers for gold or silver, such as are now used in the Royal Mint; rollers for making tin-foil, steel-plate for saws, and for many other purposes. These rollers are not hardened by a subsequent process, as in case-hardening wrought iron, but are cast in that state. This is effected by employing iron moulds: a cast-iron cylinder of three inches thick, and its diameter equal to that of the roller, is bored out with great accuracy, and fitted with ends proper to form moulds for the necks required at each end of the roller; this is buried in the sand of the foundry, and when the metal is run into it, the rapid transmission of the heat through the iron mould causes the metal which is in contact with it to cool sooner than the other parts of the mass, and renders the surface of the roller very hard. In turning a roller of this kind, the centres must be chosen so that the circumference turns as true as it will admit, and then a very small quantity being taken off, will render it perfect: this care should be taken for two reasons; first, that less will be required to be removed to make it true, which is a difficult operation, as only the best steel tools will cut it; also, that if the metal is unequally reduced, or more on one side than the other, the hardest part will there be cut away, and the roller will have a hard and a soft side, and soon wear out of the circular figure, and require a second turning. The less metal there is turned off a case-hardened roller the better it will be, because the hard part is only a case of slight thickness, and most hard at the surface.

The operation of the rolling-mill is so simple, as scarcely to require any description: the metal is heated in reverberating furnaces when it is in large masses, and for smaller pieces a kind of oven is used, in which the cokes are laid on the bottom or floor of the oven without any grate-bars, and therefore the draft of air being less rapid, it gives a slight, but very regular heat, which rises to a bright red, but no farther, and therefore it does not waste the iron by burning it to scales, as a greater heat and current of air will do. This oven is proper for heating plates, hoops, or small bars, to be rolled a second and third time: but for rolling large masses, a strong welding heat is requisite, that the metal may be consolidated, and all flaws or cracks securely closed. The reverberating furnace is used for this purpose; it is made the same as an air-furnace for melting large quantities of iron, except that the floor is horizontal; indeed it is as near as possible similar to the balling furnace. (See *Plate* II. *Iron Manufacture.*) The furnaces are placed as near as convenient to the rollers.

The iron, being heated in the furnace to the proper degree for the purpose which is intended, is taken out by a pair of pincers, the mill put in motion by drawing the shuttle, and the iron is presented to the rollers, which are previously adjusted to the thickness of the piece which is to be passed. If this is not attended to, and the workmen attempt to reduce the iron too much at one time, there is danger of breaking some of the machinery, or of stopping the mill whilst the iron is only half passed through: this is a disagreeable accident, as it will require four or five men, with an enormous wrench applied to the nuts of the roller, to turn them back sufficiently to relieve the rollers, so forcibly are the screws pressed whilst the iron is passing through: this is indeed evinced by the circumstance of solid cast-iron rollers, of ten inches in diameter, being sometimes broken in the middle; and the necks of eight and nine inches are frequently snapped. When the iron is placed on the shelf or table before them, their motion will draw it through, and as they cannot recede from each other, because of the nuts of the bolts, the metal is reduced to the exact thickness of the space between them, increasing in length, but not at all in breadth: the iron is caught by another workman behind the rollers, and returned over the top roller to the first man, who puts it through again, first giving the handles of the nuts a small turn, to bring the rolls nearer together. In this manner it is repeatedly rolled, till it is reduced to any required length and thickness, but the breadth is not at all increased by rolling; and if it is required to increase the breadth, it is done by putting the iron obliquely through the rollers; or if a great increase is wanted, the iron is put through breadthwise two or three times, till it is extended to the length of a gauge which the workman has marked upon the table in front.

Rolling of black Plate, such as is used for making the boilers of steam-engines, tanks, or other large vessels, in wrought iron. Such plates, when large, and of considerable thickness, are rolled from the blooms, or half blooms, which are made under the forge-hammer. These blooms, which are also called slabs, are nearly the length of the intended plate; their breadth about one-half or one-third as much as their length, and of a thickness to contain as much metal as will make two, three, or four plates. These pieces, when heated to a white heat, are presented breadthwise to the rollers, and passed through several times at the same heat, until what was the breadth of the bloom, being extended two or three times as great, becomes equal to its length. The thick square plate, thus formed, is now cut up by the shears across into two or three pieces, of about the same size as the first, but in a direction which will make what was the length of the first piece to be the breadth of the second. These pieces, being heated and rolled again, become extended to the size of the required plates: the reason of thus dividing the operation is, that the rolling only extends the metal in the direction in which it moves, and not at all in breadth: by this means, the particles of iron being drawn by the sides of one another, acquire something of a fibrous texture, or an approach thereto, which is desirable in bars, rods, and hoops, but not at all in plate, as it should be equally strong in either direction; therefore, by rolling it first one way, and then the other, the grain, as far as it is produced at all, is in both directions. There is no doubt that better plate would be be made, if the ſlabs or original pieces were cut to the proper proportions of length and breadth, and of a thickneſs to form only one piece; then rolling it alternately length and breadth ways every time it is paſſed between the rolls, and continuing this till the plate is finiſhed, at one heat; a better grain or texture will be thus acquired, becauſe in the former method it will be weaker one way, having ſomething of a grain in the direction of the laſt rolling.

Rolling iron Plates which are to be Tinned.—Theſe are made from the beſt Engliſh iron, and ſome of the very thinneſt from foreign iron; the bars are drawn out, by the forge hammer, to five inches broad, and half an inch thick, and are cut into lengths of eleven inches by the ſhears; theſe are heated in an oven, and paſſed breadthways through caſe-hardened rolls: this is repeated till they are extended to twice the length of the intended plates: the pieces are then folded, and ſet on edge in the furnace till properly heated, when they are rolled double, the fold being put in firſt; they are thus extended to twice the length of the folded plate. Now two men, with ſtrong tongs, tear the two leaves aſunder at the fold, and fold each again ſeparately, putting one into the other, like two ſheets of paper; in this ſtate they are heated, and rolled four thickneſſes together, the next time eight, and ſo on, till the plate is reduced to the required thickneſs: in the very thinneſt plate, ſuch as is uſed for tagging laces, fixteen leaves are rolled together. In folding the plates, care is taken every time to put a new ſurface of metal outſide, otherwiſe, thoſe which were conſtantly reduced by the preſſure of the adjacent leaves, would, at length, become grained on the ſurface; but by continually gaining new ſurfaces, which are ſmoothed by the immediate contact of the rollers, thoſe which are laid againſt them are alſo rendered ſmooth. A ſmall quantity of oil is ſprinkled between the leaves, when they are firſt put in, and inſtantly ſpreading over the whole ſurface, prevents any adheſion; the plates are dreſſed ſquare by the ſhears every time before they are folded, to remove thoſe parts which, by projecting over the edges of the other leaves, are not ſo much reduced.

After being finiſhed, dreſſed ſquare, and the ſurface ſcowered, the plates are rolled, ſingly, between a pair of poliſhed caſe-hardened rolls, without being heated; they are therefore extended but little in ſize, though rendered much harder, and more ſtiff. *Tin-foil* is rolled much in the ſame manner as the plates for tinning, but of courſe without heating.

Rolling, or Shingling Iron by Rollers.—This is a modern invention in the manufacturing of bar-iron, the rollers being ſubſtituted for the forge hammer to work the metal, in the proceſs of rendering it malleable. This method is only uſed in conjunction with the *puddling* proceſs, that is, puddling, or converting, caſt-iron into a malleable ſtate, by decarbonating it in a reverberating furnace; in this proceſs the metal becomes divided into grains the ſize of muſtard ſeeds, with a very ſlight coheſion, and full of interſtices between the grains; it therefore requires to be ſtamped, or hammered, at a welding heat, into a ſolid maſs; but rolling will alſo anſwer the purpoſe.

This was firſt diſcovered by the late Mr. Wilkinſon, who had, in his extenſive works at Broſely, in Shropſhire, a pair of enormous rollers, moved by the beam of the ſteam-engine, not with a rotatory, but with a reciprocating motion; they were five feet diameter, near ten feet long, and weighed almoſt five tons each, although caſt hollow, like garden rollers; ſectors were fixed on the ends of the gudgeons, to turn each other, as they did not make above one-third of a revolution, and then moved back again. The circumference of the rolls were grooved with grooves, gradually diminiſhing from one end to the other, in the ſame manner as the rollers ſhewn in *Plate* V. *fig.* 1. The maſs of iron to be rolled was collected into a ball in the furnace, which was taken out, and paſſed through the greateſt of the grooves. When it came through, a workman at the oppoſite ſide removed the ball to the next ſmalleſt groove, and by the returning motion of the rollers, it was carried back again to the front: the front workman then returned it in another groove, and ſo on, paſſing ſucceſſively through the different grooves, until, by gradual conſolidation, it was reduced to an imperfect bar of malleable iron. A number of theſe, being cut into lengths, were made up into faggots, or piles, and by a pair of rotatory rollers finiſhed into bars. Mr. Wilkinſon had a patent for this machine, but it was afterwards found that other rollers would effect the purpoſe better. In *fig.* 1. of *Plate* V. is a view of a pair taken from Mr. Samuel Smith's works, at Sheffield, Yorkſhire, a gentleman who, we believe, was the firſt who brought them into uſe; the two grooves *e* and *f* are very coarſe, and have teeth, that they may, more certainly, draw in the balls. The two next grooves are plain but concave, and the remainder are angular, to form ſquare bars when the ball becomes conſolidated. The uſe of theſe rollers is very ſimilar to thoſe we have juſt deſcribed, the ball of metal being taken from the furnace, and preſented to the rolls. As ſoon as the metal comes through the rollers, a workman behind lifts it over the upper roll to the firſt workman, who puts it between them again: in this manner the metal is rolled ten or twelve times, being put through a ſmaller groove of the rollers at each time, ſo as to compreſs it in a greater degree every time, till at laſt it is reduced to a tolerable ſquare bar; but the laſt groove E, *fig.* 2, has teeth in different parts of the groove, and at ſuch diſtances from each other, that they will indent ſo deeply upon the angles of the bars, at every eight or ten inches of their length, as to render it eaſy to break them into ſhort pieces when they come through. The pieces, thus formed, are piled four together, and put into a ball furnace, and, when heated, they are rolled into bars, by rollers ſhewn at *fig.* 4, which, at the firſt five grooves, *e*, *f*, are ſimilar to the former, but the ſucceeding grooves, *k*, *k*, are made to receive the rings of the oppoſite roll, leaving ſmall rectangular ſpaces, as is ſhewn by the light parts, *fig.* 4, through which the iron, being paſſed, is reduced to a parallel ſmooth bar. The ſucceſſive grooves through which it is paſſed are each made narrower than the preceding, ſo as to reduce the bars to the width and thickneſs intended, in which ſtate they are ſent to market, or if required for the nail rods, or hoops, are cut up by the ſlitters. The rollers are thought to incloſe the impurities in the iron, rather than expel them; but as rollers require much leſs power to give them motion than the hammer, it becomes worth the conſideration of manufacturers to improve their conſtruction, and render them equal in effect to the hammer. At preſent the rolled iron is not always ſo good in quality as the hammered, though this circumſtance ſhould not deter manufacturers from uſing it, as it is ſcarcely poſſible that a newly invented proceſs ſhould be at firſt brought to equal perfection with another which has exerciſed the ingenuity of manufacturers for ages paſt. But in the courſe of practice many improvements may ariſe, which will remain undiſcovered if the proceſs, in its preſent ſtate, is neglected; even in this ſtate the puddled iron, made with rollers, is by no means to be deſpiſed, when its price and quality are compared; it is for iron requiring the fibrous texture that this proceſs is beſt adapted.

Rolling and ſlitting iron for nail rods or ſmall hoops. The iron

iron which is subjected to this process is brought to the mill, *Plate* IV. before described, from the forge hammer, in bars of a size proportionate to the nail rod it is intended to make; these are cut into lengths by the shears, and heated in the furnace, then rolled repeatedly through the rollers, C, D, which are reduced every time it passes, until the bar becomes of the thickness for the square of the intended rod, half an inch for instance, and two, or two and a half, inches wide: it is, in this state, presented to the slitters E, F, and one end being introduced between the guide-bars of the slitters, is drawn in between them by the motion, and, by this means the ring of one roller presses a corresponding breadth of the hot metal into the space between the rings of the other roller; this being performed by both rollers, completely divides the bar into several rods of the same breadth with the rings of the rollers. A small leaden pipe is fixed over the cutters, and being perforated with holes, constantly lets fall a supply of cold water on the rollers, to prevent their becoming hot, and thus losing their hardness, which alone preserves their circular figure under the intense pressure they have to sustain in dividing the iron. The guide-bars are intended to force the iron rods, when cut, out of the grooves between the rings of the collar, which they would not otherwise quit, after being so forcibly pressed into them by the rings of the opposite roller. For making small hoops, the rods, as soon as they are formed, are put through the plain rolls again, and flattened into a hoop.

Rolling of Iron Hoops.—In the country these are made from iron bars, which are reduced in rollers, similar to *fig.* 4, to a size proper to produce the hoops required; these are cut into lengths, heated, and passed through the slitters, which divide them into three or four rods, which are immediately presented to the case-hardened rolls, and flattened out into a proper hoop. The mill shewn in *Plate* IV. is equally adapted for this work as for nail-rod; but for hoops, the addition of a proper fly-wheel would be an improvement, as the work is so much heavier.

In London, where a vast quantity of old hoops is to be procured, they are re-manufactured, and make the very best sort. The victualling-board alone consume many hundred tons annually for the service of the navy: the old hoops are made up into faggots, and shingled, or welded into bloom at one heat, by a forge-hammer, or in small works by rollers like *Plate* V. *fig.* 1. The blooms, being again heated, are rolled out into bars by the bar rollers, *fig.* 4, and these are cut into two or three lengths, according to the sizes of the intended hoops; these pieces are heated a third time, slit into rods as above described, and then formed into hoops by the case-hardened rolls. By successive improvements it has been found, that two heats are sufficient, the first for shingling and forming the bars, and the second for slitting and flattening the hoops; but in either method the grand object is by faggoting and rolling, always in the direction of the length, to gain a fibrous texture to the iron.

Old hoops have been lately made up into new at one operation; by employing a greater power and velocity, and making up a smaller quantity at once, it may be effected at a single heat, instead of two or three. For this purpose the old hoops are cut into short lengths and faggoted in piles, the rivets being first cut out and the pieces straightened, that the piles may be more close and compact: these piles are heated in the usual kind of furnace to a good welding heat, and are rolled between the shingling rollers, being passed through two or three grooves till they are properly reduced to go through the flat-grooved bar rollers: after rolling through the three grooves thereof, they are put through the flat parts, and a guide is used to direct them straight forwards, without care or attention from the workman. The bar is then carried to the cutters, and slit into two or more rods, which are immediately and successively passed between a pair of plain, case-hardened rolls, to finish the hoops.

Vat-hoops, or others above two inches in width, do not require to be slit, but are at once carried from the bar rollers to the plain rollers, which finish them. The piles for shingling must not be made too large, or the hoops will not retain sufficient heat to be found; about 42lbs. will be a proper quantity. The mill for this manufacture must of course have great power, and the rollers should move with a sufficient velocity to enable the iron to be got through the whole process whilst sufficiently hot. The bar and shingling rollers should be placed close together in a line, and must make about 90 revolutions *per* minute; the case-hardened rollers should make 140 *per* minute, and should be placed in such relative situations as will be most convenient to convey the iron in the quickest manner from one pair to the next. A patent has been taken out by some, who pretend to the invention of the above method; but they cannot prevent other manufacturers using it, as it is no new invention, consisting only in taking more care, and using rollers with a greater velocity.

The rolling-mill is not confined to the laminating of iron, but is likewise employed very extensively for reducing brass, copper, tin, lead, as well as gold and silver, into plates and bars. The latter metals are scarcely ever reduced by any other means than rolling; as this method makes no waste, is the most expeditious, and produces better work than hammering, or any other method, particularly when an equality of thickness and an even surface are desired; such, for example, as gold or silver, which is always to receive a polish; in these cases the rollers are made of steel hardened and polished on the surface with the most scrupulous nicety, that they may produce a perfect surface on the matters which have been passed through them.

Rolling-*Press Printing*. See Printing.

Rolling, in *Sea Language*, that motion by which a ship vibrates from side to side. Rolling is, therefore, a sort of revolution about an imaginary axis, passing through the centre of gravity of the ship; so that the nearer the centre of gravity is to the keel, the more violent will be the roll; because the centre about which the vibrations are made is placed so low in the bottom, that the resistance made by the keel to the volume of water which it displaces in rolling, bears very little proportion to the force of the vibration above the centre of gravity, the radius of which extends as high as the mast-heads. But if the centre of gravity is placed higher above the keel, the radius of the vibration will not only be diminished, but such an additional force to oppose the motion of rolling will be communicated to that part of the ship's bottom as may contribute to diminish this movement considerably.

It may be observed, that, with respect to the formation of a ship's body, that shape which approaches nearest to a circle is the most liable to roll; as it is evident, that if this be agitated in the water, it will have nothing to restrain it; because the rolling or rotation about its centre displaces no more water than when it remains upright; and hence it becomes necessary to increase the depth of the hold, the rising of the floors, and dead or rising-wood afore and abaft. See Ship-building.

Rolling-*Tackle*. See Tackle.

Rolling *Fork*, in *Geography*, a river of Kentucky, which runs into the Ohio, N. lat. 37° 47'. W. long. 86° 18'.

ROLLO, in *Biography*, the first duke of Normandy, was originally

originally a chieftain or petty prince of Denmark: the king of that country having in vain endeavoured by force to subdue his small territory, lulled him into security by a treaty which he never intended to keep, and then falling perfidiously upon him, killed his brother and many of his officers, and obliged him to take refuge in Scandinavia. Rollo here collected a body of troops, whom he farther attached to his cause by a pretended vision which predicted the certainty of future success; and then he made a bold attempt upon England, in the latter end of Alfred's reign. The order introduced by that prince having completely foiled the designs of the adventurer, he directed his enterprises to France; and sailing up the Seine, committed great ravages, and obtained possession of the city of Rouen. He proved himself so formidable an enemy to Charles the Simple, at that time king of France, that he was glad to make a treaty with Rollo, by which he gave him his daughter in marriage, with that part of Neustria called Normandy, for her dower, on the condition that Rollo should do homage for his territory, and embrace the Christian religion. Rollo very readily submitted to the ceremony of baptism, in which he had Robert duke of France for his sponsor, whose name he assumed. In governing the dukedom which he had gained by his sword, the Dane shewed nothing of the barbarian. He divided the land among his followers upon the feudal tenure, established magistracies in the different districts, and took care that law and justice were exactly administered. He severely punished robbery; treated his French subjects with mildness and equity; founded bishoprics and religious houses; and acted, in all respects, like an enlightened sovereign. Such was the reputation of his government, that the country shortly recovered its population and wealth, and many of his roving countrymen settled in Normandy, and became useful and regular subjects. To him is attributed the institution of the exchequer, or ambulatory parliament, which, at a later period, became stationary at Rouen. He died, worn out with the cares of government, in 932, having, five years before this, abdicated his throne in favour of his son William.

Rollo, in *Geography*, an island in the North sea, near the coast of Lapland. N. lat. 68° 15′.

Rollo's *Head*, a cape on the W. coast of the island of Dominica; three miles S. of Prince Rupert's Hand.

ROLLOCK, Robert, in *Biography*, a learned Scotch divine, was born near Stirling in the year 1556. He studied the classics and belles-lettres under Thomas Buchanan, who has been characterised by Spotswood as learned and wise, and a strong defender of the church's rights, and who then kept a school of considerable reputation. From Buchanan's school Rollock went to the university of St. Andrew's, where he went through a course of philosophy, and, having greatly distinguished himself, he took his degree, and was made regent of his college. In 1580 the magistrates of Edinburgh obtained permission of the king, James VI., to build a college, which being accomplished, Mr. Rollock was, in 1583, chosen the principal, and first theological professor. His high character, though not thirty years of age, brought numerous students to the new university. His reputation extended to foreign countries, where he was greatly respected by the reformed churches. He died in the year 1598, when he had only reached his forty-third year. He was author of many works, among which are the following: "In selectos aliquot Psalmos Davidis Commentarius;" "In Danielem Prophetam Commentarius;" "In Epistolam sec. Sanctum Johannem Comment." He published commentaries on some of the other epistles; also "Analysis Logica in Epistolam ad Hebræos."

ROLPACH, in *Geography*, a town of Thibet, capital of a district; 150 miles N. of Fyzabad. N. lat. 29° 21′. E. long. 82° 5′.

ROLSHUGARDE, a town of Norway; 46 miles S.S.E. of Drontheim.

ROM, an island in the North sea, near the coast of North Jutland, about eight miles long and two wide. N. lat. 55° 9′. E. long. 8° 31′.

Rom, a town of France, in the department of the Vienne; 10 miles S. of Lusignan.

ROMA, an island in the East Indian sea; about 20 miles long, and from 6 to 12 broad. S. lat. 7° 12′. E. long. 127° 12′.

ROMAGNA, a late province of Italy, bounded on the N. by the Ferrarese, on the E. by the Adriatic, on the S. by the duchy of Urbino and Tuscany, and on the W. by Bologna; about 45 miles long and 30 broad. This country, which was part of the ancient Flaminia, fell, in the fifth century, under the dominion of the Ostrogoths; whose king, Theodoric, after having taken the city of Ravenna, in the year 493, made it the place of his usual residence. In the following century, the Goths, being driven out by Belisarius and Narses, generals of the emperors of the East, Ravenna became the residence of the emperor's exarch, till the Lombards made themselves masters of it, and dispossessed the last exarch. In the year 755, Pepin, king of the Franks, having compelled Istulphus, king of the Lombards, to cede the whole exarchate, conferred it on the see of Rome. It now forms the departments of the Amone or Lamone, and the Rubicon, in the kingdom of Italy, being surrendered by the pope in 1797. See Exarch, and Ravenna.

ROMAGNANO, a town of Italy, in the department of the Gogna, on the Sesia; 15 miles N.N.W. of Novara.

ROMAGNE, La, a town of France, in the department of the Mayne and Loire; 6 miles W. of Chollet.

Romagne *sous les Côtes*, a town of France, in the department of the Meuse; 9 miles N.W. of Estain.

ROMAGNO, a town of Italy, in the Feltrin; 6 miles N.E. of Feltri.—Also, a town of the island of Sardinia; 12 miles N.N.E. of Sassari.

ROMAHIE′, a town of the Arabian Irac, on the Euphrates; 100 miles S. of Bagdad. N. lat. 31° 40′. E. long. 44° 15′.

ROMAIN, in *Husbandry*, the name of a plant, cultivated in the fields, in many parts of the world, particularly in France, and called, by our farmers, *French vetches*, or *French tares*. It is an annual plant, but a very quick grower, and is extremely good food for cattle, particularly for horses: they let these creatures feed on it all the former part of the summer, and then cut it for hay in August or September. Its short continuance in the ground makes it less valuable than saint-foin and clover; but it has this advantage over them, that it will grow on poor ground.

Romain, *Cape*, in *Geography*, a cape on the south coast of Madagascar. S. lat. 35° 38′. E. long. 49° 29′.

Romain, *St.*, a town of France, in the department of the Charente; 3 miles N.W. of Aubeterre.—Also, a town of France, in the department of the Lower Seine, and chief place of a canton, in the district of La Havre; 7 miles E. of Montivilliers. The place contains 1200, and the canton 11,569 inhabitants, on a territory of 155 kiliometres, in 28 communes.

Romain *d'Alban*, *St.*, a town of France, in the department of the Drôme; 15 miles N.N.W. of Romans.

Romain *en Jarest*, *St.*, a town of France, in the depart-

 ment

ment of the Rhone and Loire; 12 miles N.N.E. of St. Etienne.

ROMAINE, William, in *Biography*, a very popular divine of the church of England, was born at Durham in 1714, and educated at Hertford college, Oxford; from whence he removed to Chriſt-church, where he took his degrees in arts. On entering into holy orders, he became a frequent preacher before the univerſity, and was noted for his zeal in behalf of what were deemed the orthodox doctrines. He removed to London in 1749, and became lecturer at St. Dunſtan's church, Fleet-ſtreet. He was, for a ſhort time, morning preacher at St. George, Hanover-ſquare, and profeſſor of aſtronomy at Greſham college, which ſituation he ſoon reſigned. In 1764 he was choſen rector of St. Anne, Blackfriars, where, and at St. Dunſtan's, he continued to preach to large and very crowded congregations almoſt to his death, which happened in the year 1795. Towards the cloſe of life his voice was feeble, but his manner was very impreſſive. His works, which are theological, and on the Calviniſtical ſcheme, have been collected in 8 vols. 8vo. He was editor of Calaſio's Concordance to the Hebrew Bible, in 4 vols. folio, in 1749; in which, it is ſaid, he made ſome unwarrantable alterations to ſerve the Hutchinſonian doctrine.

ROMAINMOTIER, in *Geography*, a town of Switzerland, in the canton of Berne, from which a bailiwic derives its name; 11 miles S.W. of Yverdun.

ROMAINVILLE, a town of France, in the department of Paris; 5 miles E. of Paris.

ROMALE, a town of Sweden, in Weſt Gothland; 35 milies W.S.W. of Skara.

ROMAN, a town of European Turkey, in Moldavia, on the Siret, the ſee of a Greek biſhop; 145 miles W. of Bender.

Roman, *Cape*, a cape on the weſt coaſt of Eaſt Florida. N. lat. 25° 40′. W. long. 82° 25′.—Alſo, a cape on the coaſt of Chili, in the South Pacific ocean. S. lat. 48° 20′. W. long. 76° 40′.—Alſo, a cape on the coaſt of South Carolina. N. lat. 33° 5′. W. long. 79° 30′.—Alſo, a cape on the coaſt of Florida, 20½ leagues N.W. by N. from Cape Sable, the S.W. point of the peninſula of Florida.—Alſo, a cape on the north coaſt of Terra Firma, being the north point of the peninſula, which is the eaſt limit of the gulf of Venezuela. Due north of it is the iſland of Orua, or Araba, at eight or nine leagues diſtance, belonging to the Dutch.

Roman *County*, a county of North Carolina, containing 21,543 inhabitants.

Roman, ſomething belonging to the city of Rome.

Roman *Monarchy*. See Monarchy, and Rome, infra.

Roman, or *Romiſh Church*, is that of which the pope is head, ſo called in oppoſition to the reformed churches. See Papists, and Popery. See alſo Church and Reformation.

The Roman law is the civil law, or the written law, as compiled by the emperor Juſtinian.

Roman *Eccleſiaſtical Singing* and *Muſic*, during the middle ages. Theſe were in ſuch general favour throughout Europe, that it was the cuſtom, during the times of the greateſt muſical and mental darkneſs, when reaſon and reflection were the leaſt cultivated, for the prieſts, of almoſt every part of Europe, to viſit Rome, in order to learn canto fermo, and the manner of performing thoſe rites of the church, in which muſic had any concern. Even thoſe hiſtorians who are the leaſt friends to bigotry, and the moſt ready to combat ſuperſtition and papal uſurpations, allow that it was only at the court of Rome that the arts of elegance and refinement were at all cheriſhed, during theſe times. King Pepin, Charlemagne, and Alfred, had applied to the Roman pontiffs for ſinging-maſters to inſtruct their ſubjects.

The learned Juſquin went thither as a ſinger, during the pontificate of Sixtus IV. And before the year 1600, the names of near twenty Spaniſh ſingers and compoſers are recorded, who were employed in the pontifical chapel. Yet all this proves nothing more than that muſicians of great abilities, from whatever part of the world they came, were certain of encouragement there. For more facts to this purpoſe, ſee Italy.

Roman *Games*, *Ludi Romani*, were ſolemn games, held in ancient Rome, thus called by way of eminence, and on account of their antiquity, as having been inſtituted by Romulus.

They were ſometimes alſo called *magni ludi*, from the great pomp and expence of them; and ſometimes *conſualia*, becauſe performed in honour of the god Neptune, who was alſo called *Conſus*, in his quality of god of ſecret counſels.

They alſo bore the denomination of *ludi Circenſes*, becauſe held in the Circus.

This ſolemnity, Halicarnaſſeus obſerves, was originally inſtituted by Evander, in honour of Neptune, under the name of Ἱππιος, whence the feſtival itſelf was called Ἱπποκρατια; and was afterwards renewed by Romulus, in honour of the ſame deity, only under another name.

For Romulus, needing the advice of a god to counſel him in the deſign he had to furniſh his new citizens with wives, applied to the god of ſecret counſel himſelf, Conſus; proclaimed the Conſualia; and invited his neighbours all around to the firſt celebration thereof. The conſequence was the rape of the Sabine women, who came to be ſpectators of it.

The great ceremony, in theſe games, conſiſted in a cavalcade of horſes and aſſes, adorned with garlands; Neptune being reputed the firſt author of riding on horſeback.

Their horſes here were of two kinds; *viz.* πομπικοι, or ſuch as were merely led up and down for ſtate; and δρομικοι, which were for race and exerciſe.

The other diverſions were fencing, and that till one of the combatants was killed on the ſpot; fighting with beaſts, and with the cæſtus, or whirlbats; wreſtling, running, leaping, ſea-fights, horſe-races, chariot-races, &c.

Theſe games, Livy tells us, were improved, and rendered much more magnificent, by Tarquinius Priſcus. Manutius ſays, they were held on the eve of the nones of September; *i. e.* on the 14th day of the month.

Roman *Operas*. In treating of the progreſs of the muſical drama, in that ancient and renowned capital, during the former part of the 17th century, it does not appear that any regular theatre was opened there for the performance of operas; nor, indeed, can we diſcover that any ſecular muſical drama was exhibited there till the year 1632, when "Il Ritorno di Angelica nell' Indie, Drama Muſicale," is recorded by Leo Allacci, in his Drammaturgia, to have been performed in that city; but without informing us where, or by whom ſet to muſic or ſung. Several muſical dramas, however, were performed there at the palaces of ambaſſadors, and other great perſonages, between 1632 and 1661, when "Clearco," ſet by Tenaglia, a Roman maſter, was performed. This compoſer, who had diſtinguiſhed himſelf by his productions for the church, is celebrated by P. Della Valle among great Roman muſicians in 1640.

The firſt public theatre, opened for the exhibition of muſical dramas at Rome, in modern times, was il Torre di Nona, where "Giaſone" was performed, 1671. No other theatre feems to have been ufed for this purpofe in that city till 1679, when the opera of "Dov' è Amore, è Pietà," fet by Bernardo Pafquini, the famous organift, was reprefented Nella Sala de' Signori Capranica. This theatre ftill fubfifts.

ROMANS, *King of the*, in *Modern Hiftory*, is a prince elected and defigned fucceffor to the German empire.

ROMAN *Alum*. See *Roman* ALUM.

ROMAN *Balance*, *Statera Romana*, the fteel-yard.

A ROMAN *Charity*, among *Painters*, is a picture of a woman fuckling an old man.

ROMAN *Indiction*. See INDICTION.

ROMAN *Knight*, &c. See KNIGHT, &c.

ROMAN *Language*, &c. See LATIN, &c.

ROMAN *Order*, in *Architecture*, is that more ufually called the Compofite.

ROMAN *Purple* now denotes the dignity of a cardinal.

ROMAN *Roads*. See ROAD and WAY.

ROMAN *Year*, &c. See YEAR, &c.

ROMANCE, anciently *Romaunt*, and *Romant*, a fabulous relation of certain intrigues and adventures in the way of love and gallantry, invented to entertain and inftruct the readers.

M. Fontenelle calls romances poems in profe; and Boffu is not averfe to their being admitted as poetical pieces, though not written in verfe.

Setting afide the verfification, it is certain an epic poem and a romance are almoft the fame thing. The juft notion, therefore, of a romance is, that it is a difcourfe invented with art to pleafe and improve the mind, and to form or mend the manners, by inftructions, difguifed under the allegory of an action, or feries of actions, related in profe, in a delightful and probable, yet furprifing manner.

A juft romance confifts of two parts: *viz.* a moral, as its foundation, and end; and a fable, or action, as the fuperftructure and means.

It muft alfo have the manners; that is, the characters muft be diftinguifhed, and the manners muft be neceffary; and it muft have all the other qualities of poetical manners.

The incidents muft be delightful, and, to that end, rightly difpofed and furprifing. The fentiments fall under the fame rules as in the drama.

But the diction is allowed to be more lofty and figurative; as being a narration, and not having terror or pity, but admiration for its end.

A romance of chivalry, according to the definition of a late writer, is any fabulous narration, in verfe or profe, in which the principal characters are knights, conducting themfelves, in their feveral fituations and adventures, agreeably to the inftitutions and cuftoms of chivalry.

As compofitions of this kind have a long time been little elfe but hiftories of amorous adventures, and feats of knight-errantry, the origin of romances is referred to that of love-hiftories; and accordingly Dearchus, a difciple of Ariftotle, who firft wrote of thofe matters, is ufually termed the original author of romances. Though Photius is of opinion, that Antonius Diogenes's book on the errors and amours of Dinias and Dercyllis gave birth to moft of the works of this kind. Be this as it will, it is certain the ancients have had their romances as well as we. Such are the amours of Rhodanis and Simonides, defcribed in iambics; fuch is the romance of Leucippe and Clitophon, compofed by Achilles Tatius, a Greek writer, afterwards a bifhop; fuch are the Four Books of Incredible Things, written by Damafcius; fuch are the Ethiopics of Heliodorus, in which he relates the amours of Theagenes and Chariclea. Laftly, under the fame clafs may be ranked the Fables of Parthenius Nicenus, of Athenagoras, Theodorus Prodromus, Euftathius, and Longus.

Indeed antiquity could fcarce be reconciled to fuch pieces, and always looked on them as abufes. Photius, in his Bibliotheca, cod. lxxxvii. gives a frightful account of that of Tatius; and the Ethiopics of Heliodorus, though one of the moft modeft and moft referved pieces of the kind, met with a very fevere treatment. The author was bifhop of Tricca, in Theffalia, in the fourth century. Nicephorus tells us, that a fynod, confidering the danger which might accrue to youth from reading his romance, authorifed as it was by the dignity of its author, propofed it to him, either to fupprefs his book, or renounce his bifhopric; and that he chofe the latter. But this hiftory is a little doubtful.

Be this as it will, Heliodorus has ferved as a model to all the romances written fince; and the marriage of Theagenes and Chariclea has produced a very numerous iffue, even all the romances now extant in the world.

Mr. T. Warton, in his "Differtation on the Origin of Romantic Fiction in Europe," prefixed to the "Hiftory of Englifh Poetry," vol. i. is of opinion, that the peculiar and arbitrary fpecies of fiction, which we call romantic, was entirely unknown to the writers of Greece and Rome; and it appears to have been imported into Europe by a people, whofe modes of thinking, and habits of invention, are not natural to that country. Whatever be their origin, which will be a fubject of inquiry in the fequel of this article, it muft be allowed that the ancient metrical romances were very early fuperfeded by profe works upon the fame fubjects. Thefe laft, although far inferior, in intereft and merit, to the poetical tales which preceded them, claimed and obtained a fuperior degree of credit, founded upon the fiction alleged to be infeparable from metre; upon the degraded ftate of the minftrels, whofe province it was to recite thefe difparaged rhyming legends; and, above all, upon a grave pretext fet up by the author of each profe work, that he had tranflated it *verbatim et literatim* from an ancient Greek or Latin original. As no fuch Greek or Latin original for a romance of chivalry has ever been produced, we may be fafely allowed to doubt whether any fuch ever exifted. But our anceftors received thefe accounts with unhefitating credulity, and gravely read the voluminous romances of Lancelot du Lac, and Palmerin of England, as tranflations from ancient annals, while they rejected with fcorn the rhyming legends of the minftrels on the fame fubjects. Thus the metrical romances were obliged to give way to the profe works, which were, in fact, borrowed from them; and fo complete was the fubftitution of the one fpecies of fable for the other, that the prefs, which was then invented about the period of this revolution in public tafte, groaned under the fplendid folios of the former, while the latter remained in obfcure manufcripts, or were only printed in the meaneft manner, and for the meaneft of the people. Thus the very exiftence of the metrical romance, as a diftinct, feparate, and more ancient kind of compofition, was unknown and unnoticed till the publication of the works of fome modern writers.

Bifhop Percy, the venerable editor of the "Reliques of Ancient Poetry," feems to have been the firft perfon in our country who directed the public attention to this fubject, by an "Effay upon Metrical Romance," prefixed to the third volume of his work, in which the merits and qualities of the poetry and chivalry are critically inveftigated, and a lift given of fuch metrical romances as had come to his knowledge, The learned prelate was followed by Mr. T. Warton; and not to mention the collectors and publifhers of fome of the fhorter and more ancient of our metrical tales of chivalry, both in London and Edinburgh, the firſt comprehenſive and general work upon this intereſting ſubject was undertaken by Mr. Ritſon, which was ſoon ſucceeded by the more popular and elegant performance of Mr. George Ellis, entitled "Specimens of early Engliſh Metrical Romances, chiefly written during the early Part of the 14th Century: to which is prefixed a hiſtorical Introduction, intended to illuſtrate the Riſe and Progreſs of Romantic Compoſition in France and England." Mr. Ritſon's work is a ſelection of "Ancient Engliſh Metrical Romances," containing twelve metrical romances of chivalry; to which is prefixed a long and elaborate diſſertation on Romance and Minſtrelſy.

In imitation of the archbiſhop Turpinus, who paſſed for author of the romance of the Feaſts of Charlemagne and Orlando, a great number of hiſtories, of the like kind, were written in France, during the time of Philip the Fair; the authors of which ſeemed to improve on each other, contending who ſhould go fartheſt in the merveilleux. Theſe books, being intended for polite people, were written in the court language of that age, which was called the *romans*, *romant*, or *romantic;* whence the books themſelves were called by thoſe names: and thus, by degrees, *romans*, &c. became the general name of all books of this kind; whence, at length, our *romance.*

To this purpoſe, Creſcimbeni, reciting the ſeveral opinions reſpecting the name *romanza*, derives it from the word *Roma*, and tells us, that it means that vulgar idiom which, with colonies of Romans, paſſed into Provence, and elſewhere, and was eſteemed, even by the barbarians who inhabited thoſe kingdoms, and called *Romano* and *Romanzo;* and in this they wrote the acts and achievements of knights; which writings were, therefore, ſtyled *romanzi*, or *romances.*

Others derive the word from the Spaniſh *romanſero, I invent;* as intimating romances to be mere fictions. And hence it is that the ancient poets of Provence, who were the firſt great dealers in romances, are called *troubadours*, *q. d.* finders, or inventors.

Creſcimbeni remarks, that the Italians derived from Provence, not only the origin and art of writing romances, but alſo the very ſubjects on which they were founded; and though it is not preciſely known who were the romance writers of Provence, yet many of their romances are found in the Italian libraries; and, indeed, from ſuch a ſource of poetical fiction as the country of Provence appears to have been, nothing leſs could be expected than a vaſt profuſion of romances, and other works of invention. See PROVENÇAL *Poets*, and alſo MINSTRELS, with whoſe hiſtory that of romances, of which they were the compoſers, is nearly connected.

It has been a received opinion amongſt modern critics, that the fictions of romance, borrowed from the Arabians, were communicated to the Weſtern world by means of the Cruſades. Mr. Warton (ubi ſupra) is of opinion, that although theſe expeditions greatly contributed to propagate this mode of fabling in Europe, they were introduced at a much earlier period by the Saracens, or Arabians, who came from the northern coaſts of Africa, and ſettled in Spain, about the beginning of the eighth century. From Spain, he imagines, they found an eaſy paſſage into France and Italy; and the cloſe connection which ſubſiſted for many centuries between the Welſh and their coloniſts, the Armoricans, might have been the means of bringing them from France into this iſland. (See ARMORICA.) A ſtrict intimacy alſo ſubſiſted between Cornwall and Wales; and hence we are able to account for Cornwall's being made the ſcene and the ſubject of ſo many romantic adventures in the French romances. Their language, cuſtoms, and alliances were the ſame; and by Britiſh writers, Cornwall, ſeparated from Wales only by a ſtrait of inconſiderable breadth, is frequently ſtyled Weſt Wales. At the invaſion of the Saxons, both countries became indiſcriminately the receptacle of the fugitive Britons. We find the Welſh and Corniſh, as one people, often uniting themſelves as in a national cauſe againſt the Saxons. They were frequently ſubject to the ſame prince, who ſometimes reſided in Wales, and ſometimes in Cornwall; and the kings or dukes of Cornwall were perpetually celebrated in ſong by the Welſh bards. Traditions about king Arthur are as popular in Cornwall as in Wales; and moſt of the romantic caſtles, rocks, rivers, and caves, of both nations are alike diſtinguiſhed at this day by ſome noble achievements, at leaſt by the name of that celebrated champion.

Arthur and Charlemagne, according to Warton, are the firſt and original heroes of romance. And as Geoffroy's hiſtory is the grand repoſitory of the acts of Arthur, ſo a fabulous hiſtory, aſcribed to Turpin above-mentioned, is the ground-work of all the chimerical legends which have been related concerning the conqueſts of Charlemagne, and his twelve peers. Its ſubject is the expulſion of the Saracens from Spain: and it is filled with fictions evidently congenial with thoſe which characterize Geoffroy's hiſtory. Some have ſuppoſed this romance to have been written by Turpin, a monk of the eighth century, who for his learning, and ſanctity, and gallant exploits againſt the Saracens of Spain, was preferred by Charlemagne to the archbiſhopric of Rheims. Others ſuppoſe it to have been forged under archbiſhop Turpin's name, about that time; others, very ſoon afterwards, in the reign of Charles the Bald, that is, about the year 870. Hiſtorical evidence concurs with numerous internal arguments to prove, that it muſt have been compiled after the cruſades, or about the year 1110. In the two fabulous chronicles now mentioned, the foundations of romance ſeem, in Mr. Warton's opinion, to be laid. The principal characters, the leading ſubjects, and the fundamental features, which have ſupplied ſuch ample matter to this ſingular ſpecies of compoſition, are here firſt diſplayed. And although the long continuance of the cruſades imported innumerable inventions of a ſimilar complexion, and ſubſtituted the achievements of new champions, and the wonders of other countries; yet the tales of Arthur and Charlemagne, diverſified indeed, or enlarged with additional embelliſhments, ſtill continued to prevail, and to be the favourite topics. Upon the whole Mr. Warton concludes, that theſe volumes are the firſt ſpecimens extant in this mode of writing; but he conſiders the Saracens, either at their immigration into Spain, about the ninth century, or at the time of the cruſades, as the firſt authors of romantic fiction among the Europeans.

In examining the hypotheſis of Dr. Percy and Mr. Mallet, who derive theſe fictions, in a lineal deſcent, from the ancient hiſtorical ſongs of the Gothic bards and ſcalds, he allows this opinion to be in ſome meaſure well founded, and that ſo far it is alſo reconcileable with his own ſyſtem.

The ſcaldic inventions, he ſays, had undoubtedly taken deep root in Europe, and prepared the way for the more eaſy admiſſion of the Arabian fabling, about the ninth century, by which they were, however, in a great meaſure ſuperſeded. As a proof of which he obſerves, that the enchantments of the Runic poetry are very different from thoſe in our romances of chivalry. The former chiefly deals in ſpells and charms, ſuch as would preſerve from poiſons, blunt the

weapons

weapons of an enemy, procure victory, allay a tempeſt, cure bodily diſeaſes, or call the dead from their tombs, in uttering a form of myſterious words, or inſcribing Runic characters. The magicians of romance are chiefly employed in forming and conducting a train of deceptions. There is an air of barbaric horror in the incantations of the ſcaldic fablers: the magicians of romance often preſent viſions of pleaſure and delight: and although, not without their alarming terrors, ſometimes lead us through flowery foreſts, and raiſe up palaces glittering with gold and precious ſtones. The Runic magic is more like that of Canidia in Horace, the romantic reſembles that of Armida in Taſſo. The operations of the one are frequently but mere tricks, in compariſon of that ſublime ſolemnity of necromantic machinery which the other ſo awfully diſplays.

He adds, it is alſo remarkable, that in the earlier ſcaldic odes we find but few dragons, giants, and fairies. Theſe were introduced afterwards, and are the progeny of Arabian fancy. Nor, indeed, do theſe imaginary beings often occur in any of the compoſitions which preceded the introduction of that ſpecies of fabling.

That the ideas of chivalry, the appendage and the ſubſtance of romance, ſubſiſted among the Goths, our author readily allows, but not without certain limitations. It was under the feudal eſtabliſhments, which were ſoon afterwards erected in Europe, that it received new vigour, and was inveſted with the formalities of a regular inſtitution.

From the whole of his obſervations, the author deduces the following general concluſion.

Amid the gloom of ſuperſtition, in an age of the groſſeſt ignorance and credulity, a taſte for the wonders of oriental fiction was introduced by the Arabians into Europe, many countries of which were already ſeaſoned to a reception of its extravagancies by means of the poetry of the Gothic ſcalds, who, perhaps, originally derived their ideas from the ſame fruitful region of invention. Theſe fictions, coinciding with the reigning manners, and perpetually kept up and improved in the tales of troubadours and minſtrels, ſeemed to have centered, about the eleventh century, in the ideal hiſtories of Turpin and Geoffrey of Monmouth, which record the ſuppoſititious achievements of Charlemagne and king Arthur, where they formed the ground-work of that ſpecies of fabulous narrative called romance. And from theſe beginnings, or cauſes, afterwards enlarged and enriched by kindred fancies, fetched from the cruſades, that ſingular aud capricious mode of imagination aroſe, which at length compoſed the marvellous machineries of the more ſublime Italian poets, and their diſciple Spenſer.

Hearne imagines, that the old metrical romance, called "Richarde cuer de Lyon," was written by Robert de Brunne. It is probable, however, that the leiſure of monaſtic life produced many rhymers, nor is it at all unlikely, but that the monks often wrote for the minſtrels, and that many of our ancient tales in verſe, containing fictitious adventures, were written, although not invented, in the religious houſes. The romantic hiſtory of "Guy earl of Warwick" is expreſsly ſaid, on good authority, to have been written by Walter of Exeter, a Franciſcan friar of Carocus in Cornwall, about the year 1292. (Carew's Survey of Cornwall, p. 59.) The libraries of the monaſteries were full of romances. Among the many French minſtrels invited into England by Richard I., it is natural to ſuppoſe that ſome of them made their magnificent and heroic patron a principal ſubject of their compoſitions. We have a romance now remaining in Engliſh rhyme (which we have juſt mentioned) that celebrates the achievements of this illuſtrious monarch. It is called "Richard, &c." and was probably tranſlated from the French about this period. That this romance, either in French or Engliſh, exiſted before the year 1300, is evident from its being cited by Robert of Glouceſter, in his relation of Richard's reign, and alſo by Robert de Brunne, who wrote much about the ſame time with Robert of Glouceſter; and hence we may infer that Hearne muſt be miſtaken in ſuppoſing that he was the author of it.

The French, above all other nations, have applied themſelves to this kind of writing; whether it be owing to the natural taſte and genius of the people, or to the freedom, &c. with which they converſe with the women. They appear to have written metrical romances before or about the year 1200. Some of theſe ſeem to have been formed from proſe hiſtories, enlarged and improved with new adventures and embelliſhments from earlier and more ſimple tales in verſe on the ſame ſubject. They began chiefly with romances of chivalry: hence their Amadis, in twenty-four volumes; Palmerin d'Oliva; and of England, king Arthur, &c. of which we have an agreeable critique in Don Quixote.

Chreſtien of Troys wrote "Le Romans du Graal," or the adventures of Sangrale, which included the deeds of king Arthur, ſir Triſtram, Lancelot du Lake, and the reſt of the knights of the round table, before 1191. Chreſtien alſo wrote the romance of "Sir Percival," and left unfiniſhed "La Charette," containing the adventures of Lanucelot. The firſt French writers of romance were the *Troubadours*; which ſee.

The later romances are much more polite; the beſt of which are the Aſtrea of d'Urfe; the Cyrus and Clelie of Mademoiſelle de Scuderi; the Caſſandre and Cleopatre of La Calprenede; Ariane, Francion; and the Adventures of Telemachus, by the late archbiſhop of Cambray, worth all the reſt.

The Germans, too, have their romances; eſpecially Hercules and Herculiſcus, the Aramena, Octavia, Arminius, Otbert, &c.

The Italians have their Eromena, by Biondi; the works of Loredano, Marino, &c. The Spaniards, who, from their temper and conſtitution, were extravagantly fond of chivalrous exerciſes, had their Amadis of Gaul, their Diana, and Don Quixote. Some critics have even ſuppoſed, that Spain, having learned the art of romance-writing from their naturalized gueſts the Arabians, communicated it at an early period to the reſt of Europe. The Engliſh, their Arcadia, &c. And in modern times, the number has been ſo great, that our circulating libraries are full of them.

The Argenis of Barclay is rather a ſatire than a romance.

Although we owe to the Norman minſtrels the greater part of the romances now extant, which were avowedly tranſlated into Engliſh, as ſoon as that language ſuperſeded the French; yet ſome few were moſt probably originally compoſed in Engliſh for the uſe of the Scottiſh court, where French was never excluſively ſpoken, and afterwards imitated or tranſlated by French minſtrels. Hence it is curious to obſerve, that as the earlieſt French romances were written in England, ſo the earlieſt Engliſh romances were compoſed in Scotland.

Mr. Ellis makes an arrangement of romances into claſſes, introducing each with appropriate remarks. The firſt claſs comprehends romances relating to king Arthur; which were probably the earlieſt in order, and were moſt popular and numerous. The next claſs included what he has ventured to call Saxon romances, that is, romances referring to Saxon ſubjects, and claiming, perhaps, ſome foundation in the hiſtory of that people. Guy of Warwick and Bevis of of Hamptoun occupy this station entirely. These two, notwithstanding their demerits, equalled, or excelled in popularity, almost all the romances of the middle ages. The next is entitled an Anglo-Norman romance, and recites the adventures of no less a person than Richard Cœur de Lion. The next class of romances comprehend such as relate to Charlemagne and his Paladins. Under this head Mr. Ellis has enumerated three, *viz.* Roland and Ferragus, Sir Otuel, and Sir Ferumbras. The next romance is of oriental origin, being the earliest tradition of the Seven Wise Masters, long known among the school-boys of this country. To this he has added ten miscellaneous romances, which we must content ourselves to pass over without mentioning their names. The importance of the ancient metrical romances in an historical point of view must be acknowledged. They hold out to us, like Shakspeare's plays, the abstract and brief chronicles of the time, and demand the consideration of every historian. Even in a literary point of view, their merit is not contemptible. It is true, the story is generally rambling and desultory, utterly incapable consequently of exciting the pleasure arising from a well-conducted plan, all the parts of which depend upon each other, and tend, each in due degree, to bring on the catastrophe. So far is this from being the case, that in a long romance, the adventures usually are all separated and insulated; only connected with each other, by their having happened to the same hero; just as a necklace of beads is combined by the thread on which they are strung. This arrangement, in fact, best suited the reciters, whose narration was to be proportioned to the time and patience of their audience; and whom this loose structure of story permitted to use freedom of compression or dilatation as best suited their purpose, since any single adventure might be inserted without impropriety, or left out without being missed. The same cause accounts for the loose and often tedious style in which the minstrels indulged. It was of consequence that their stanza should be so simple, as to be easily recollected, and their diction so copious, as not to suffer by any occasional deficiency of memory. For these reasons, Robert de Brunne tells us, that the common minstrels were unable to repeat tales written in a concise style and complicated stanza, and that such became *naught* in their imperfect recitation. To these faults, we have often to add those of extreme awkwardness of contrivance and improbability of incident; but which neither offended the taste, nor shocked the faith of our plain and hardy ancestors. On the other hand, there is a sort of *keeping* in these ancient tales, which did not depend upon the minstrel's inclination, and from which he could not have departed, if he had a mind to do so. This arises from his painting the manners of his own time, as they passed before his eyes, and thus giving a truth and unity to the chivalrous events he relates, which the modern labourers in the vineyard of romance are utterly unable to imitate. With all the pains these last can use to deck their champions in the antique taste, they are perpetually confounding the past time with the present, and are guilty of anachronisms almost as gross as his who introduced a tea-table scene into the history of John of Gaunt. Neither is the language in which these legends are told altogether unworthy of our applause. There often occur passages, which, from the spirit of the poet rising with the situation, may justly claim a rank among the higher and more masculine orders of poetry. And although, as we have already noticed, the general conduct of the story is desultory and slightly put together, yet many of the individual adventures, of which each long romance is composed, are happily conceived and artfully executed. The gloom of superstition likewise added a wild and dismal effect to the wonders of the minstrel; and occasionally his description of supernatural events amounts nearly to sublimity. See Warton, Ritson, Ellis, ubi supra, and Edinb. Review, N° XIV.

ROMANCHE, La, in *Geography*, a river of France, which runs into the Drac, a little above Grenoble.

ROMANENGO, a town of Italy, in the department of the Upper Po; 4 miles E. of Crema.

ROMANIA, a province of European Turkey, containing the territory anciently denominated "Thrace," and deriving its present name from New Rome, by which Constantinople was distinguished. The Turks call it "Rumelia" or "Rumili," and "Icella;" and it is also denominated "Romelia." This province is bounded on the N. by Bulgaria, on the E. by the Black sea, on the S. by the sea of Marmora and the Archipelago, and on the W. by Macedonia. It is upon the whole a level country, though famous for some of its mountains: such are mount Hæmus, which separates it on the N. from Bulgaria; Rhodope, celebrated among the ancients for the catastrophe of Orpheus; and mount Pangæus, which divides this country from Macedonia. The two former are long ridges of mountains, that extend from the frontiers of Macedonia to the Black sea. The territories that lie among the mountains are cold and barren; but those near the sea are pleasant and fertile, producing all kinds of grain, and particularly rice of good quality. This country was anciently divided into several independent kingdoms: and the Thracian Chersonesus was also governed by its own kings. The present inhabitants are Greeks, descended from the ancient Thracians, interspersed with Turks. Thrace (which see) was formerly distinguished by the cultivation of the sciences and fine arts: but the present state of Romania is very different, being wholly destitute of persons of literature. It is governed by three Sangiaks, and divided into as many districts under the denomination Sangiacates. The capital is *Constantinople*, which see.

Romania, *Cape*, a cape on the S.E. point of Malacca. N. lat. 1° 18′. E. long. 104° 15′.

ROMANO, Giulio, in *Biography*, the cognomen of Giulio Pippi, the most renowned among the immediate scholars of Raphael d'Urbino, his heir, and the continuator of his works. He was born at Rome in the year 1492. While a pupil, he followed less his master's delicacy than energy of character, and chiefly signalized himself in subjects of war and battles, which he represented with equal spirit and erudition. As a designer, he commands the whole mechanism of the human body; and, without fear of error, turns and winds it about to serve his purposes, but sometimes oversteps the modesty of nature. Vasari, who visited him at Mantua, prefers his drawings to his pictures, as being more full of that original fire which distinguishes his conception, and was apt to evaporate in the longer process of finish: some have, with better evidence, objected to the character of his physiognomies, as more sagacious than enamoured, less simple than vulgar, and often dismal and horrid, without being terrible. In colour, whether fresco or oil, his hand was as expeditious, and his touch, especially in the former, as decided, as his eye and choice were congenial. Bricky lights, violet demi-teints, and black shades, compose in general the raw, opaque tone of his oil pictures; far different from that characteristic tone which signalizes the Battle of Constantine, painted by him from the design and after the death of Raphael, and which was by Poussin admired as being most happily adapted to the subject. The style of his draperies is classic, but the arrangement of the folds generally arbitrary and mannered; the hair and head-dresses of his women are always fanciful and luxurious, but not

not always arranged by taste; whilst those of his men frequently border on the grotesque.

After he had completed the Hall of Constantine in the Vatican from the design of his master Raphael, he went to Mantua, where the increased practice and authority, derived from the superintendance of the great works he had just completed, established his reliance on himself; and the patronage of the Gonzaghi roused that loftiness of conception, and gave birth to those magnificent plans, from which Mantua and the palace *del T.*, as from enchantment, rose. To the stores of antique treasures belonging to this great family, of which the statues, busts, and basso-relievos at present in the academy are but insignificant remains, he added his own; rich in designs of Raphael, and in studies and plans from the antique. No designer ever possessed such industry with so much fire, so much consideration with such fecundity, or combined with equal rapidity such correctness, with great recondite knowledge in mythology and history, and that popularity and care in treating it.

The palace *del T.* furnishes specimens in every class of picturesque imagery. Whatever be the dimension, the subject, or the scenery, minute or colossal, simple or complex, terrible or pleasing, we trace a mind bent to surprise or to dazzle by poetic splendour; but sure to strike by the originality of his conception, he often neglects propriety in conducting his subjects, considered as a series: and in the arrangement or choice of the connecting parts, hurried into extremes by the torrent of a fancy more lyric than epic, he disdains to fill the intermediate chasms, and too often leaves the task of connection to the spectator.

In this palace, Giulio adopted the method of his master. He prepared the cartoons, and the pictures were executed by his pupils; but he retouched, corrected, and gave the last finish to them: unfortunately, his master-strokes have been covered again by modern pencils; and the fable of Psyche, the Allegories of Human Life, the Giants storming Heaven, exhibit now indeed his composition and design, but not his hand: this is better preserved in the paintings of the old palace, or, as it is now called, the Corte of Mantua; which are in fresco, and relate chiefly the histories of the Trojan war. They have the same beauties and defects as those of the palace *del T.*: each singly considered is a proof of the poetic spirit and the practical powers of the master; as a cyclus they want connection and evidence. Helen sleeping, Vulcan forging Arms for Achilles, are beautiful; and Minerva in the act of slaying Ajax, the son of Oileus, sublime. Nor is his versatility less admirable in the Bacchic or amorous subjects; the *capricci* and grotesque conceits with which he decorated the small cabinets of the same palace.

The altar-pieces of Giulio are not numerous. He did not live to finish those which he had begun for the cathedral of Mantua. The most remarkable of those which he finished with his own hand, are the three frescoes at St. Marco; and in the church of St. Cristofero, the athletic figure of that saint, groaning under the weight of the divine Infant on his shoulders. They are, however, far inferior, for genuine pathos and classic execution, to the Martyrdom of St. Stephen, on the head altar of the church of St. Stephen at Genoa.

Of Giulio's scholars and assistants, the most celebrated were F. Primaticcio, chiefly employed in the stuccoes and ornaments of the palace *del T.*; Benedetto Pagni of Pescia, who accompanied Giulio from Rome to Mantua; and Rinaldo Mantovano, the most expert of the three, and in the opinion of Vasari, who laments the shortness of his life, the greatest painter that Mantua ever produced; the altar-piece of Sta. Agostina alla Trinita has a grandeur of style above his age, and has by some been suspected to be the design of Giulio. To these may be added Fermo Guisoni, who coloured in the cathedral the Call of St. Peter and St. Andrew, from the most studied and most beautiful cartoon of the master; and Theodore Ghigi, or as he subscribes himself, Theodore Mantovano, a great designer, and so practised in the style of Giulio, that after his death he was selected by the prince to finish several of his works.

In addition to his powers as a painter, Giulio Romano possessed a very considerable knowledge of the principles of architecture; and was employed in plans for several of the palaces at Rome and Mantua. His last architectural exertion was the erection of a splendid mansion for himself at Mantua. Vasari relates, that upon the death of San Gallo, the architect of St. Peter's, Guilio was selected by the pope for his successor, but was prevented leaving Mantua by the interest of the cardinal Duke, and the entreaties of his wife and her immediate friends and relations; and whilst he was endeavouring to surmount these difficulties, and enjoy the proffered honour and emolument, he was seized with illness, and borne to the grave in the year 1546, and in the 54th of his age. He left a son, called, after his respected master, Raphael, of whom nothing remains, but the tradition that he possessed talents worthy of his father. He died in 1560, at the age of 30. Fuseli's Pilkington.

ROMANO, in *Geography*, a town of Italy, in the department of the Adda and Oglio; 11 miles S.S.E. of Bergamo.

ROMANO, or *Ramano Cayo*, a small island off the N. shore of the island of Cuba; it is long and narrow, and lies at the E. extremity of the cluster of isles called the King's Garden.

ROMANO, *St.*, a town of Italy, in the department of the Panaro; 18 miles S.W. of Modena.

ROMANOV, a town of Russia, in the government of Jaroslavl, on the Volga; 16 miles W.N.W. of Jaroslavl. N. lat. 57° 46′. E. long. 39° 40′.

ROMANOVA, a town of Russia, in the government of Irkutsk, on the Angara; 60 miles W.S.W. of Ilimsk.—Also, a town of Russia, in the government of Tambov, on the Olonetz; 16 miles S. of Lipetzk.

ROMANOVKA, a town of Russia, in the country of the Cossacks, on the Don; 116 miles E.N.E. of Azoph.—Also, a town of Russia, in the government of Upha; 64 miles N.E. of Orenburg.

ROMANOW, a town of Russian Poland, in the palatinate of Kiev; 8 miles N.E. of Zytomiers.—Also, a town of Austrian Poland, in Galicia; 33 miles W. of Przemyl.—Also, a town of Lithuania, called also Romanowo, in the palatinate of Novogrodek; 18 miles N. of Sluck.

ROMANS, a town of France, in the department of the Drôme, and chief place of a canton, seated on the Isere; two posts N.E. of Valence. The place contains 6173, and the canton 15,180 inhabitants, on a territory of 225 kiliometres, in 11 communes. N. lat. 45° 2′. E. long. 5° 8′.

ROMANS, *Romant*, *Romanic*, or *Romance*, the polite language formerly spoken at the court of France; in contradistinction to the *Waloon*, or ancient Gaulish, spoken by the common people.

The Romans having subdued the Gauls, introduced part of their language among them; and a mixture of half Latin, half Gaulish, or Celtic, constituted the Romans; of which the modern French is only an improvement.

Hence, to *enromance* was to write in romance, &c. See ROMANCE.

Covarruvias, a learned Spanish writer, observes, that the name romance is generical, and belongs alike to the Tuscan, French, and Spanish; inasmuch as all these were derived from the purity of the Latin tongue, which the Romans, being conquerors, introduced into these provinces, and which, at first, the nobles spoke and wrote. He further says, that the Latin tongue, being admitted into Spain, was spoken as in Rome, and that there were men well skilled in it, who spoke and wrote it with greater refinement than the vulgar; but upon the irruption of the Goths it was remarkably corrupted: that which was before *Roman* was converted into *Romance*, which is equivalent to its being derived from the Romans. And it farther appears, that the name *Romance* was given to the Spanish language, to distinguish it from the Gothic.

Mr. Planta, in his elaborate account of the Romansh language (Phil. Transf. vol. lxvi. part i. p. 129, &c.), which is now spoken in the most mountainous parts of the country of the Grisons, near the sources of the Rhine and the En, informs us, that this language consists of two principal dialects; which, though partaking of the same general name, differ so widely as to constitute in a manner two distinct languages. One dialect, he says, which is spoken in the Engadine, a valley extending from the source of the En to the frontiers of the Tyrolese, is by the inhabitants called *Ladin*. And he observes, that the Romansh has never been used in any regular composition in writing, till the sixteenth century, nor affected by any foreign invasion, or intimate connection: but that it is at present the identical language that was spoken two hundred years ago.

This learned writer observes, that notwithstanding the variety of conjectures and controversies, which have occurred with regard to the Gallic Romance, it is agreed on all hands, that the vocabulary of the Roman, and the idiom of the Celtic, have chiefly contributed to its formation; and, therefore, that it partakes of a common origin with that of the Grisons. He adds, that there are incontestible proofs that this language was once universal through France, and that this, and not immediately the Latin, hath been the parent of the Provençal, and afterwards of the modern French, the Italian, and the Spanish.

From a comparison of the two Romances, as well as from the similarity of their origin, Mr. Planta infers, that they are one and the same language.

However, whilst the Grisons neglected to improve their language, or had no opportunity for this purpose, the taste and fertile genius of the troubadours, fostered by the countenance and elegance of the brilliant courts and splendid nobility of Provence, did not leave theirs long in the rude state in which we find it in the ninth century. But the change being gradual, and almost imperceptible, the French historians have fixed no epocha for the transition of the Romance into the Provençal. Nevertheless, it appears, that the former language had received no considerable alteration in the twelfth century, and it still bore the same name. But after this era, though the name occurs, the language distinguished by it is very different from the Romance of the ninth century. Allowing, however, the universal use of the Romance all over France till the twelfth century, and that what the writers of those times say of the Gallic, is to be understood of the Romance, of which there is sufficient evidence, it follows, says Mr. Planta, that the language introduced into England under Alfred, and afterwards more universally established by Edward the Confessor, and William the Conqueror, must have been an emanation of the Romance, very near akin to that which is now spoken in the Alps.

According to Du-Cange, the Romance had also penetrated into Scotland before the twelfth century. The same corruption, or coalescence, which gave rise to the Gallic Romance, and that of the Grisons, must also have produced, in Italy, a language much resembling, if not perfectly similar, to those two idioms. It appears also, from what has been already said, that the language of the Romans penetrated very early into Spain, and that the Romance was very common in that kingdom. The universality of the Romance in the French dominions, during the eleventh century, accounts for its introduction into Palestine, and many other parts of the Levant, by Godfrey de Bouillon, and other adventurers, who engaged under him in the crusades.

This writer farther adds, that the heroic achievements and gallantry of the knights of the Cross gave rise to a swarm of fabulous narrations, which, though not an invention of those days, were yet, from the name of the language in which they were written, ever after distinguished by the appellation of Romances. And he presumes, that the Romance hath been preserved so near its primitive state, not only in the country of the Grisons, but in several other remote and unfrequented parts.

Mr. Berington, in his "Literary History of the Middle Ages," recently published, observes, that the language afterwards known by the name of French, was divided into two dialects, both of which bore the name of "Romane," or Romance, because each was formed on the basis of the Roman: that to the north being adulterated by a mixture of Frankish and Norman words; whilst the dialect of the south was vitiated by words transferred from the language of the Ostrogoths, Visigoths, and Alani. The river Loire, not rigidly taken, was their common boundary. The first might be called the "French Romane," the latter the "Provençal," because it was spoken by the subjects of Raimond, count of Provence, well known in the armies of the crusaders. The characters of these dialects, however, though owning a common source, were marked by strong lines of difference. The Provençal, from a milder climate, from a more constant intercourse with strangers, and from a closer affinity to the mother tongue, was soft and harmonious: the French more harsh, as retaining more of its northern mixture. But if we mention the countries in which these languages were current in the 13th century, it will be seen that the Provençal was confined within the limits above assigned it; while the French Romane, overflowing its natural boundaries, became familiar to distant nations. It passed with the conquerors into England, where it was previously fashionable. The Norman settlers rendered it familiar at Naples and in Sicily; though here it was soon vanquished by the superior fascination of the Italian dialect. The crusaders carried it into the East, and planted it in Syria, in Palestine, in Cyprus, and at Constantinople, where it was at least as permanent as the conquests which they had made.

ROMANTRINO, in *Geography*, a town of Italy, in the Novarese; 4 miles E.N.E. of Novara.

ROMANUS I., Lecapenus, in *Biography*, emperor of the East, rose from an obscure origin to various employments under Leo the philosopher, and was, at one time, possessed of the command of the naval armies. Having rendered himself all-powerful at court, he persuaded the prince Constantine to marry his daughter, banished the empress-mother Zoe to a monastery, and in 919 caused himself to be crowned emperor by the patriarch. He associated his three sons in the imperial authority, and ordered their names, with his own, to be placed in all edicts before that of the lawful emperor Constantine. The adherents of the latter made some attempts to free him from this servitude, but they were

were fruftrated and punifhed. During thefe inteftine difturbances, Simeon, king of Bulgaria, renewed his inroads on the empire, and penetrated to the gates of Conftantinople. Romanus brought him to accede to terms of peace, and the Roman admiral, about this time, entirely deftroyed a Saracen fleet in the harbour of Lemnos. Simeon dying in 927, his fon Peter refumed hoftilities, and broke into the Conftantinopolitan territory, but peace was concluded, and a marriage entered into with the emperor's grand-daughter to the Bulgarian king. An invafion of the Roman dominions in Afia by the Syrian Saracens was repulfed by the imperial general; and the commanders of the armies of Romanus had equal fuccefs againft the Ruffians, who had ravaged the empire with a numerous fleet. In the mean time, Romanus loft his eldeft fon Chriftopher, and the two remaining brothers quarrelled with each other, and with their father. The youngeft fon of Romanus formed a confpiracy for his father's dethronement, and in December 944, his apartment was entered by night, and he was conveyed to an ifland of the Propontis. He there affumed the religious habit and life, and died in 946 in this retreat, a true penitent for the injuftice which he had inflicted upon Conftantine. Previoufly to his deceafe, his two fons were banifhed to the fame ifland, whom he reproached, when he met them on the beach, for their ingratitude and unkindnefs to him, neverthelefs he very readily allowed them to fhare of his water and vegetable diet. Lecapenus does not appear, fays Gibbon, to have poffeffed either the virtues or vices of a tyrant. The fpirit and activity of his private life diffolved away in the fun-fhine of the throne; and in his licentious pleafures, he forgot the fafety both of the republic and of his family. Of a mild and religious character, he refpected the fanctity, the innocence of youth, the memory of his parents, and the attachment of the people. Univer Hift. Gibbon.

Romanus II., called *the Young*, fucceeded his father, Conftantine Porphyrogenitus, in 959. He had married Theophano, a woman of mean origin, who was charged with having been chiefly inftrumental in the alleged crime of poifoning his father. Romanus was fuppofed to poffefs confiderable talents, but he was habitually attached to frivolous amufements and diffolute pleafures, and refigned all care of the ftate to his chief chamberlain. In the morning, this luxurious emperor vifited the circus; at noon he feafted the fenators; the greateft part of the afternoon he fpent in the tennis-court, the only theatre of his victories; from thence he paffed over to the Afiatic fide of the Bofphorus, hunted and killed four wild boars of the largeft fize, and returned to the palace, proudly content with the labours of the day. He banifhed from court his mother Helena, and his two fifters, who were reduced to a ftate of great indigence.

During the fhort reign of this emperor, the two brothers, Nicephorus Phocas and Leo, obtained great fucceffes againft the Saracens in Crete and the Eaft, while the emperor was wafting his time in indolence. According to fome hiftorians, debauchery, but according to others, the evil practices of Theophano, brought his life to a clofe in the year 963, at the age of twenty-four, and in the fourth year of his reign. Univer. Hift. Gibbon, vol. ix.

Romanus III., named *Argyrus*, a patrician of an ancient family, was nearly related to Conftantine IX. During the laft illnefs of that emperor, he was offered his daughter Zoe for a wife, with the title of Cæfar. He would readily have declined the high honour intended for him, but was told the lofs of his eyes or his life muft be the confequence of his refufal. His wife, devoted to his welfare, as well as ardently attached to his perfon, made way for a new marriage, by retiring herfelf to a convent, and in 1028 Romanus efpoufed the princefs Zoe. On the death of Conftantine he fucceeded to the imperial throne, and began his reign by eafing the people of fome of their taxes, and performing other popular acts. In the fecond year of his reign, the Saracens having invaded Syria, the emperor refolved to march in perfon againft them, but he was defeated, with the lofs of his baggage, and a great part of his army. After his return, feveral public calamities in the empire followed, which occafioned him entirely to apply his mind to works of piety. In the mean time the emprefs Zoe, who, at an advanced age, continued to follow a licentious courfe of life, attached herfelf to a new lover of mean birth, whom fhe wifhed to raife to the purple, and fhe juftified the Roman maxim, that every adulterefs is capable of poifoning her hufband. To effect her purpofe, fhe caufed the deadly cup to be adminiftered to her hufband; and finding it too flow in its operation, fhe employed an affaffin, who fuffocated him in the bath. He died in 1034, after a reign of five years and a half. Gibbon. Univer. Hift.

Romanus IV., named *Diogenes*, a defcendant of Romanus Argyrus, in the regency of Eudocia, widow of Conftantine Ducas, engaged in a confpiracy for raifing himfelf to the throne, for which he was tried and condemned to death. This punifhment, on account of his fine perfon, was commuted for a fhort exile, after which the imperial widow nominated him to the command of her armies, and in 1067 fhe married him, and he was proclaimed emperor. He had not occupied the throne more than two months, before he put himfelf at the head of the few troops he could affemble, and croffed the Hellefpont to attack the Turkifh fultan, who had made incurfions into his territories. He came up with the Turks, who were retiring loaded with rich fpoils. He attacked and routed them with great flaughter, and purfuing his blow, recovered Aleppo and Hierapolis. In the two following campaigns, Romanus difplayed his military talents to great advantage, and finally drove the Turks acrofs the Euphrates. In the fourth campaign he led a numerous army to the deliverance of Armenia. After this he fhared in defeat, and was, in a general engagement, left alone, almoft in the midft of his enemies, and was taken prifoner by the Turkifh fultan, who obliged him to fign an humiliating treaty, and then fet him at liberty. During his misfortunes, a revolution was effected at Conftantinople: Eudocia had been driven from the throne, and fhut up in a monaftery; and her eldeft fon, Michael Ducas, had been proclaimed emperor. Romanus was dethroned, and his eyes torn out with circumftances of fo much cruelty that he foon died. This happened in 1071, after a reign of three years and eight months. Univer. Hift.

Romanus, pope, was elected to that dignity in the year 897, upon the expulfion of Stephen VI. and VII. Little is recorded of him: he is faid by Platina to have annulled the acts of his predeceffor, and, in particular, to have declared his proceedings againft the corpfe and memory of pope Formofus unjuft and illegal. Romanus' dignity was of very fhort duration; he died before he had been in poffeffion of it quite four months. Bower.

ROMAON, St., in *Geography*, a town of Portugal, in the province of Beira; 19 miles S.S.E. of Vifeu.

ROMBACH, a town of the duchy of Wurzburg; 2 miles N. of Hasfurt.

ROMBLON, or Romblino, one of the fmaller of the Philippine iflands, about 30 miles in circumference. N. lat. 12° 40′. E. long. 121° 58′.

ROMBOUTS, Theodore, in *Biography*, a native of Antwerp, and born in 1597, was a painter of very confiderable merit. At firft he ftudied under Abraham Janfens; but

but in his 20th year he went to Italy, and there began his career as an historical painter. He was patronized by the duke of Tuscany, and painted several large compositions for that prince, who honoured and rewarded him handsomely. On his return to Antwerp he found Rubens in possession of full fame; and soon perceived how difficult it was for him to meet with that degree of estimation at home which he had received abroad. A noble emulation, however, stimulated him to enter the lists with that great master; and though he certainly was not adequate to the combat, yet he exhibited considerable prowess, which even Rubens acknowledged.

As he died at the age of 40, his works are not numerous. The principal ones, among those executed after his return from Italy, were painted for the court-house of Ghent.

He likewise painted pictures of low subjects, such as mountebanks and their attendants, soldiers playing at cards, &c. &c.; which he did as pastime, or merely to acquire money, but they are not among his best performances. On the historical pictures he produced, his reputation rests for support, and is upheld to a considerable rank.

ROME, ROMAN EMPIRE, *&c.* in *Geography* and *History.* The ancient city of Rome, situated on the river Tiber, in east longitude 13°, and about 41¾° of north latitude, though in its origin one of the most humble of cities, was destined to become the capital of the largest empire in the ancient world. In modern history it has been famous for being the centre of an ecclesiastical tyranny, under which, for many centuries, the greater part of what may be denominated the civilized world was held in subjection. The city of Rome, without dispute, was founded by Romulus; but we may trace the origin of its inhabitants, that is, of the ancient Romans, to Æneas, the hero celebrated in Trojan story. When the Greeks became masters of Troy, Æneas, with the forces under his command, retired into the fortress, which, for some time, they defended with great bravery; but being at length compelled to yield, he conveyed away his gods, his father, wife, and children, and fled, with a numerous crowd of Trojans attached to him, to the strong places of mount Ida. Here, however, his enemies followed him, and he was obliged to negociate a peace, the terms of which forced him to quit the Trojan territories altogether: the Greeks, on their part, engaged not to molest him in his retreat. Æneas accordingly equipped a fleet, in order to seek a settlement in some foreign land. The Trojan having crossed the Hellespont, arrived in the peninsula of Pallene, where he built a city, calling it, from himself, Æneia, and left in it a part of his followers. From thence he sailed to Delos, and thence to Cythera, where he erected a temple to Venus. He built another, to the same goddess, in Zacynthus, and in this island he instituted games, named "the races of Venus and Æneas." Wherever the Trojan hero went he left memorials of himself, and in the time of Dionysius these were still existing in the places already mentioned, and in many others, as at Leucas, Actium, Dodona, &c. which were accordingly regarded as indisputable proofs of the reality of Æneas' voyage to Epirus: and "that he came into Italy," says Dionysius, "we have the concurrent testimony of all the Romans; the ceremonies they observe in their sacrifices and festivals bear witness to it; also the Sibylline books, the Pythian oracles, and many other things that nobody can reasonably reject as fable."

Æneas first landed in Italy, after crossing the Ionian sea, at Cape Minerva, in Japygia; from thence he went to Drepanum in Sicily, to which place Elymus and Ægystus, who had escaped from Troy a little before him, had brought a Trojan colony. Æneas augmented this colony, by leaving a part of his own followers; and then crossing the Tyrrhenian sea, he bent his course for Italy. He gave the name of Palinurus to the cape at which he first landed, from one of his pilots, who died there. From this place he sailed to several other parts, till at length the Trojan prince, and his faithful attendants, finished their long voyages on the coast of Latium, a small territory on the east side of the river Tiber, which now contains a part of the present Campagna di Roma. Latinus was the king of the country, and the people of it were called Latins. Here Æneas and his followers undertook to raise a second Troy, hoping that they had arrived at the end of their adventures.

When Æneas arrived in Italy, Latinus was engaged in a war with the Rutuli, but his success was very doubtful: he accordingly assigned to Æneas and his followers a track of land for their settlement, upon condition that they should join their arms to his against the Rutuli, who were to be considered as their common enemy. Æneas accepted the conditions offered, and complied with his engagement so faithfully, that Latinus reposed in him the most unbounded confidence, and gave him in marriage his only daughter, Lavinia, thus securing to him the succession to the throne of Latium; hence Æneas changed the name of his camp from Troy, and called it Lavinium, in honour of his wife. The Trojans followed the example of their leader, by making alliances with Latin families; so that in a very short time they became one nation, united by the closest bonds.

There was, however, a cause for considerable strife excited by this union: Turnus, nearly related to the queen, and who had been brought up by Latinus, had entertained hopes of having Lavinia for his wife; when, therefore, he saw that princess given to Æneas, he instantly joined the Rutuli; but in the first battle after this confederacy, both Turnus and Latinus were slain: the consequence of this was, that Æneas came into quiet possession of the kingdom of Latium, which he governed with great wisdom, and transmitted to posterity. His reign was, however, short; but during that period he established the worship of the gods of his own country, and to the religion of the Latins he added that of Troy. The two palladiums, which had been the protectors of that city, became the tutelary deities of Lavinium, and, in after ages, of the whole Roman empire. He introduced, likewise, the worship of Vesta, and appointed certain virgins, called, from her, Vestals, to keep a fire burning in honour of the goddess. Many other deities, who had been reverenced in Troy, became probably known to the Latins by means of Æneas, which might be the occasion of his being designated by the appellation of the *pious* Æneas. This hero was, at length, obliged to head the united forces of the Latins and Trojans against the Rutuli, who had formed an alliance with Mezentius, king of the Tyrrhenians. A battle ensued, which lasted till night, when Æneas, being pushed to the banks of the Numicus, which was a boundary of Lavinium, and being forced into that river, was unfortunately drowned. The Trojans had, however, address enough not only to conceal his body, but to pretend that, instead of his having been drowned, he was suddenly taken up to heaven, where, in the character of a deity, he was overlooking the conduct of his subjects: who, in honour of the newly-formed god, erected to him a temple, under the title of "Jupiter Indiges."

Upon the death of Æneas, he was succeeded by his son Euryleon, named also Ascanius and Iulus, who contended with Mezentius, and in the end obliged him to sue for peace, which was granted, upon condition that for the future the river Tiber should be the boundary between the Latin and

and Etrurian territories. Afcanius was the fon of Æneas by his firft wife, and of him Lavinia, who was left pregnant by Æneas, began to be jealous, and retired to the woods, where fhe was delivered of a fon, which, from the place of his birth, fhe named Silvius. Afcanius after a time difcovered the place of Lavinia's retreat, and perfuaded her to return; from this time he treated Silvius not only as a brother, but refigned to him the kingdom as his rightful inheritance, and built for himfelf a capital to a new ftate, which he called *Alba Longa*. After he had reigned twelve years in his new kingdom, Afcanius died, leaving a fon, named Iulus, between whom and Silvius the right of fucceffion lay, the latter being the fon, and the former the grandfon of Æneas. At length the two kingdoms were united under Silvius; and as a compenfation to Iulus, he was appointed to fovereign power in matters relating to religion, a power which thenceforward continued in his family. Silvius was fucceeded by thirteen kings of the fame race, who reigned, it is faid, though with no great probability, during a fpace of 400 years. Of thefe little certain can be known; one of them, it appears, was named Tiberinus, who engaged in a war which proved fatal to him; for, in a battle which was fought on the banks of the Albula, he was forced into that river and drowned, whence the river was afterwards named the Tiber, which appellation it has borne ever fince. Agrippa fucceeded Tiberinus, and after him Alladius reigned, who was followed by Aventinus, who left his name to a certain hill, in which he was interred. Procas, the fucceffor of Aventinus, was father of Numitor and Amulius, and at his death he bequeathed the throne to Numitor. This prince was driven from the government by Amulius, who, to fecure it for himfelf, murdered Ægeftus, Numitor's only fon, and forced his daughter, Rhea Sylvia, to devote herfelf to the worfhip of Vefta, by which fhe was obliged to perpetual virginity. Her virtue, it was feigned, was violated by the god Mars; the confequence of which was, that fhe was delivered of two fons, who were placed in a wooden trough, and fent floating down the Tiber. From this dangerous fituation they were refcued by Fauftulus, the king's fhepherd, and fuckled by his wife Acca Laurentia, who, for her want of good conduct, was named *Lupa*, a circumftance that gave rife to the fable of the twins having been fuckled by a fhe-wolf.

Great care was taken of their education, and as they grew up they exhibited fomething in their appearance and behaviour, that denoted them to be above the common race of fhepherds: and at length Fauftulus difclofed to them their real defcent, which infpired them with the ambition of doing fomething worthy of their high birth. They had already obtained the names of Romulus and Remus, and before they had arrived at the age of manhood they had taken part in a quarrel between Amulius and Numitor, in which the former was depofed and killed, and the latter placed on the throne of Alba. Numitor, in gratitude for their fervice, advifed them to undertake the founding of a new colony; and to affift them in the project, he beftowed upon them thofe lands near the Tiber where they had been brought up, fupplied them with all kinds of inplements for breaking up the ground, and with flaves and cattle, and granted full liberty to his fubjects to join them.

For the more fpeedily carrying on their work, it was thought proper to divide thofe who were employed in it into two companies, one under each brother; a circumftance which, however well intended, gave birth to two rival factions, which openly manifefted themfelves when the choice was to be made of a place for the building of their new city, the one being for the mount Aventine, and the other for the Palatine mountain: difputes on the fubject came at laft to open hoftilities, and Remus was killed. By what means his death happened is not certain; but according to Livy he was killed by the hand of his brother.

Regal State of Rome.—Romulus, being now at the head of the colony, applied all his talents to the rearing of the new city, which he propofed to call after his own name. He fixed upon mount Palatine for its fituation, and performed all thofe ceremonies which were connected with the fuperftition of the Etrurians. As to the exact year of the foundation of Rome, there is a confiderable difagreement among chronologers, but it is generally referred to 753 before the birth of Chrift. When the city was finifhed, which probably confifted of about a thoufand houfes, or rude huts, the people, being affembled to make choice of a government moft agreeable to their wifhes, determined upon a monarchy, and refolved to take Romulus as their king. Being, unqueftionably, a man of a vigorous mind, he immediately applied himfelf to the eftablifhment of good order, and to the formation of certain rules or laws by which his fubjects were to be bound. He affumed a habit of diftinction for himfelf, appointed twelve lictors to attend him as guards, and divided his fubjects into different ranks. The lands he diftributed into three portions, one for the fupport of government; another for the maintenance of religion; and the third he divided into equal portions of two acres to each Roman citizen. After this he formed a fenate, confifting of a hundred perfons, afterwards increafed to 200, chofen from among the fuperior clafs of the people, and from whom the Patrician families were defcended. This affembly were not only to be judges in matters of fmall importance, but to debate and refolve upon fuch public affairs as the king propofed, and to determine them by a plurality of voices. The people at large were allowed to create magiftrates, enact laws, and refolve upon any war in which the king fhould propofe to engage. Romulus next proceeded to fettle the religious affairs of his people, and he added many of the Trojan deities to thofe whom the aborigines, or Italian natives, already worfhipped. He chofe priefts, inftituted feftivals, and laid the foundation of a regular fyftem of religion.

After all that has been attributed to the political fagacity and talents of Romulus, it is probable that the great outlines of the firft conftitution had a natural foundation in the ufages of barbarous nations; though many of his inftitutions, it will be readily admitted, bear the traces of a difcerning and active mind.

The Sabines were the moft formidable enemies of the early Romans; but after the death of Romulus, who reigned 37 years, Numa, a Sabine, was elected king. He was, in his own nature, formed for pacific meafures, and a worfhipper of the gods; he endeavoured to give his people the fame character. To increafe his influence, and render his government more powerful, he pretended to divine infpiration. As we have feen in fome preceding articles, fee CALENDAR, NUMA, &c. he reformed the calendar, divided the year into twelve months, following the courfe of the moon; and diftinguifhed the days into thofe in which civil occupations might be carried on, and thofe that were to be devoted to religious purpofes. The bufinefs of agriculture was lawful on the latter, as a religious duty. This wife prince reigned forty-three years; and was fucceeded by

Tullius Hoftilius, whofe reign commenced in the year 670 B.C. His difpofition was the reverfe of that of Numa. He made frequent wars upon his neighbours; and alienated the

the Sabines from the Romans, who became the moft powerful of their enemies. Tullius reigned thirty-three years.

Ancus Martius, the fourth king of Rome, grandfon to Numa, inherited his virtues, to which he joined the talents of a warrior. He greatly increafed the population of Rome, by naturalizing the conquered ftates; and he built the port of Oftia, at the mouth of the Tiber. His reign continued twenty-four years. See ANCUS.

The fifth king of Rome, Tarquinius Prifcus, a citizen of Corinth, noted for his great liberality and vaft wealth, was victorious in his wars, and he adorned the city with works of utility and magnificence. Such were the CIRCUS, the CAPITOL, and the CLOACÆ, thofe immenfe common fewers which led to the belief that Rome had been built on the ruins of an ancient city of much greater magnitude. This king was affaffinated in the 38th year of his reign; and was fucceeded by

Servius Tullius, his fon-in-law, who very much improved the city with ufeful edifices, and by extending its boundaries. He alfo made fome new arrangements in the divifion of the citizens; of which we fhall have occafion to fay more under the biographical article SERVIUS *Tullius*. This king was affaffinated, after a reign of forty-four years, by his own daughter Tullia, who had married Tarquinius, the grandfon of Prifcus, and who thus paved the way for her hufband to afcend the vacant throne.

The government of this Tarquin was fyftematically tyrannical, and from his haughtinefs he obtained the furname of *Proud*. By his ill conduct he at length roufed the vengeance of the people againft him, and they not only expelled the tyrant, but at one blow abolifhed the regal government at Rome. See TARQUINIUS.

The regal form of government fubfifted 244 years, during which there were only feven kings, of whom two died violent deaths, and one was depofed. Thefe circumftances throw a confiderable degree of doubt on the authenticity of the Roman hiftory, as the reigns of monarchs who die in the common courfe of nature cannot be averaged fo high as thirty years, whereas, notwithftanding the violent deaths and depofition of three of the kings, the average length of their reigns is more than thirty-four years each. Befides, it is admitted that for the firft five centuries after the building of Rome, there were no hiftorians, and, according to Livy, almoft all the ancient records were deftroyed when Rome was taken by the Gauls.

At the period of the abolition of the regal government, the territory of the Romans was extremely limited. The chief ufe which they made of their victories was to naturalize the inhabitants of fome of the conquered ftates, and fo increafe their population; thus their ftrength being always fuperior to their enterprizes, they laid a folid foundation of their empire.

Confular State of Rome.—When the regal government was abolifhed, it was agreed to commit the fupreme authority to two magiftrates, who fhould be annually elected by the people from the Patrician order. To thefe officers they gave the title of confuls, a name, as it has been faid, that was intended to defignate the counfellors of the republic, rather than its fovereigns, though, in point of fact, their authority differed fcarcely in any thing from that of kings. They had the fupreme adminiftration of juftice, the difpofal of the public money, the power of convoking the fenate and affembling the people, raifing the armies, and the right of making peace and war. Their authority was, however, limited to a year. The firft confuls were Brutus and Collatinus, the hufband of that Lucretia whofe death had occafioned the revolution which deftroyed the regal power. Tarquin was, at this time, in Etruria, where he got two of the moft powerful cities, Veii and Tarquinii, to efpoufe his caufe. He had alfo numerous and powerful partizans at Rome, and a plot was contrived to open the gates to admit him. The confpiracy was difcovered, and Brutus had the mortification to find his two fons in the number of confpirators. He felt it his duty to forget the affection of the parent, and to confider their cafes as conful; he accordingly condemned them to be beheaded in his prefence. This act of fevere juftice ftruck fuch terror into the Romans, that fcarcely any perfon ventured to oppofe the conful; and the efforts that were made to bring back monarchy, proved unfuccefsful. To fecure themfelves againft the affaults of every invader, the Romans formed an alliance with the Carthaginians, which fubfifted 250 years. All precautions, however, that were ufed for the prefervation of the tranquillity of the ftate, could not guard the people againft the oppreffion of the nobility. The former foon found that they had only changed their mafters, and embraced the mere fhadow of liberty. They made heavy complaints; thefe were followed by acts of rebellion, which occurred about the year B.C. 498. Peace was reftored by the creation of a dictator, a magiftrate who was elected for the period of fix months, and who was invefted with abfolute and unlimited authority. Lartius, nominated to this office, armed the lictors with axes, fummoned the whole people to the public affemblies, and calling over the names, enrolled all fuch as he judged moft fit for the fervice of his country, inflicting, without hefitation, capital punifhment upon thofe who dared to refift the order.

The fpirit of the people, though checked for a time, was not fubdued; they again complained, remonftrated, and even rebelled; and Rome, for fome years, was the fcene of anarchy and fedition. At length the fenate, alarmed by the idea of a general revolt, abated their former rigour, in fome meafure eafed the burdens of the people, and fecured their future interefts by the creation of five new magiftrates, called tribunes, who were to be elected annually by the people, whofe perfons were to be facred, whofe bufinefs it was to defend the oppreffed, to pardon offences, to arraign the enemies of the people; and, when they judged it neceffary, to ftop, by their fiat, the whole machine of government.

The tribunes demanded, and obtained, two other magiftrates to affift them, who were named Ediles, from the charge of the public buildings of the city being committed to them. From this era, which was about 493 years before the birth of Chrift, the commencement of the popular conftitution of the Roman republic may be dated.

The power of the tribunes foon rofe to an unexpected height, and proved the fource of perpetual diffentions in Rome. The nobles and patricians had ftill in view an ariftocratical form of government, while the tribunes aimed at nothing fhort of a complete democracy, hoping thereby to increafe their own power and influence. The tribunes prevailed, and Coriolanus, a patrician of inflexible virtue, was, in the year 491 B.C., banifhed. Encouraged by the fuccefs of the tribunes, Spurius Caffius Vifcellinus, an ambitious patrician, afpired to the fupreme power. To accomplifh his purpofe, he flattered the people by propofing the Agrarian law, which caufed the moft violent commotions in the ftate. His ambition was, in the end, punifhed with death, and from this time perpetual contentions and difcords fubfifted between the tribunes and patricians. The number of the former was increafed to ten, and the people procured the right of electing them in an affembly convened by the tribes. From this period the fupreme authority in the

the Roman republic may be conſidered as having paſſed completely from the higher order into the hands of the people.

Hitherto the Romans had no written laws. So long as the monarchy ſubſiſted, the will of their kings was to them inſtead of laws: while the ancient uſages, the deciſions of the conſuls and of the ſenate were founded, or ſuppoſed to be founded, on the principles of natural equity. To ſupply this defect in the government, the tribunes propoſed an eſtabliſhment of laws, to which, but with great reluctance, the ſenate aſſented. Commiſſioners were accordingly appointed to bring from Athens the laws of Solon, that ſuch of them might be adopted as were ſuited to the exiſting conſtitution of the Roman republic. Ten perſons were choſen out of the ſenatorial order to compoſe a code of laws from thoſe of Greece, and from the ancient uſages of Rome. This ſyſtem was divided into twelve tables, fragments of which are ſtill to be found in the hiſtory of that early period, and which are the baſis of the great ſtructure of the Roman juriſprudence. An acquaintance therefore with theſe ancient laws is deemed of importance. Even in the moſt flouriſhing times of the republic, they continued to be of the higheſt authority. Cicero paſſed upon them a very high encomium, and from him we learn, that to commit theſe laws to memory was an eſſential part of a liberal education. From the twelve tables the juriſconſulti compoſed a ſyſtem of judicial forms for the regulation of the different tribunals. The Decemviri were inveſted with all the powers of government; each decemvir preſided in his turn a ſingle day, and was during that period inveſted with ſovereign authority, with its inſignia the faſces. The other nine officiated ſolely as judges in the determination of law-ſuits, and the correction of abuſes. An abuſe, however, of the moſt flagrant nature, committed by Appius Claudius, (ſee his article,) the chief of their number, was deſtined to bring their office to an end. Prompted alſo by the ambition and artifices of this man, the whole body conſpired againſt the public liberty, and even bound themſelves by an oath to endeavour to make the government perpetual. The ſenators, the ſoldiers, and the people, rouſed by the tyranny of theſe uſurpers, inflicted the puniſhment which their crimes ſo juſtly merited, and at the ſame time reſtored the conſular and tribunitian power. This was in the year 449 B.C.

The ſcale of the people was daily acquiring weight at the expence of that of the higheſt order. There were however two barriers, which ſtill ſeparated the patricians and plebeians; the one a law, which prevented their intermarriage, and the other, the limitation of all the higher offices to the order of patricians. It was the object of the people to remove theſe reſtraints, becauſe then the patricians and plebeians would be on an equality. The firſt, after a long conteſt, was agreed to by the ſenate. This conceſſion ſtimulated the people to inflexible perſeverance in their ſtruggle for the latter. The ſenate ſought a palliative by the creation of ſix military tribunes inſtead of conſuls, of whom three were to be patricians, and three plebeians. This meaſure ſatisfied the people for a ſhort time: the conſuls were, however, ſoon reſtored. The diſorders of the republic, and the frequent wars in which the country was engaged, had interrupted the regular ſurvey of the citizens. This was remedied by the creation of two officers, under the title of Cenſors, 437 B.C. whoſe buſineſs was not only to make the cenſus every five years, but to inſpect the morals, and regulate the duties of the people. The diſſentions continued with but little variation, and the people uniformly, as their laſt reſource, refuſed to enrol themſelves, till overawed by the ſupreme authority of a dictator. To obviate the frequent neceſſity of this meaſure, which enforced but an unwilling obedience, the ſenate had recourſe to the expedient of paying the ſoldiery, who before had ſerved without hire, as was uſual in other countries under the feudal ſyſtem. To defray this expence, a tax was levied from every perſon in proportion to his means, and thus a fund was eſtabliſhed for the maintenance of the army. The Roman ſyſtem of warfare now aſſumed a new aſpect. The ſenate always found ſoldiers at command, and the army was under its controul: the enterprizes of the republic were more extenſive, and its ſucceſſes more ſignal and important.

One of the early effects of the new ſyſtem was a war declared againſt the Veii, the proud rival of Rome, and its equal in extent and population. After a ſiege of ſeveral years their capital was taken by Camillus, and the Veian territory was added to the Roman empire, in the year B.C. 396. Their dominions, till now confined to the territory of a few leagues, was at this period rapidly extended, and the Romans were, from this circumſtance, an overmatch for all their neighbours.

The glory, and other good effects of the conqueſt over the Veii, were more than overbalanced by the ſubſequent fatal cataſtrophe in a war with the Gauls, who, under the command of Brennus, invaded Italy, plundered Rome, and actually burnt it to the ground, B.C. 390. They then retired to their own country loaded with ſpoils. To the burning of the city, on this occaſion, as we have before obſerved, the Roman writers attribute the loſs of all the records and monuments of their early hiſtory. The city was ſpeedily rebuilt, but the effects of this calamitous event were long felt. The neighbouring ſtates combined to prevent the Romans from recovering their former power; "but," ſays the hiſtorian, "neither the united efforts of foreign enemies, nor inteſtine diviſions, could ruin a city deſtined to be the miſtreſs of the world." The Gauls in 367 returned to Italy, but they were no longer ſucceſsful, and were forced to retreat with the utmoſt precipitation. About the ſame time a plebeian was raiſed to the conſulſhip, and the offices of Prætor and Edile were created; the one to adminiſter juſtice, and the other to inſpect the temples and public places. In the mean time hoſtilities were carried on by the Romans againſt thoſe provinces that refuſed to ſubmit to their power, or who made the leaſt attempt at revolt. The war with the Samnites, a hardy nation, who inhabited a large track of ſouthern Italy, which began about this period, was continued for half a century: but its ſucceſsful termination was ſpeedily followed by the reduction of all the Italian ſtates. In the courſe of this important war, the Tarentines, allies of the Samnites, ſought the aid of Pyrrhus, king of Epirus, one of the moſt illuſtrious generals of his age. Pyrrhus landed in Italy with 30,000 men and a train of elephants, about the year 280 B.C. For a few years he was ſucceſsful, but ſo ſoon as the Romans underſtood his mode of warfare, they became more than a match for him; and when he was making a laſt effort near Beneventum, he was totally defeated with the loſs of 26,000 men. He then abandoned all further views to Italy, and returned with precipitation to his own country, 274 B.C. The hoſtile ſtates ſubmitted to the victorious power, and Rome, 480 years from its foundation, was now ſovereign of all Italy. It may be obſerved, that the extent of their conqueſts was as much the effect of wiſe policy, as of power. They removed to Rome all the leading men of the principal conquered cities, admitting them into their tribes, and thus, in a meaſure, ſoothed the pride of the vanquiſhed, by giving them an apparent ſhare in their own domeſtic government; while, in arranging the conſtitution of the cities themſelves, they filled their magiſtracies with illuſtrious Romans, whoſe abilities and influence were fitted to command allegiance, reſpect, and attachment to the Roman government.

The command of the continent did not ſatisfy the Roman ambition. The Carthaginian ſtate excited their jealouſy, and the aid which it had granted to the Tarentines was the pretext for commencing hoſtilities. Sicily had long been conſidered as the granary of Italy, and in that iſland the Carthaginians poſſeſſed conſiderable ſettlements, and they were ambitious of acquiring its entire dominion. An obvious policy led the Romans to diſpute with them this important acquiſition, which gave riſe to the Punic wars. Sicily was at firſt the theatre of war between theſe two nations, which was afterwards removed into Africa, and thence into Spain and Italy. We have however, under the words CARTHAGE and CARTHAGINIANS, entered ſo much at large into this ſubject, as to preclude the neceſſity of doing here more than adding a few lines to render the Roman hiſtory connected. For ſome time the event was doubtful, but in the year 242 B.C. the Carthaginians were conſtrained to ſue for peace, which they obtained on hard and ignominious terms. Rankling under the diſgrace, they ſoon repaired their loſſes, collected a numerous army, and entruſted the ſupreme command to HANNIBAL; ſee his article. In 218 the war was renewed and proſecuted with vigour. The Romans were defeated in ſeveral battles, and Rome itſelf threatened with inſtant deſtruction. The prudent and cautious Fabius, then appointed dictator, averted the impending blow. In the courſe of this ſecond Punic war Maſſiniſſa declared in favour of the Romans; and Syphax, king of Numidia, took up arms againſt them. Scipio, the celebrated Roman general, who carried the war into Africa, defeated the combined forces of Aſdrubal and Syphax in ſeveral battles, and Carthage in its turn trembled for its ſafety. Hannibal was recalled from Italy, and defeated with prodigious loſs in the year B.C. 202, and peace was concluded between the Romans and Carthaginians in the following year.

Elated with ſucceſs the moſt complete, the Roman ambition now exceeded all limits, and aſpired at the domination of the whole world. War was proclaimed againſt Philip of Macedon, who was defeated by Flaminius in Theſſaly in the year 197 B.C. and obtained peace by agreeing to pay a tribute. The ſubjection of Macedon portended the ruin of all the Grecian ſtates.

Antiochus, king of Syria, ſurnamed the Great, by the perſuaſion of Hannibal, declared war againſt the Romans, but after three years he was under the neceſſity of imploring peace, and to accept of terms the moſt rigorous. The Aſiatic war, however, in the event proved fatal to the Romans, whoſe habits and manners were corrupted by the vices which accompanied the luxury of the Eaſt. Previouſly to this, Perſeus, the Macedonian monarch, refuſing to ſubmit to the conditions that had been impoſed on his father, was attacked and defeated by Paulus Æmilius, and his kingdom, which had ſubſiſted ſeven centuries, was reduced to the form of a Roman province.

The moſt frivolous pretexts were aſſigned as the cauſes of the third Punic war, in the year 149 B.C., which ended in the deſtruction of Carthage, long renowned for arts, opulence, and extent of dominion. Conſcious of their utter inability to reſiſt this formidable power, the Carthaginians, after a ſhort conteſt, offered every ſubmiſſion to ſave their city, but the Romans inſiſted that Carthage ſhould be razed to its very foundation. Deſpair inſpired this miſerable people with courage: they determined to make one effort at leaſt, and then, if neceſſary, to die in the defence of their altars and gods. The effort was in vain, and Carthage, in 146, was taken by ſtorm, its inhabitants cruelly maſſacred, and the city burnt to the ground. In the ſame year, the ruin of Corinth, and of the Grecian ſtates, was effected. Greece became a Roman province under the name of Achaia. Many other kingdoms ſhared the ſame fate, among which were Numantia and Luſitania. Thus, in the ſpace of about a century, the Romans extended their conqueſts in Europe, Aſia, and Africa.

"This," ſays Mr. Tytler, "was the era of the dawn of luxury and taſte at Rome, the natural fruit of foreign wealth, and an acquaintance with foreign manners. In the unequal diſtribution of this imported wealth, the vices to which it gave riſe, the corruption and venality of which it became the inſtrument, we ſee the remoter cauſes of thoſe fatal diſorders to which the republic owed its diſſolution."

All diſſentions between the ſenate and the people had been ſuſpended during their victories and triumphs, but when they had no foreign enemy to contend with, they turned their weapons againſt themſelves. Sentiments of honour and virtue among the great maſs of the people were well nigh extinguiſhed; and pride, luxury, and ſelf-intereſt, ſucceeded to temperance, ſeverity of life, and public ſpirit. Tiberius and Caius GRACCHUS, (ſee their articles,) beheld, with concern, the univerſal corruption of the ſtate, and attempted to introduce thoſe reforms that might bring back the people to the former habits of moral diſcipline. They, however, both fell victims to their zeal for the public good. The tumults which attended, or were ſubſequent to the exertions of theſe noble youths, were but the prelude to thoſe civil diſorders which followed in quick ſucceſſion. The Numidian war, which commenced in the year 111 B.C., and which laſted five years, afforded many inſtances of the injuſtice, inſolence, and venality of the Roman people. In this, JUGURTHA, (ſee his article,) who ſought to uſurp the crown of Numidia by the moſt cruel means, obtained the friendſhip and aid of the Roman ſenate, who having been bribed for the purpoſe, declared him innocent of every crime of which he was charged, and decreed to him the ſovereignty of half the kingdom.

About this time, 105 B.C. an immenſe body of fierce barbarians ruſhed, like a mighty torrent, from the northern regions of Europe, and threatened all before them with utter ruin and deſolation. Marius alone was able to avert the impending deſtruction. He defeated the barbarians with great ſlaughter: but he fought and triumphed merely with a view of furthering his own ambition, which was ſoon proved to be unbounded. Sylla, an artful and aſpiring patrician, jealous of the glory and popularity which Marius had acquired, boldly ſtood forward to oppoſe him. Factions were formed, and preparations made for the doubtful conteſt. The effects, however, of domeſtic animoſities were ſuſpended by the *Social* war, which was occaſioned by the anxiety of the allied ſtates of Italy to attain the rights of citizenſhip; but the immediate cauſe of the war was the murder of Druſius the tribune. This war, which ended in the conceſſion of thoſe rights to ſuch of the confederates as ſhould return peaceably to their allegiance, was followed by the more dreadful conteſt between the oppoſing factions of Sylla and Marius. Sylla, commanding in a war againſt Mithridates, the moſt powerful monarch of the Eaſt, was ſuperſeded, and recalled from Aſia. He refuſed to ſubmit to the order, and having ſounded his army, found it well diſpoſed to ſupport him

him in all his meaſures. "Let us march to Rome," they exclaimed with one voice; "lead us on to avenge the cauſe of oppreſſed liberty." Sylla readily liſtened to the cry, and led his conquering army towards Rome: they entered the city ſword in hand; Marius and his partiſans fled with precipitation, and Sylla ruled for a time triumphant. He ſullied the glory of his victories by many acts of cruelty and barbarity; aſſumed the title and power of perpetual dictator in the year 82; and after maſſacring many thouſands in cold blood, returned to the ſtation of a private man. It ſhould, however, be obſerved, that previouſly to this he had engaged perſonally in the Mithridatic war, and that during his abſence, Marius returned to Italy, and joining his forces to thoſe of Cinna, laid ſiege to Rome, and compelled the city to abſolute ſubmiſſion. After a tremendous and unſparing maſſacre of all whom they regarded as their enemies, Marius and Cinna proclaimed themſelves conſuls, without the formality of an election, but Marius died within a very few days after this had happened.

The death of theſe rivals did not give peace to Rome: Lepidus aſpired to ſucceed Sylla in his power, and Pompey, who was, by much, his ſuperior in talents, cheriſhed the ſame ambition. While Pompey was employed in the reduction of the revolted provinces of Aſia, the conſpiracy of Catiline threatened the entire deſtruction of Rome. It was, however, extinguiſhed by the prudence, foreſight, and patriotic zeal of Cicero. The next conſiderable candidate for popularity and ſovereign power was Julius Cæſar, who in the reign of Sylla had been numbered among the proſcribed. From the danger attached to his ſituation he had learned prudence; and while Pompey and Craſſus were contending for the command of the republic, Cæſar, who, by attaching himſelf to either rival, would infallibly make the other his enemy, ſhewed his talents and wiſdom by reconciling them, and thus acquiring the favour and friendſhip of both. They accordingly agreed to a partition of power, and hence the firſt triumvirate was formed. Cæſar was elected conſul: and he had the command of four legions, and the government of Tranſalpine Gaul and Illyria. The death of Craſſus, in an expedition againſt the Parthians, diſſolved the triumvirate, and the others, Pompey and Cæſar, aſpired, as rivals, to an undivided dominion. The term of Cæſar's government was near expiring, but to ſecure to himſelf that power which was the object of his ambition, he procured a propoſal to be made in the ſenate by one of his friends, which had the appearance of moderation and juſtice, namely, that Cæſar and Pompey ſhould either both continue in their governments, or both be deprived of them, as they were equally capable of endangering public liberty by an abuſe of power. The motion paſſed, and Cæſar offered to reſign, but Pompey refuſed, and reſolved to maintain his right by force of arms; a civil war was the neceſſary conſequence. The ſenate were chiefly attached to Pompey, but Cæſar had on his ſide a victorious army, conſiſting of ten legions, and the great body of the Roman citizens, whom he had won to his intereſt by his liberality. Mark Antony and Caſſius, at that time tribunes of the people, left Rome for Cæſar's camp. The ſenate, apprehenſive of his deſigns, and dreading the effects of his power and popularity, paſſed a decree, branding with the crime of parricide any commander who ſhould dare to paſs the Rubicon, a river which was the boundary between Italy and the Gauls, with a ſingle cohort without their permiſſion. Cæſar ſet at defiance their decree, and marched direct to Rome. Pompey, to whom the ſenate had committed the defence of the ſtate, was without an army. He quitted Rome, followed by the conſuls and a part of the ſenate, and endeavoured haſtily to levy troops over all Italy and Greece, while Cæſar had triumphantly entered the city, amidſt the acclamations of the people, ſeized the public treaſury, and poſſeſſed himſelf of ſupreme authority without any oppoſition. Having ſecured the capital, he ſet out to meet the lieutenants of Pompey, who had poſſeſſion of Spain. He defeated them, and ſubdued the whole country in the ſpace of forty days. On his return, he found he had, during his abſence, been nominated dictator; and in the ſucceeding election he was choſen conſul, and thus inveſted by a double title, with the right of acting in the name of the republic. Pompey had now raiſed a uumerous army, and in the field of Pharſalia the rival armies met: Cæſar was victorious, leaving 15,000 of his enemies dead, while 24,000 ſurrendered themſelves as his priſoners. The battle of Pharſalia, for ſo it has been named, which happened in the year B.C. 48, decided the fate of the rival chiefs, and that of the empire.

In the ſpace of two years Cæſar gave law to the known world; but his ſucceſs accelerated his ruin. He took part with Cleopatra againſt Ptolemy: a war enſued, in which Ptolemy was killed, and Egypt was ſubdued by the Roman arms. In this war the famous library at Alexandria was burnt to aſhes. A revolt of the Aſiatic provinces, under Pharnaces, the ſon of Mithridates, was ſignally chaſtiſed; and the report of the conqueror to the Roman ſenate was conveyed in three words, *veni, vidi, vici*. Cæſar having added Mauritania to the number of the Roman provinces, returned to Rome abſolute maſter of the empire. It is, however, much to his credit, that from this moment his attention was directed ſolely to the proſperity and happineſs of the people. He remembered no longer that there had been oppoſite parties: he was beneficent alike to the friends of Pompey as to thoſe attached to himſelf. He laboured to reform every ſpecies of abuſe and grievance: and in return he was hailed "the father of his country"—was created conſul for ten years, and perpetual dictator. His perſon was declared ſacred, and he had the title of *Imperator* beſtowed upon him. Thus the Roman republic finally, by its own acts, reſigned its liberties. A conſpiracy was formed againſt him by ſixty of the ſenators, at the head of whom were Brutus and Caſſius, and the dictator was ſtabbed, in the year 44, at the foot of Pompey's ſtatue. Mark Antony improved this favourable opportunity, and became maſter of the commonwealth: he found, however, a formidable competitor in Octavius, the grand nephew and adopted heir of Cæſar, who, at this critical moment, arrived in Rome, and who gained the ſenate to his intereſt. The conteſt terminated in a civil war, in the courſe of which Octavius and Antony were reconciled, and they ſtrengthened their hands by admitting Lepidus into their aſſociation. Thus was formed the ſecond triumvirate, the effects of whoſe union were beyond meaſure deſtructive. They divided among themſelves the provinces, and cemented their union by a deliberate ſacrifice, made by each, of his friends to the vengeance of his aſſociates. Antony gave up his uncle Lucius to death; Lepidus his brother Paulus; and Octavius his guardian Toranius and his friend Cicero. Beſides theſe illuſtrious characters, 300 ſenators and 3000 knights were put to death. A conſpiracy was excited againſt the triumvirs. Octavius and Antony marched againſt them; an engagement enſued at Philippi, which decided the fate of the empire: the republican party was annihilated. Antony now ſought a recompence for his troops by the plunder of the Eaſt. He became the willing conqueſt of Cleopatra, for whom he abandoned, and even forgot, glory, ambition, and fame. Octavius ſaw this phrenzy with delight, and contemplated in it his rival's ruin; and from Lepidus he had nothing to dread,

dread, whose insignificant character drew on him the contempt of his own friends, and whose folly, in attempting an invasion of the province of his colleague, was punished by his deposition and banishment. Antony had lavished the provinces of the empire, in gifts to his paramour and her children. At these enormities the Roman people were justly indignant, and the divorce of his wife Octavia, the sister of his colleague, was the signal of declared hostility between them. An immense armament, chiefly naval, came to a decisive conflict near Actium, on the coast of Epirus. Fortune was favourable to Octavius, and the battle of Actium gave him the empire of the world.

Thus have we traced the history of Rome from its commencement, through all its revolutions, till the final extinction of the republic: before we come to an account of the emperors, we shall notice some particulars relating to the character of the ancient Romans, beginning with the mode of their education, upon which almost every thing depends, with regard to character, in the largest extent of the word.

Roman Education and Literature.—A rigid severity of manners was the characteristic of the Romans under their kings, and in the first ages of the republic. The private life of the citizens, which was frugal, temperate, and laborious, had its influence on their public character. The head of every family had sovereign authority over all the members that composed it, and this power, there is every reason to believe, was seldom, if ever, abused. The Roman laws did not prescribe a system and rules for the education of the young, but the manners of the people supplied this want, and the utmost attention was bestowed on the early formation of mind and character. The Roman matrons did not abandon their infants to mercenary nurses. They esteemed those duties connected with the nurture of their offspring and the rudiments of their education as the highest points of female merit. A remarkable degree of attention was paid to the language of children, and to the attainment of correctness and purity of expression; thus, the Gracchi, the sons of the virtuous and excellent Cornelia, were said to be educated "non tam in græmio, quam in sermone matris." This was the more necessary, because it was by eloquence more than by the exercise of any other talent that the young Roman could rise to the highest offices and dignities of the state. The exercises of the body were likewise particularly attended to, and whatever had a tendency to harden the temperament, and to confer strength and agility, was regarded as of prime importance. At seventeen a youth was consigned to the care of a master in rhetoric, whom he attended constantly to the forum, or to the courts of justice, for it was necessary to be an orator, to be regarded as an accomplished gentleman.

Before the intercourse with Greece, which took place after the Punic wars, the Roman people were rude and illiterate, and it was not till five hundred years had elapsed, that the regular drama was introduced at Rome, and the earliest Roman plays were, no doubt, translations from the Greek. Of the early Roman drama, Ennius was a great ornament, and from his time the art made a rapid advancement. The comedies of Plautus, the contemporary of Ennius, display much knowledge of human nature, and are still read with pleasure. Cæcilius improved so much on the comedies of Plautus, that he is mentioned by Cicero as, perhaps, the best of the Roman comic writers, but none of his compositions remain. The "Andria" of Terence, the first of his comedies, was performed in the year 587 from the building of the city. The comedies of this writer are chiefly borrowed from the Greek of Menander and Apollodorus, and their merit lies in that nature and simplicity which are observable in the structure of the fable; in the delineation of the characters, and in the delicacy and purity of the sentiments. The Roman comedy was of four different species; the *first* admitted serious scenes and personages; the *second* was a representation of ordinary life and manners; the *third* was where the dialogue was not committed to writing, but the subject of the scene was prescribed, and the dialogue was filled up by the talents of the actors: and the *last* included pieces of comedy of the lowest species; farces, or entertainments of buffoonery. The Roman tragedy kept pace in its advancement with comedy; of the best, namely, of Actius and Pacuvius, there are no remains; those under the name of Seneca are probably the work of different hands.

The most perfect era of Roman literature was the age of Cicero, comprehending all, of the preceding times, whom Cicero might have seen, and all, of the succeeding, who might have seen him. These will include, among others, Sallust, Cæsar, Livy, and Tacitus, as historians. Among the poets were Lucretius, Catullus, Virgil, Horace, Ovid, Tibullus, and Martial. See the several articles in the alphabetical arrangement of the New Cyclopædia.

State of Philosophy and the Arts among the Romans.—In the earlier periods of the republic, the Romans had little leisure to bestow on the cultivation of the sciences, and had no conception of philosophical speculation. It was not till the interval between the war with Perseus and the third Punic war, that philosophy made its appearance at Rome. Some learned Achaians, banished from their country, had settled in various parts of Italy, and applied themselves to the cultivation of literature, and the education of youth, diffusing a taste for those studies hitherto unknown to the Romans. Jealous of the introduction of foreign manners with foreign studies, the senate banished the Greek philosophers from Rome. But Carneades and Critolaus came afterwards in the train of an Athenian embassy, who revived the taste for the Greek philosophy, and left behind them many able disciples who publicly taught their doctrines. As the Roman manners had still a tincture of their ancient severity, the Stoical system prevailed. The philosophy of Aristotle was little known in Rome till the age of Cicero, and even then the great orator complains that Peripatetic philosophy was but little understood at Rome, and, on that account, he sent his son to study its doctrines in the schools of Athens. Lucullus, whose residence in Greece gave him an opportunity of being acquainted with all the different sects, disseminated, on his return to Rome, a very general taste for philosophy. The old and new academy had each their partisans; of the former, the most illustrious disciples were Marcus Brutus and Terentius Varro. Cicero, who must be deemed the most eminent of all the Roman philosophers, is usually classed among the supporters of the new school.

The cultivation of physics, or natural philosophy, seems to have been but little attended to, either by the Greeks or Romans. The natural history of Pliny is the most valuable storehouse of the knowledge of the ancients in physics, economics, and the arts and sciences. The Romans had no natural taste in the fine arts. On the conquest of Greece, an immense field opened at once to their eyes, and they were almost instantly surrounded with the master-pieces of art; but their minds were not sufficiently cultivated to appreciate their excellencies.

The Romans seem to have invented or perfected no art, but that of war. The rest they had from Egypt, Greece, Sicily, and Etruria. In our articles, therefore, concerning the

the *Music of the Ancients*, and *Musical Instruments* of the Greeks, (see MUSIC, and INSTRUMENT, in *Music*,) those of the Romans are generally included. They, indeed, imitated and adopted many customs, religious rites and ceremonies of the Etrurians; and Plutarch (Vita Romuli) mentions it as a prevailing opinion, that the Greek language, which was spoken by the Romans in the time of Romulus, was not corrupted by Italian words. From these accounts it appears that the Romans had not only vocal and instrumental music as well as other arts and sciences from Greece, but even their alphabet, language, religion, and all the learning of which they were possessed during the time of their kings, and the first ages of their republic, these having been originally Greek, though the Romans had them through Etruscan strainers.

The first Roman triumph, according to Dionysius (lib. ii.), was that of Romulus over the Cæninenses; in which, clad in a purple robe, he was drawn in a chariot by four horses. The rest of the army, both horse and foot, followed, ranged in three several divisions, hymning their gods in songs of their country, and celebrating their general with extemporary verses: this account affords a very venerable origin to the improvisatori of Italy; as the event happened in the fourth year of Rome, 749 years before Christ, and the fourth year of the seventh olympiad.

Indeed the Romans were later in cultivating arts and sciences than any other great and powerful people; and none of them seem to have been the natural growth of the soil, except the military art; all others were brought in by conquest.

During the reign of Augustus, except Vitruvius, it does not appear that the Romans had one architect, sculptor, painter, or musician; those who have been celebrated in the arts at Rome, having been Asiatics, or European Greeks, who came to exercise such arts among the Latins, as the Latins had not among themselves; this custom was continued under the successors of Augustus, and those Romans who were prevented by more important concerns from going into Greece, contrived in a manner to bring Greece to Rome, by receiving into their service the most able professors of Greece and Asia, in all the arts. We find too, not only that each of the best Roman writers was an imitator of some great Grecian model, but are certain that the finest remains in painting, sculpture, and architecture, which still subsist in Italy, were either brought thither from Greece, or were the works of Greek artists, who had left their own ruined and oppressed country, to bask in the warm sun-shine of power and affluence at Rome.

Vitruvius, in his Treatise on Architecture, has inserted a chapter on music, in which he has given the harmonical system of Aristoxenus; but he introduces it with a complaint of the unavoidable obscurity of musical literature, on account of the deficiency of terms in the Latin tongue, to explain his ideas. "The science of music, in itself obscure," says he, "is particularly so to such as understand not the Greek language." This writer, therefore, who seems to have been the first that had treated of music in the Roman language, confesses the necessity he was under of using Greek appellatives, not only for the notes, but for other parts of the art; which shews, if not the low state of music at Rome when he wrote, which was in the Augustan age, at least whence their music came; and *borrowing* implies *inferiority*. Indeed, the writings of Cicero shew that philosophy, and all the arts and sciences, were wholly furnished to the Romans from Greece, even in the most enlightened times.

Music was, however, in great favour at Rome during the latter end of the republic, and the voluptuous times of the emperors; the stage then flourished; the temples were crowded; festivals frequent; and banquets splendid; so that we may suppose it to have been very much used both upon public and private occasions, in so rich, populous, and flourishing a city as Rome, the mistress of the world. But this music must have differed as little from that of the Greeks, as the descriptions of it in Horace and Virgil differ from those to be found in Homer, and the Greek lyric poets.

Notwithstanding the Romans had the Greeks, Etrurians, and Sicilians to imitate in the polite arts, they never advanced so far in them as the modern Italians have done; who, without any foreign help, have greatly surpassed not only their forefathers the ancient Romans, but even the Greeks themselves, in several of the arts, and in no one so much as that of music, in which every people of Europe have, at different times, consented to become their scholars.

From the success which attended the arms of the Romans, and that dominion which they acquired over the greatest part of the known world, it is natural to conclude that they must have carried the military art to a higher degree of perfection than any other nation of that period. It is the discipline of an army that makes the multitude act as one man; it moreover increases the courage of troops, because each individual confides in the steady co-operation of his associates. From the constant practice of athletic exercises, the Romans were inured from infancy to hardiness and fatigue, and bred to that species of life which a soldier leads in the most active campaign.

Among the ancient nations there were usually but two different arrangements of the troops in order of battle. The one the Phalanx, or close arrangement in parallelograms, intersected only by great divisions; the other the Quincunx, consisting of small companies or platoons, disposed in three straight lines, with alternate spaces between them equal to the space occupied by each company. The military tactics of the Romans are supposed to have been at their highest pitch of excellence during the Punic wars. Hannibal was a master in the science, and the Romans understood how to profit from the instructions of an enemy. The art of intrenchment was carried to great perfection by the Romans, particularly by Julius Cæsar. Their intrenchments consisted of a ditch from nine to fifteen feet in depth and width, fenced on the inside by the mound of excavated earth, and on the outside by strong stakes with pointed branches.

In besieging a town, several camps were formed around the place, joined to each other by lines of circumvallation and countervallation. A mound of earth was raised, gradually rising in elevation as it approached the city. The front, where workmen were employed, was defended by a curtain of hides. On this mound the engines of attack were advanced, till they played on the very spot which the besiegers wished to assail. The same machines were used by the besieged for annoying the enemy. When the batteries from the terrace had silenced those on the walls, the battering ram was brought up, and if it once reached the walls, it was generally decisive of the fate of the town. The great object, therefore, of the besieged, was to prevent its approach by every power of annoyance.

The naval military art was utterly unknown among the Romans till the first Punic war. A Carthaginian galley was the first model; and in the space of two months they equipped a fleet of 100 gallies of five banks of oars, and 20 with three banks. In the times of the empire, which we are going, very briefly, to describe, the Romans maintained their different conquests, not by their armies, but by their fleets, which were moored in the large rivers and bays,

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and generally preferved a fixed ftation, as well as the legions.

Rome under the Emperors.—The battle of Actium, as we have already obferved, decided the fate of the commonwealth, and Octavius, now having affumed the name of Auguftus, was mafter of the Roman empire. This emperor new-modelled the ftate, flattered the people, and rendered monarchy fupportable to republicans. Auguftus poffeffed the talent of difcerning what character was beft fitted for gaining the affections of the people he governed, and verfatility of temper and genius to affume it. His virtues, though the refult of policy, not of nature, were certainly favourable to the happinefs, and even the liberties, of his fubjects. The fate of Cæfar might, and probably did, warn him of the infecurity of an ufurped dominion; and, therefore, while he ftudioufly imitated what was excellent in his predeceffor, he affected a much higher degree of moderation and refpect for the rights of the people. Long peace, in which the temple of Janus was fhut, which had been open nearly two centuries, fince the beginning of the fecond Punic war; an uniform and temperate government, and prevailing luxury, introduced a flow poifon into the vitals of the empire. The national character was changed. The outward form remained; but the animating fpirit and vigour had vanifhed. The Romans thought themfelves free, becaufe they had no longer to fight for their liberty. The fovereign kept up the delufion, by maintaining the ancient forms of the republican conftitution, in the election of magiftrates, &c. though they were nothing more than mere forms. He even pretended to confider his own functions as temporary, exerted for the benefits of the people, and depending upon their will. Five times, in the courfe of his protracted reign, did he fubmit to a fort of election. The emperor repofed the moft unlimited confidence in Mecænas, by whofe counfels all public affairs were conducted, and the moft falutary laws enacted for the remedy of public grievances, and even the correction of the morals of the people. By his influence and wife inftructions, Auguftus affumed thofe virtues to which his heart was a ftranger; and which, in their tendency to the happinefs of his fubjects, were equally effectual as if they had been the genuine fruits of his nature. On the death of Marcellus, the nephew and fon-in-law of the emperor, he beftowed his chief favour on Marcus Agrippa, who married Julia, the widow of Marcellus; and on his deceafe, Julia took Tiberius for her third hufband, who became the emperor's fon-in-law by a double tie, for Auguftus had previoufly married his mother, Livia. On the death of the emperor, in the 14th year of the Chriftian era, and in the 44th of his reign, Tiberius fucceeded to the throne.

The government eftablifhed by Auguftus, founded, as it unqueftionably was, on the power of the fword, not on the confent of the fenate and people, degenerated in proportion as the army became corrupted. This prince had refolved to confine the boundaries of the empire to the limits which, he affumed, Nature had pointed out, *viz.* on the weft the Atlantic ocean; the Rhine and Danube on the north; the Euphrates on the eaft; and towards the fouth, the fandy deferts of Arabia and Africa. His immediate fucceffors adopted this refolution. Britain and Dacia were the fole acceffions to the empire during the firft century of the Chriftian era. A military fpirit was, in fome degree, preferved and cherifhed, when almoft every virtue was extinguifhed; but the difcipline of the legions was greatly corrupted by the ambition, or relaxed by the weaknefs, of the emperors, who confided in the army, and particularly in the ftrength and fidelity of the Prætorian guards, which had been formed by Auguftus, and were kept up for the protection of the emperor's perfon. The foldiers were, however, foon roufed to a fenfe of their own power, and of the impotency of the civil authority.

Tiberius, the fecond emperor, was an unfeeling tyrant, and he took for his counfellor Sejanus, prefect of the Prætorian guards, a man ftill more cruel and tyrannical than himfelf. Sejanus conceived the project of placing himfelf on the throne: for the furtherance of his plans, he caufed Drufus, the fon of the emperor, to be poifoned, and removed from the fight of the people the fons of Germanicus, who were the natural heirs to the crown. He even perfuaded Tiberius himfelf, under the pretence of a difcovery of plots for his affaffination, to retire from Rome to the ifle of Capreæ, and devolve the government upon himfelf. He had but one ftep more to the attainment of the object of his ambition: he was on the point of affaffinating his mafter when he was detected, and inftantly executed. Tiberius now became negligent of the cares of government, and the imperial power was difplayed only in fcenes of cruelty and rapine. At length he fell fick, and was ftrangled in his bed by Macro, the præfect of the Prætorian guards, in the 78th year of his age, and the 23d of his reign.

Caligula, the fon of Germanicus, who was Tiberius's nephew, was the third emperor of Rome. The commencement of his reign was fignalized by a few acts of clemency and good policy. But tyrannical and cruel by nature, he fubftituted military execution for legal punifhment. The provinces were loaded with the moft oppreffive taxes, and daily confifcations filled the imperial coffers. He was affaffinated in the 4th year of his reign, and was fucceeded by his uncle

Claudius, the fon of Octavia, the fifter of Auguftus, whofe fhort reign, though he was a man of weak intellects, and of little education, was marked by an enterprife of importance. He undertook the reduction of Britain, and after vifiting the ifland in perfon, left his generals, Plautius and Vefpafian, to profecute a war, which was carried on for feveral years with various fuccefs. The inhabitants of Wales, then denominated the Silures, under their king Caractacus, made a noble refiftance, but were finally defeated, and Caractacus was led captive to Rome. The civil adminiftration of Claudius was weak and contemptible; he was the flave even of his domeftics, and the dupe of his abandoned wives Meffalina and Agrippina. Claudius was put to death in the 15th year of his reign.

Nero, the fcourge of mankind, fucceeded his father Claudius, and for the firft five years he reigned with great applaufe, whence Trajan, faid "cunctos principes longè abeffe a Neronis quinquennio;" but when his character began to unfold itfelf, he was found to be a compound of every thing that was bafe and inhuman. (See his article.) He perifhed in the 30th year of his age, and the 14th of his reign.

The two fucceeding emperors, Galba and Otho, did not reign a year between them; the former was murdered by the foldiers, and the latter died by his own hand.

The reign of Vitellius, the next emperor, was of eight months' duration. He is faid to have propofed Nero for his model, and it was juft that he fhould refemble him in his fate. Vefpafian, who had obtained from Nero the charge of the war againft the Jews, which he had conducted with ability and fuccefs, was proclaimed emperor by his troops in the Eaft, and a great part of Italy fubmitting to his generals, Vitellius capitulated to fave his life; but as foon as Rome was taken, the depofed emperor was feized, maffacred, and his body thrown into the Tiber.

Vefpafian reigned with great popularity for ten years. He the *Music of the Ancients*, and *Musical Instruments* of the Greeks, (see MUSIC, and INSTRUMENT, in *Music*,) those of the Romans are generally included. They, indeed, imitated and adopted many customs, religious rites and ceremonies of the Etrurians; and Plutarch (Vita Romuli) mentions it as a prevailing opinion, that the Greek language, which was spoken by the Romans in the time of Romulus, was not corrupted by Italian words. From these accounts it appears that the Romans had not only vocal and instrumental music as well as other arts and sciences from Greece, but even their alphabet, language, religion, and all the learning of which they were possessed during the time of their kings, and the first ages of their republic, these having been originally Greek, though the Romans had them through Etruscan strainers.

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Indeed the Romans were later in cultivating arts and sciences than any other great and powerful people; and none of them seem to have been the natural growth of the soil, except the military art; all others were brought in by conquest.

During the reign of Augustus, except Vitruvius, it does not appear that the Romans had one architect, sculptor, painter, or musician; those who have been celebrated in the arts at Rome, having been Asiatics, or European Greeks, who came to exercise such arts among the Latins, as the Latins had not among themselves; this custom was continued under the successors of Augustus, and those Romans who were prevented by more important concerns from going into Greece, contrived in a manner to bring Greece to Rome, by receiving into their service the most able professors of Greece and Asia, in all the arts. We find too, not only that each of the best Roman writers was an imitator of some great Grecian model, but are certain that the finest remains in painting, sculpture, and architecture, which still subsist in Italy, were either brought thither from Greece, or were the works of Greek artists, who had left their own ruined and oppressed country, to bask in the warm sun-shine of power and affluence at Rome.

Vitruvius, in his Treatise on Architecture, has inserted a chapter on music, in which he has given the harmonical system of Aristoxenus; but he introduces it with a complaint of the unavoidable obscurity of musical literature, on account of the deficiency of terms in the Latin tongue, to explain his ideas. "The science of music, in itself obscure," says he, "is particularly so to such as understand not the Greek language." This writer, therefore, who seems to have been the first that had treated of music in the Roman language, confesses the necessity he was under of using Greek appellatives, not only for the notes, but for other parts of the art; which shews, if not the low state of music at Rome when he wrote, which was in the Augustan age, at least whence their music came; and *borrowing* implies *inferiority*. Indeed, the writings of Cicero shew that philosophy, and all the arts and sciences, were wholly furnished to the Romans from Greece, even in the most enlightened times.

Music was, however, in great favour at Rome during the latter end of the republic, and the voluptuous times of the emperors; the stage then flourished; the temples were crowded; festivals frequent; and banquets splendid; so that we may suppose it to have been very much used both upon public and private occasions, in so rich, populous, and flourishing a city as Rome, the mistress of the world. But this music must have differed as little from that of the Greeks, as the descriptions of it in Horace and Virgil differ from those to be found in Homer, and the Greek lyric poets.

Notwithstanding the Romans had the Greeks, Etrurians, and Sicilians to imitate in the polite arts, they never advanced so far in them as the modern Italians have done; who, without any foreign help, have greatly surpassed not only their forefathers the ancient Romans, but even the Greeks themselves, in several of the arts, and in no one so much as that of music, in which every people of Europe have, at different times, consented to become their scholars.

From the success which attended the arms of the Romans, and that dominion which they acquired over the greatest part of the known world, it is natural to conclude that they must have carried the military art to a higher degree of perfection than any other nation of that period. It is the discipline of an army that makes the multitude act as one man; it moreover increases the courage of troops, because each individual confides in the steady co-operation of his associates. From the constant practice of athletic exercises, the Romans were inured from infancy to hardiness and fatigue, and bred to that species of life which a soldier leads in the most active campaign.

Among the ancient nations there were usually but two different arrangements of the troops in order of battle. The one the Phalanx, or close arrangement in parallelograms, intersected only by great divisions; the other the Quincunx, consisting of small companies or platoons, disposed in three straight lines, with alternate spaces between them equal to the space occupied by each company. The military tactics of the Romans are supposed to have been at their highest pitch of excellence during the Punic wars. Hannibal was a master in the science, and the Romans understood how to profit from the instructions of an enemy. The art of intrenchment was carried to great perfection by the Romans, particularly by Julius Cæsar. Their intrenchments consisted of a ditch from nine to fifteen feet in depth and width, fenced on the inside by the mound of excavated earth, and on the outside by strong stakes with pointed branches.

In besieging a town, several camps were formed around the place, joined to each other by lines of circumvallation and countervallation. A mound of earth was raised, gradually rising in elevation as it approached the city. The front, where workmen were employed, was defended by a curtain of hides. On this mound the engines of attack were advanced, till they played on the very spot which the besiegers wished to assail. The same machines were used by the besieged for annoying the enemy. When the batteries from the terrace had silenced those on the walls, the battering ram was brought up, and if it once reached the walls, it was generally decisive of the fate of the town. The great object, therefore, of the besieged, was to prevent its approach by every power of annoyance.

The naval military art was utterly unknown among the Romans till the first Punic war. A Carthaginian galley was the first model; and in the space of two months they equipped a fleet of 100 gallies of five banks of oars, and 20 with three banks. In the times of the empire, which we are going, very briefly, to describe, the Romans maintained their different conquests, not by their armies, but by their fleets, which were moored in the large rivers and bays, and

and generally preserved a fixed station, as well as the legions.

Rome under the Emperors.—The battle of Actium, as we have already observed, decided the fate of the commonwealth, and Octavius, now having assumed the name of Augustus, was master of the Roman empire. This emperor new-modelled the state, flattered the people, and rendered monarchy supportable to republicans. Augustus possessed the talent of discerning what character was best fitted for gaining the affections of the people he governed, and versatility of temper and genius to assume it. His virtues, though the result of policy, not of nature, were certainly favourable to the happiness, and even the liberties, of his subjects. The fate of Cæsar might, and probably did, warn him of the insecurity of an usurped dominion; and, therefore, while he studiously imitated what was excellent in his predecessor, he affected a much higher degree of moderation and respect for the rights of the people. Long peace, in which the temple of Janus was shut, which had been open nearly two centuries, since the beginning of the second Punic war; an uniform and temperate government, and prevailing luxury, introduced a slow poison into the vitals of the empire. The national character was changed. The outward form remained; but the animating spirit and vigour had vanished. The Romans thought themselves free, because they had no longer to fight for their liberty. The sovereign kept up the delusion, by maintaining the ancient forms of the republican constitution, in the election of magistrates, &c. though they were nothing more than mere forms. He even pretended to consider his own functions as temporary, exerted for the benefits of the people, and depending upon their will. Five times, in the course of his protracted reign, did he submit to a sort of election. The emperor reposed the most unlimited confidence in Mecænas, by whose counsels all public affairs were conducted, and the most salutary laws enacted for the remedy of public grievances, and even the correction of the morals of the people. By his influence and wise instructions, Augustus assumed those virtues to which his heart was a stranger; and which, in their tendency to the happiness of his subjects, were equally effectual as if they had been the genuine fruits of his nature. On the death of Marcellus, the nephew and son-in-law of the emperor, he bestowed his chief favour on Marcus Agrippa, who married Julia, the widow of Marcellus; and on his decease, Julia took Tiberius for her third husband, who became the emperor's son-in-law by a double tie, for Augustus had previously married his mother, Livia. On the death of the emperor, in the 14th year of the Christian era, and in the 44th of his reign, Tiberius succeeded to the throne.

The government established by Augustus, founded, as it unquestionably was, on the power of the sword, not on the consent of the senate and people, degenerated in proportion as the army became corrupted. This prince had resolved to confine the boundaries of the empire to the limits which, he assumed, Nature had pointed out, *viz.* on the west the Atlantic ocean; the Rhine and Danube on the north; the Euphrates on the east; and towards the south, the sandy deserts of Arabia and Africa. His immediate successors adopted this resolution. Britain and Dacia were the sole accessions to the empire during the first century of the Christian era. A military spirit was, in some degree, preserved and cherished, when almost every virtue was extinguished; but the discipline of the legions was greatly corrupted by the ambition, or relaxed by the weakness, of the emperors, who confided in the army, and particularly in the strength and fidelity of the Prætorian guards, which had been formed by Augustus, and were kept up for the protection of the emperor's person. The soldiers were, however, soon roused to a sense of their own power, and of the impotency of the civil authority.

Tiberius, the second emperor, was an unfeeling tyrant, and he took for his counsellor Sejanus, prefect of the Prætorian guards, a man still more cruel and tyrannical than himself. Sejanus conceived the project of placing himself on the throne: for the furtherance of his plans, he caused Drusus, the son of the emperor, to be poisoned, and removed from the sight of the people the sons of Germanicus, who were the natural heirs to the crown. He even persuaded Tiberius himself, under the pretence of a discovery of plots for his assassination, to retire from Rome to the isle of Capreæ, and devolve the government upon himself. He had but one step more to the attainment of the object of his ambition: he was on the point of assassinating his master when he was detected, and instantly executed. Tiberius now became negligent of the cares of government, and the imperial power was displayed only in scenes of cruelty and rapine. At length he fell sick, and was strangled in his bed by Macro, the præfect of the Prætorian guards, in the 78th year of his age, and the 23d of his reign.

Caligula, the son of Germanicus, who was Tiberius's nephew, was the third emperor of Rome. The commencement of his reign was signalized by a few acts of clemency and good policy. But tyrannical and cruel by nature, he substituted military execution for legal punishment. The provinces were loaded with the most oppressive taxes, and daily confiscations filled the imperial coffers. He was assassinated in the 4th year of his reign, and was succeeded by his uncle

Claudius, the son of Octavia, the sister of Augustus, whose short reign, though he was a man of weak intellects, and of little education, was marked by an enterprise of importance. He undertook the reduction of Britain, and after visiting the island in person, left his generals, Plautius and Vespasian, to prosecute a war, which was carried on for several years with various success. The inhabitants of Wales, then denominated the Silures, under their king Caractacus, made a noble resistance, but were finally defeated, and Caractacus was led captive to Rome. The civil administration of Claudius was weak and contemptible; he was the slave even of his domestics, and the dupe of his abandoned wives Messalina and Agrippina. Claudius was put to death in the 15th year of his reign.

Nero, the scourge of mankind, succeeded his father Claudius, and for the first five years he reigned with great applause, whence Trajan, said "cunctos principes longè abesse a Neronis quinquennio;" but when his character began to unfold itself, he was found to be a compound of every thing that was base and inhuman. (See his article.) He perished in the 30th year of his age, and the 14th of his reign.

The two succeeding emperors, Galba and Otho, did not reign a year between them; the former was murdered by the soldiers, and the latter died by his own hand.

The reign of Vitellius, the next emperor, was of eight months' duration. He is said to have proposed Nero for his model, and it was just that he should resemble him in his fate. Vespasian, who had obtained from Nero the charge of the war against the Jews, which he had conducted with ability and success, was proclaimed emperor by his troops in the East, and a great part of Italy submitting to his generals, Vitellius capitulated to save his life; but as soon as Rome was taken, the deposed emperor was seized, massacred, and his body thrown into the Tiber.

Vespasian reigned with great popularity for ten years. He the *Mufic of the Ancients*, and *Mufical Inftruments* of the Greeks, (fee Music, and Instrument, in *Mufic*,) thofe of the Romans are generally included. They, indeed, imitated and adopted many cuftoms, religious rites and ceremonies of the Etrurians; and Plutarch (Vita Romuli) mentions it as a prevailing opinion, that the Greek language, which was fpoken by the Romans in the time of Romulus, was not corrupted by Italian words. From thefe accounts it appears that the Romans had not only vocal and inftrumental mufic as well as other arts and fciences from Greece, but even their alphabet, language, religion, and all the learning of which they were poffeffed during the time of their kings, and the firft ages of their republic, thefe having been originally Greek, though the Romans had them through Etrufcan ftrainers.

The firft Roman triumph, according to Dionyfius (lib. ii.), was that of Romulus over the Cæninenfes; in which, clad in a purple robe, he was drawn in a chariot by four horfes. The reft of the army, both horfe and foot, followed, ranged in three feveral divifions, hymning their gods in fongs of their country, and celebrating their general with extemporary verfes: this account affords a very venerable origin to the improvifatori of Italy; as the event happened in the fourth year of Rome, 749 years before Chrift, and the fourth year of the feventh olympiad.

Indeed the Romans were later in cultivating arts and fciences than any other great and powerful people; and none of them feem to have been the natural growth of the foil, except the military art; all others were brought in by conqueft.

During the reign of Auguftus, except Vitruvius, it does not appear that the Romans had one architect, fculptor, painter, or mufician; thofe who have been celebrated in the arts at Rome, having been Afiatics, or European Greeks, who came to exercife fuch arts among the Latins, as the Latins had not among themfelves; this cuftom was continued under the fucceffors of Auguftus, and thofe Romans who were prevented by more important concerns from going into Greece, contrived in a manner to bring Greece to Rome, by receiving into their fervice the moft able profeffors of Greece and Afia, in all the arts. We find too, not only that each of the beft Roman writers was an imitator of fome great Grecian model, but are certain that the fineft remains in painting, fculpture, and architecture, which ftill fubfift in Italy, were either brought thither from Greece, or were the works of Greek artifts, who had left their own ruined and oppreffed country, to bafk in the warm fun-fhine of power and affluence at Rome.

Vitruvius, in his Treatife on Architecture, has inferted a chapter on mufic, in which he has given the harmonical fyftem of Ariftoxenus; but he introduces it with a complaint of the unavoidable obfcurity of mufical literature, on account of the deficiency of terms in the Latin tongue, to explain his ideas. "The fcience of mufic, in itfelf obfcure," fays he, "is particularly fo to fuch as underftand not the Greek language." This writer, therefore, who feems to have been the firft that had treated of mufic in the Roman language, confeffes the neceffity he was under of ufing Greek appellatives, not only for the notes, but for other parts of the art; which fhews, if not the low ftate of mufic at Rome when he wrote, which was in the Auguftan age, at leaft whence their mufic came; and *borrowing* implies *inferiority*. Indeed, the writings of Cicero fhew that philofophy, and all the arts and fciences, were wholly furnifhed to the Romans from Greece, even in the moft enlightened times.

Mufic was, however, in great favour at Rome during the latter end of the republic, and the voluptuous times of the emperors; the ftage then flourifhed; the temples were crowded; feftivals frequent; and banquets fplendid; fo that we may fuppofe it to have been very much ufed both upon public and private occafions, in fo rich, populous, and flourifhing a city as Rome, the miftrefs of the world. But this mufic muft have differed as little from that of the Greeks, as the defcriptions of it in Horace and Virgil differ from thofe to be found in Homer, and the Greek lyric poets.

Notwithftanding the Romans had the Greeks, Etrurians, and Sicilians to imitate in the polite arts, they never advanced fo far in them as the modern Italians have done; who, without any foreign help, have greatly furpaffed not only their forefathers the ancient Romans, but even the Greeks themfelves, in feveral of the arts, and in no one fo much as that of mufic, in which every people of Europe have, at different times, confented to become their fcholars.

From the fuccefs which attended the arms of the Romans, and that dominion which they acquired over the greateft part of the known world, it is natural to conclude that they muft have carried the military art to a higher degree of perfection than any other nation of that period. It is the difcipline of an army that makes the multitude act as one man; it moreover increafes the courage of troops, becaufe each individual confides in the fteady co-operation of his affociates. From the conftant practice of athletic exercifes, the Romans were inured from infancy to hardinefs and fatigue, and bred to that fpecies of life which a foldier leads in the moft active campaign.

Among the ancient nations there were ufually but two different arrangements of the troops in order of battle. The one the Phalanx, or clofe arrangement in parallelograms, interfected only by great divifions; the other the Quincunx, confifting of fmall companies or platoons, difpofed in three ftraight lines, with alternate fpaces between them equal to the fpace occupied by each company. The military tactics of the Romans are fuppofed to have been at their higheft pitch of excellence during the Punic wars. Hannibal was a mafter in the fcience, and the Romans underftood how to profit from the inftructions of an enemy. The art of intrenchment was carried to great perfection by the Romans, particularly by Julius Cæfar. Their intrenchments confifted of a ditch from nine to fifteen feet in depth and width, fenced on the infide by the mound of excavated earth, and on the outfide by ftrong ftakes with pointed branches.

In befieging a town, feveral camps were formed around the place, joined to each other by lines of circumvallation and countervallation. A mound of earth was raifed, gradually rifing in elevation as it approached the city. The front, where workmen were employed, was defended by a curtain of hides. On this mound the engines of attack were advanced, till they played on the very fpot which the befiegers wifhed to affail. The fame machines were ufed by the befieged for annoying the enemy. When the batteries from the terrace had filenced thofe on the walls, the battering ram was brought up, and if it once reached the walls, it was generally decifive of the fate of the town. The great object, therefore, of the befieged, was to prevent its approach by every power of annoyance.

The naval military art was utterly unknown among the Romans till the firft Punic war. A Carthaginian galley was the firft model; and in the fpace of two months they equipped a fleet of 100 gallies of five banks of oars, and 20 with three banks. In the times of the empire, which we are going, very briefly, to defcribe, the Romans maintained their different conquefts, not by their armies, but by their fleets, which were moored in the large rivers and bays, and

and generally preferved a fixed ftation, as well as the legions.

Rome under the Emperors.—The battle of Actium, as we have already obferved, decided the fate of the commonwealth, and Octavius, now having affumed the name of Auguftus, was mafter of the Roman empire. This emperor new-modelled the ftate, flattered the people, and rendered monarchy fupportable to republicans. Auguftus poffeffed the talent of difcerning what character was beft fitted for gaining the affections of the people he governed, and verfatility of temper and genius to affume it. His virtues, though the refult of policy, not of nature, were certainly favourable to the happinefs, and even the liberties, of his fubjects. The fate of Cæfar might, and probably did, warn him of the infecurity of an ufurped dominion; and, therefore, while he ftudioufly imitated what was excellent in his predeceffor, he affected a much higher degree of moderation and refpect for the rights of the people. Long peace, in which the temple of Janus was fhut, which had been open nearly two centuries, fince the beginning of the fecond Punic war; an uniform and temperate government, and prevailing luxury, introduced a flow poifon into the vitals of the empire. The national character was changed. The outward form remained; but the animating fpirit and vigour had vanifhed. The Romans thought themfelves free, becaufe they had no longer to fight for their liberty. The fovereign kept up the delufion, by maintaining the ancient forms of the republican conftitution, in the election of magiftrates, &c. though they were nothing more than mere forms. He even pretended to confider his own functions as temporary, exerted for the benefits of the people, and depending upon their will. Five times, in the courfe of his protracted reign, did he fubmit to a fort of election. The emperor repofed the moft unlimited confidence in Mecænas, by whofe counfels all public affairs were conducted, and the moft falutary laws enacted for the remedy of public grievances, and even the correction of the morals of the people. By his influence and wife inftructions, Auguftus affumed thofe virtues to which his heart was a ftranger; and which, in their tendency to the happinefs of his fubjects, were equally effectual as if they had been the genuine fruits of his nature. On the death of Marcellus, the nephew and fon-in-law of the emperor, he beftowed his chief favour on Marcus Agrippa, who married Julia, the widow of Marcellus; and on his deceafe, Julia took Tiberius for her third hufband, who became the emperor's fon-in-law by a double tie, for Auguftus had previoufly married his mother, Livia. On the death of the emperor, in the 14th year of the Chriftian era, and in the 44th of his reign, Tiberius fucceeded to the throne.

The government eftablifhed by Auguftus, founded, as it unqueftionably was, on the power of the fword, not on the confent of the fenate and people, degenerated in proportion as the army became corrupted. This prince had refolved to confine the boundaries of the empire to the limits which, he affumed, Nature had pointed out, *viz.* on the weft the Atlantic ocean; the Rhine and Danube on the north; the Euphrates on the eaft; and towards the fouth, the fandy deferts of Arabia and Africa. His immediate fucceffors adopted this refolution. Britain and Dacia were the fole acceffions to the empire during the firft century of the Chriftian era. A military fpirit was, in fome degree, preferved and cherifhed, when almoft every virtue was extinguifhed; but the difcipline of the legions was greatly corrupted by the ambition, or relaxed by the weaknefs, of the emperors, who confided in the army, and particularly in the ftrength and fidelity of the Prætorian guards, which had been formed by Auguftus, and were kept up for the protection of the emperor's perfon. The foldiers were, however, foon roufed to a fenfe of their own power, and of the impotency of the civil authority.

Tiberius, the fecond emperor, was an unfeeling tyrant, and he took for his counfellor Sejanus, prefect of the Prætorian guards, a man ftill more cruel and tyrannical than himfelf. Sejanus conceived the project of placing himfelf on the throne: for the furtherance of his plans, he caufed Drufus, the fon of the emperor, to be poifoned, and removed from the fight of the people the fons of Germanicus, who were the natural heirs to the crown. He even perfuaded Tiberius himfelf, under the pretence of a difcovery of plots for his affaffination, to retire from Rome to the ifle of Capreæ, and devolve the government upon himfelf. He had but one ftep more to the attainment of the object of his ambition: he was on the point of affaffinating his mafter when he was detected, and inftantly executed. Tiberius now became negligent of the cares of government, and the imperial power was difplayed only in fcenes of cruelty and rapine. At length he fell fick, and was ftrangled in his bed by Macro, the præfect of the Prætorian guards, in the 78th year of his age, and the 23d of his reign.

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Claudius, the fon of Octavia, the fifter of Auguftus, whofe fhort reign, though he was a man of weak intellects, and of little education, was marked by an enterprife of importance. He undertook the reduction of Britain, and after vifiting the ifland in perfon, left his generals, Plautius and Vefpafian, to profecute a war, which was carried on for feveral years with various fuccefs. The inhabitants of Wales, then denominated the Silures, under their king Caractacus, made a noble refiftance, but were finally defeated, and Caractacus was led captive to Rome. The civil adminiftration of Claudius was weak and contemptible; he was the flave even of his domeftics, and the dupe of his abandoned wives Meffalina and Agrippina. Claudius was put to death in the 15th year of his reign.

Nero, the fcourge of mankind, fucceeded his father Claudius, and for the firft five years he reigned with great applaufe, whence Trajan, faid "cunctos principes longè abeffe a Neronis quinquennio;" but when his character began to unfold itfelf, he was found to be a compound of every thing that was bafe and inhuman. (See his article.) He perifhed in the 30th year of his age, and the 14th of his reign.

The two fucceeding emperors, Galba and Otho, did not reign a year between them; the former was murdered by the foldiers, and the latter died by his own hand.

The reign of Vitellius, the next emperor, was of eight months' duration. He is faid to have propofed Nero for his model, and it was juft that he fhould refemble him in his fate. Vefpafian, who had obtained from Nero the charge of the war againft the Jews, which he had conducted with ability and fuccefs, was proclaimed emperor by his troops in the Eaft, and a great part of Italy fubmitting to his generals, Vitellius capitulated to fave his life; but as foon as Rome was taken, the depofed emperor was feized, maffacred, and his body thrown into the Tiber.

Vefpafian reigned with great popularity for ten years.

He

He respected the ancient forms of the constitution, restored the senate to its deliberative rights, and acted by its authority in the administration of all public affairs. Under his reign, and by the arms of his son Titus, was terminated the war against the Jews. They had been brought under the yoke of Rome by Pompey, who took Jerusalem. Under Augustus, they were governed for some time by Herod as viceroy; but the tyranny of his son Archelaus was the cause of his banishment, and also of the reduction of Judæa into the ordinary condition of a Roman province. In the reign of Vespasian, Jerusalem was besieged, and after a blockade of six months, taken by storm, the temple burnt to ashes, and the city buried in ruins. Vespasian associated Titus in the imperial dignity, and soon after died, at the age of 69, in the year 79 of the Christian era.

In elective monarchies, the vacancy of the throne is a moment big with danger and mischief. The Roman emperors, desirous to spare the legions that interval of suspence, and the temptation of an irregular choice, invested their designed successor with so large a share of present power, as should enable him, after their decease, to assume the remainder, without suffering, as it were, the empire to perceive the change of masters. Thus Augustus, after all his fair prospects had been snatched from him by untimely deaths, rested his last hopes on Tiberius, and obtained a law, by which the future prince was invested with an authority equal to his own over the provinces and the armies. Thus, also, Vespasian subdued the generous mind of his eldest son. Titus was adored by the eastern legions; his power was dreaded; but as his virtues were clouded by the intemperance of youth, his designs were liable to be suspected. Instead of listening to such unworthy suspicions, the prudent monarch associated, as we have seen, Titus to the full powers of the imperial dignity: and the grateful son ever approved himself the humble and faithful minister of so indulgent a father.

Vespasian had embraced every measure that might confirm his recent and precarious elevation. The military oath, and the fidelity of troops, had been consecrated by the habits of an hundred years to the name and family of the Cæsars; and although that family had been continued only by the fictitious rite of adoption, the Romans still revered, in the person of Nero, the grandson of Germanicus, and the lineal successor of Augustus. It was not without reluctance and remorse that the Prætorian guards were persuaded to abandon the cause of the tyrant. The rapid downfall of Galba, Otho, and Vitellius, taught the armies to consider the emperors as the creatures of their will, and the instruments of their licence. The birth of Vespasian was very mean: his own merit had raised him, in an advanced age, to the empire. "Such a prince," then, says Gibbon, "consulted his true interest by the association of a son, whose more splendid and amiable character might turn the public attention from the obscure origin, to the future glories, of the Flavian house. Under the mild administration of Titus, the Roman world enjoyed a transient felicity. His character was humane, munificent, dignified, and splendid. In his reign happened that dreadful eruption of Vesuvius, which overwhelmed the cities of Herculaneum and Pompeii; and the public losses from these calamities he repaired by the sacrifice of his fortune and revenues. He died in the third year of his reign, and obtained the most exalted epithet, 'Deliciæ humani generis.'"

Domitian, the brother of Titus, and suspected of murdering him by poison, succeeded to the empire A.D. 81. He was a most cruel tyrant. A rebellion in Germany gave him an opportunity to signalize the barbarity of his disposition; and its consequences were long felt in the sanguinary punishments inflicted under the pretence of justice. In this reign, the successes of Agricola in Britain threw a lustre on the Roman arms; nevertheless Domitian treated this brave commander with the basest ingratitude. The emperor was assassinated in the sixteenth year of his reign.

It may not be amiss, before we proceed, to notice, in a geographical sense, the different divisions of the empire under Augustus, and which continued during the reigns of the twelve Cæsars, to that of Adrian. When Augustus made himself master of the Roman empire, its possessions extended almost to all the then known world. He did not, as we have seen, make any attempts to extend the limits of the empire, but took every means, that his great talents could suggest, to preserve his own authority, without rendering the senate and people his enemies. He appeared to surrender to them their ancient authority and rights, and only to attend to those parts of the government which were most laborious and difficult. He even seemed to divide the provinces of the empire between himself and the nation, which provinces he arranged into twenty-six dioceses or departments. Of these he granted twelve to the senate and people, reserving to himself the other fourteen. He had taken care, in this division of the empire, that not only the most considerable provinces should fall to his own share, but that they should be so situated, as to give him a decided pre-eminence over the others. With respect to the departments under the controul of the senate and people, two were governed by proconsuls, and ten by pretors.

I. The two departments governed by proconsuls comprehended Africa, including Africa proper, Numidia, and part of Libya.

II. The ten departments under the government of prætors comprehended that part of Spain denominated Bœtica; Gallia Narbonensis; Sicily; Sardinia, and Corsica; Illyria, and part of Epirus; Macedonia, and part of Greece; Achaia; Bœotia, Acarnania, and part of Epirus; the island of Crete; Cyrenaica, an ancient kingdom of Africa, including the present kingdom and desart of Barca and Tripoli; the island of Cyprus; Bithynia; Paphlagonia; the countries about the Propontis and Pontus.

III. The fourteen dioceses or departments under the immediate authority of the emperor were as follow: Hispania; Lusitania; Celtiberia; Aquitania; the most important parts of Gallia and Belgica; Nerica, Vindelicia, and Rhætia; Mœsia, comprehending Dardania, Dacia, and Thrace; Dalmatia, and part of Illyria; the Maritime Alps; Cilicia, Isauria, and Lycaonia; Galatia, Pamphylia, and Pisidia; Syria, Little Armenia, Mesopotamia, and all the eastern parts of the empire; Egypt, and part of Arabia; Italy, from the island of Sicily to the Alps.

Nerva, who succeeded Domitian, had scarcely accepted the sovereign power from the murderers of that emperor, before he discovered that he was too aged and infirm to stem the torrent of public disorders, which had multiplied to an alarming degree under the long tyranny of his predecessor. His mild disposition was highly respected by the virtuous, but was treated with great contempt by the guilty. Though he had relations of his own, yet he adopted for his successor a stranger, Trajan, who had commanded with wisdom and success a powerful army in Lower Germany, and immediately, by a decree of the senate, declared him his colleague and successor in the empire. Nerva died in sixteen months after his elevation to the throne.

Trajan possessed every talent and every virtue that can adorn a sovereign. As a warrior, he raised the Roman arms to their ancient splendour, and greatly enlarged the boundaries of the empire. He subdued the Dacians, conquered the Parthians, and brought under subjection Assyria, Mesopotamia, and Arabia Felix. Nor was he less eminent in promoting the happiness of his subjects, and the internal prosperity of the empire. He was illustrious in every connection, and in every station of life, and obtained the epithet *Optimus*. He died after a glorious reign of nineteen years. Of this emperor Gibbon remarks, "It is sincerely to be lamented, that while we are fatigued with the disgustful relation of Nero's crimes and follies, we are reduced to collect the actions of Trajan from the glimmering of an abridgment, or the doubtful light of a panegyric. Above two hundred and fifty years after the death of Trajan, the senate, in pouring out the customary acclamations on the accession of a new emperor, wished that he might surpass the felicity of Augustus and the virtue of Trajan."

Adrian, the nephew of Trajan, was nominated to the throne, in the last moments of his predecessor, and his title was peaceably acknowledged. Under his reign the empire flourished: he encouraged the arts, reformed the laws, asserted strict military discipline, and visited all his provinces in person. He adopted a policy very different from that of his predecessor, and judging the limits of the empire too extensive, abandoned all the conquests of Trajan, bounding the eastern provinces by the Euphrates. To his talents as an able politician, he joined an excellent taste in the liberal arts. In the last year of his life he adopted, and declared for his immediate successor, Titus Aurelius Antoninus, and substituting Annius Verus, the son of Ælius Verus, in case of the other's death. Adrian died A.D. 138, at the age of 62.

The emperor Adrian suppressed the departments established by Augustus, and divided the whole empire into eleven parts, as follow.

I. Italy, including two provinces, of which the first comprehends all the country from Picenum to Sicily; and the second from Picenum to the Alps, with the two Rhætias.

II. Africa, comprehending the proconsular part of that country; Numidia, and Mauritania.

III. Hispania, including Hispania Tarraconensis; Bœtica, and Lusitania.

IV. Gallia, comprehending Gallia Belgica; Gallia Lugdunensis; Gallia Aquitanica, and Gallia Narbonensis.

V. Britanny, comprehending the upper and lower countries of that name.

VI. Illyria, containing seventeen provinces, *viz.* the two Noricas; the Upper and Lower Pannonia, and their appendages; Dalmatia; Mœsia Prima; the Superior and Inferior Dacia; Macedonia; Thessaly; Achaia; the two Epiri, and the island of Crete.

VII. Egypt, including Egypt Proper; Thebais; Libya, and Pentapolis.

VIII. The eastern part of the empire comprehended Palestine; Phœnicia; Cœlo-Syria; Syria; the two Cicilias; Isauria; Mesopotamia; Arabia, and the island of Cyprus,

IX. Thrace comprehended Thrace Proper; the Lower Mœsia; Scythia, and the adjoining countries.

X. Pontus included Pontus Proper; Galatia; Bithynia; the two Cappadocias; Paphlagonia, and Armenia.

XI. The Asiatic division comprehended the proconsular part of Asia; Pamphylia; the countries about the Hellespont; Lydia; Pisidia; Lycaonia; the two Phrygias; Lycia; Caria; and several islands, of which Rhodes was the chief.

The Age of the Antonines.—This has by historians been regarded as an era in the Roman empire. Adrian, says the historian, was resolved to deserve the thanks of posterity, by placing the most exalted merit on the Roman throne. His discerning eye easily discovered a senator about 50 years of age, blameless in all the offices of life; and a youth of about 17, whose riper years opened the fair prospect of every virtue. The elder of these, as we have seen, was declared the son and successor of Adrian, on condition that he himself should immediately adopt the younger. The two Antonines, for so they have been denominated, governed the Roman world 42 years, with the invariable spirit of wisdom and virtue. The former has, on account of his many excellent qualities, been surnamed Pius; the latter, Annius Verus, on his accession, assumed the name of Marcus Aurelius Antoninus. Titus Antoninus Pius has been denominated a second Numa. The same love of justice and peace was the distinguishing characteristic of both princes: but the situation of the latter opened a much wider field for the exercise of those virtues. The wisdom of the former could benefit but a few villages; but Antoninus diffused order and tranquillity over the greatest part of the earth. "His reign," says Gibbon, "is marked by the rare advantage of furnishing very few materials for history; which is, indeed, little more than the register of the crimes, follies, and misfortunes of mankind." In private life, he was an amiable as well as a good man; and he enjoyed with moderation the advantages of his good fortune. He died after a reign of 22 years.

The virtue of Marcus Aurelius Antoninns was of a severer and more laborious kind. At the age of twelve he embraced, from a conviction of its utility, the rigid system of the Stoics, which taught him to subject his body to his mind, his passions to his reason; to consider virtue as the only good, and vice as the only evil. His "Meditations," composed in the midst of a camp, are not only extant, but still read with delight and advantage; and he even gave lessons of philosophy to the Roman people, as he had before done in several cities of Greece and Asia. War he detested, as the disgrace and calamity of human nature; but when the necessity of a just defence called upon him to take up arms, he readily exposed his person to eight winter campaigns on the frozen banks of the Danube, the severity of which was at last fatal to the weakness of his constitution. Having appeared like a benevolent deity, diffusing around him peace and happiness, he died in Pannonia, in the 19th year of his reign, A.D. 180. His memory was revered by a grateful posterity; and above a century after his death, many persons preserved the image of Marcus Antoninus among those of their household gods.

"If a man," says the historian of these times, "were called on to fix the period in the history of the world, during which the condition of the human race was most happy and prosperous, he would, without hesitation, name that which elapsed from the death of Domitian to the accession of Commodus. The vast extent of the Roman empire was governed by absolute power, under the guidance of virtue and wisdom. The armies were restrained by the firm and gentle hand of five successive emperors, whose characters and authority commanded an involuntary respect. The forms of the civil administration were carefully preserved by Nerva, Trajan, Adrian, and the Antonines, who delighted in the image of liberty, and were pleased with considering themselves as accountable ministers of the laws. Such princes deserved the honour of restoring the republic, had the Romans of their days been capable of enjoying a rational freedom. The labours of these monarchs were overpaid by the immense reward that inseparably waited on their success; by the honest pride of virtue, and by the exquisite delight

delight of beholding the general happinefs, of which they were the authors."

Commodus fucceeded to the empire on the death of his father. The meafures of this reign were as unimportant as the character of the fovereign was contemptible. Commodus had an averfion from every rational and liberal purfuit, and was in many refpects very like Nero. To his other crimes, which he had in common with preceding tyrants, may be added, that he entered the lifts as a public gladiator, and actually received a ftipend for the flaughter of his helplefs antagonifts. The concubine and fome of the chief officers of this emperor prevented their own deftruction, by affaffinating him in the thirteenth year of his reign, A.D. 193.

Publius Helvius Pertinax was the next emperor, a man of mean birth, but who had rifen to efteem by his virtues and military talents. He difappointed the army of a promifed reward for his elevation, and, after a reign of 86 days, was murdered in the imperial palace by the fame hands which had raifed him to the throne. The empire was now put up to auction by the Prætorians, and was purchafed by Didius Julianus; but not paying the ftipulated price for his elevation, he was depofed and put to death.

Septimius Severus fucceeded, whofe intention was to erect the fabric of abfolute monarchy, and all his inftitutions operated to that end. He poffeffed eminent military talents, and it was his boaft, that, having received the empire oppreffed with foreign and domeftic wars, he left it in profound, univerfal, and honourable peace. He carried with him into Britain his two fons, Caracalla and Geta; and died at York, in the 66th year of his age, after a reign of eighteen years, A.D. 211. He was fucceeded by the two fons juft named, whofe former mutual hatred of each other was increafed by their affociation in the empire; and Caracalla, with brutal inhumanity, caufed his brother to be openly murdered in the arms of his mother. His reign, which was of fix years' duration, and full of atrocities, was at length terminated by affaffination, A.D. 217.

As it would not be confiftent with the limits affigned to this article, neither is it at all neceffary, to advance ftep by ftep through the fucceeding reigns; it will be fufficient to tranfcribe, with very trifling additions, the names of feveral of the emperors who followed Caracalla.

The diforders in the Roman empire, which began with Commodus, continued nearly a century, till the acceffion of Diocletian: and this interval was filled by the reigns of Macrinus and Heliogabalus, who were both flain by the foldiers. Alexander Severus was a juft prince and a lover of learning; he was fuccefsful in his war againft Artaxerxes, the new king of Perfia, and after that, was flain by fome of his foldiers in an expedition into Germany.

Maximin, Maximus and Balbinus, Gordian, and Philip the Arabian, with his fon, in whofe reign were inftituted the fecular games, were all raifed to the throne by the prætorian bands, and by them killed. Decius, a fevere perfecutor of the Chriftians, was drowned while fighting againft the barbarians. After this Gallus was flain by the army, at the end of a reign of two years. The life of Valerianus was devoted to the reformation of the manners of his people; but in a war with Sapor, king of Perfia, he was captured and flead alive. Gallienus, the fon of Valerianus, was loft in luxury and debauchery, and fuffered the empire to be torn from him on all fides by barbarians and tyrants. Hence the 30 tyrants, as they are called, though hiftory records the names of 19 only, rofe up againft him. Among thefe was Zenobia, wife to Odenatus, prince of Palmyra, a woman of martial fpirit, who fpread her conquering arms far over the Eaftern world.

After Gallienus were Claudius II., who died of the plague: Aurelian, who carried Zenobia a captive in triumph, and who was murdered by his foldiers: Claudius Tacitus, Probus, and Carus followed in fucceffion. Probus was killed by the foldiers, and Carus was ftruck dead with lightning.

Diocletian began his reign A.D. 284, and introduced a new fyftem of adminiftration, dividing the empire into four governments, under as many princes. Maximian fhared with him the title of Auguftus, and Galerius and Conftantius were declared Cæfars, or their fucceffors. Each had his feparate department or province, all nominally fupreme, but in reality under the direction of the fuperior talents and authority of Diocletian. The two emperors, trufting to a continuance of that order in the empire which their vigour had eftablifhed, retired from fovereignty, and left the government in the hands of the Cæfars; but Conftantius died foon after in Britain, and he was fucceeded by his fon Conftantine, who was proclaimed emperor at York, though Galerius, at firft, refufed to acknowledge his title. Maximian, however, having once more refumed the purple, beftowed on Conftantine his daughter in marriage, and thus he invefted him with a double title to the empire. On the death of Maximian and Galerius, Conftantine had no other competitor than Maxentius, the fon of Maximian, and the conteft between them was decided by the fword. Maxentius fell in battle, and Conftantine remained fole mafter of the empire: this was the time in which the crofs is faid to have appeared in the heavens, in vifion, to the emperor, with this infcription, "in hoc figno vinces."

Conftantine made a confiderable change in the diftribution of the provinces which had not fuffered much alteration fince the arrangement of Adrian. He fubjected the whole empire to the dominion of four prefects of the palace; of whom one was placed over Gallia, one over Italia, one over Illyria, and the other over the Eaftern provinces. Thefe prefects had under them *proconfuls* in fome of the provinces; in others, *magiftrates*, called *confuls*, *prefidents*, and *correctors*; and a certain number of provinces over which thefe were placed being united, formed a vicariat. The *prefect of the palace*, under Auguftus, was a military officer, in the order of knights. Tiberius increafed the importance of the office; but Antoninus was the firft who made ufe of that officer to promulgate, in his name, the laws of the empire. Hence the prefect of the palace became chief judge, who had authority over all other tribunals. In him were united the feveral offices of conftable, chancellor, and fuperintendant of the finances. Conftantine fuppreffed this office, as held by an individual, and created four prefects of the palace, who had under them *vicars*, whofe power extended over a certain number of countries, forming a diocefe or department. Thefe officers had the moft confiderable influence in their departments, and when they quitted the capital, they left their children with the emperor, as pledges of their fidelity.

Under Auguftus, and after him, the proconfuls were magiftrates fent by the fenate to correct the exifting abufes of the departments: but they had neither the command of troops, nor the adminiftration of the provinces.

The *conful*, called alfo rector of the province, had only the name and the enfigns of that office, not the power. Auguftus governed the departments of the empire, which he had referved to himfelf, by means of his prætors and confuls.

The *correctors* were officers who were charged to reform the abufes which had crept into the provinces.

The

The *presidents* were cloathed with a much greater power than that possessed by the proconsuls. They were military officers, and had the power of life and death over the army. It was to one of these officers that the provinces of the empire were subjected in each of the great prefectures: thus,

The prefecture of the Gauls, comprehending twenty-nine provinces, was divided into three vicariats, *viz.* Hispania, Gallia, and Britanny.

I. The vicariat of Hispania included seven provinces, of which three were under consuls, and four under presidents.

II. The vicariat of the Gauls included seventeen provinces; six under consuls, and eleven under presidents.

III. The vicariat of Britanny comprised five provinces; two under consuls, and three under presidents.

The prefecture of Italy included likewise twenty-nine provinces, divided into the proconsulship of Africa, and the vicariats of Rome, Italy, Africa, and Illyria. The vicariat of ROME was under consuls, correctors, and presidents; that of ITALY was under consuls and presidents; that of AFRICA was under consuls and presidents; and that of ILLYRIA under one consul, one corrector, and four presidents.

The prefecture of Illyria included eleven provinces; one under the proconsul of Achaia; the vicariat of Macedonia comprehended five provinces, two under consuls, and three under presidents; the vicariat of Dacia was under one consul, and four presidents.

The prefecture of the East included forty-eight provinces; *viz.* three under the proconsul of Asia; fifteen under the count of the East, a companion to the emperor; six under the prefect of Egypt; seven under the vicariat of Asia; eleven under the vicariat of Pontus; and six under the vicariat of Thrace.

We are now arrived to that state of the Roman empire in which it was governed by Christian emperors, and which may be divided into three distinct periods. The *first* will contain the whole time that the Roman world was governed by one emperor only. The *second* commences with the division of the empire, after the death of Theodosius the Great, and goes down to the extinction of the Western empire under Augustulus. The *third* reaches from the fall of the Western empire to the capture of Constantinople, and the destruction of the whole empire.

Of the Christian Roman Emperors before the Division of the Empire.—The administration of Constantine was, in the early part of his reign, mild, equitable, and politic. Though strongly attached to the Christian faith, he made no great innovations on the religion of the state. He introduced order and economy into the civil government, and repressed every species of oppression and corruption. But his natural temper was severe and cruel, and the latter part of his reign was deformed by rancour and a most sanguinary rigour. From this unfavourable change of character he lost the affections of his subjects; and from a feeling, probably of reciprocal disgust, he removed the seat of the Roman empire to Byzantium, where a new city was raised; from his name it was called CONSTANTINOPLE; see the article. The court followed the sovereign: the opulent proprietors were attended by their slaves and retainers. Rome was in a few years depopulated, and the new capital swelled almost at once to an enormous magnitude. In an expedition against the Persians, Constantine died at Nicomedia, in the 30th year of his reign, A.D. 337. During this reign the Goths had made several irruptions on the empire, and though repulsed and weakened, they began gradually to encroach on the provinces.

Before we proceed with the monarchs, we may just notice some particulars relating to the state of the Roman empire at this period; for which we shall be chiefly indebted to Mr. Tytler's Elements, already quoted and referred to.

Instead of the ancient republican distinctions, which were founded chiefly on personal merit, a rigid subordination of rank and office now went through all the orders of the state. The magistrates were divided into three classes, distinguished by the unmeaning titles of, 1, the Illustrious; 2, the Respectable; and 3, the Clarissimi. The epithet of *Illustrious* was conferred on, 1, the consuls and patricians; 2, the prætorian prefects of Rome and Constantinople; 3, the masters-general of the cavalry and infantry; and 4, the seven ministers of the palace.

The consuls were created by the sole authority of the emperor; their dignity was inefficient, and their names served only to give the legal date of the year. The dignity of patrician was not hereditary, but was bestowed as a title of honour by the emperor on his favourites. The prætorian prefects were the civil governors of the four departments of the empire. These were the East, Illyria, Italy, and the Gauls: to them was committed the supreme administration of justice, and of the finances.

The *Respectables* were the proconsuls of Asia, Achaia, and Africa; and the military *comites* and *duces*, generals of the imperial armies. The *Clarissimi* included the inferior governors and magistrates of the provinces, responsible to the prefects and their deputies.

The intercourse between the court and the provinces was maintained by the construction of roads, and the institution of regular posts or couriers; under which denomination were ranked the numberless spies of government, whose duty was to convey all kinds of intelligence to the seat of empire. Taxes were levied by the sole authority of the emperor, and subsidies were exacted from all the cities, under the name of free gifts, on various occasions of public concern, as the accession of an emperor, the birth of a prince, &c.

An impolitic distinction was made between the troops stationed in distant provinces, and those in the heart of the empire. The latter, denominated *Palatines*, enjoyed a higher pay, and more particular favour, and having less employment, spent their time in idleness and luxury; while the former, called *Borderers*, who, in truth, had the care of the empire, and were exposed to perpetual hard service, had, with an inferior reward, the mortification of feeling themselves regarded as of a meaner rank than their fellow-soldiers. Constantine also debased the body of the army by the intermixture of Scythians, Goths, and Germans. This mass of heterogeneous parts, which internally laboured with the seeds of dissolution and corruption, was kept together for some time by the vigorous exercise of despotic authority.

Constantine had divided the empire among five princes, three of them his sons, and two nephews; but Constantius, the youngest of the sons, finally freed himself from all his competitors, and ruled the empire alone. During his reign, the Franks, Saxons, Alemanni, and Sarmatians, laid waste all the fine countries on the banks of the Rhine, and the Persians made the most destructive incursions on the provinces of the East. Constantius wasted his time in theological controversies; but before his death, he appointed his cousin Julian to the dignity of Cæsar. He died A.D. 361.

Julian possessed many heroic qualities, and his mind was formed by nature for the sovereignty of a great people; but having been educated under the philosophers at Athens, he had unfortunately conceived a rooted antipathy to the doctrines of Christianity. The reformation of civil abuses delight of beholding the general happineſs, of which they were the authors."

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After Gallienus were Claudius II., who died of the plague: Aurelian, who carried Zenobia a captive in triumph, and who was murdered by his ſoldiers: Claudius Tacitus, Probus, and Carus followed in ſucceſſion. Probus was killed by the ſoldiers, and Carus was ſtruck dead with lightning.

Diocletian began his reign A.D. 284, and introduced a new ſyſtem of adminiſtration, dividing the empire into four governments, under as many princes. Maximian ſhared with him the title of Auguſtus, and Galerius and Conſtantius were declared Cæſars, or their ſucceſſors. Each had his ſeparate department or province, all nominally ſupreme, but in reality under the direction of the ſuperior talents and authority of Diocletian. The two emperors, truſting to a continuance of that order in the empire which their vigour had eſtabliſhed, retired from ſovereignty, and left the government in the hands of the Cæſars; but Conſtantius died ſoon after in Britain, and he was ſucceeded by his ſon Conſtantine, who was proclaimed emperor at York, though Galerius, at firſt, refuſed to acknowledge his title. Maximian, however, having once more reſumed the purple, beſtowed on Conſtantine his daughter in marriage, and thus he inveſted him with a double title to the empire. On the death of Maximian and Galerius, Conſtantine had no other competitor than Maxentius, the ſon of Maximian, and the conteſt between them was decided by the ſword. Maxentius fell in battle, and Conſtantine remained ſole maſter of the empire: this was the time in which the croſs is ſaid to have appeared in the heavens, in viſion, to the emperor, with this inſcription, "in hoc ſigno vinces."

Conſtantine made a conſiderable change in the diſtribution of the provinces which had not ſuffered much alteration ſince the arrangement of Adrian. He ſubjected the whole empire to the dominion of four prefects of the palace; of whom one was placed over Gallia, one over Italia, one over Illyria, and the other over the Eaſtern provinces. Theſe prefects had under them *proconſuls* in ſome of the provinces; in others, *magiſtrates,* called *conſuls, preſidents,* and *correctors;* and a certain number of provinces over which theſe were placed being united, formed a vicariat. The *prefect of the palace,* under Auguſtus, was a military officer, in the order of knights. Tiberius increaſed the importance of the office; but Antoninus was the firſt who made uſe of that officer to promulgate, in his name, the laws of the empire. Hence the prefect of the palace became chief judge, who had authority over all other tribunals. In him were united the ſeveral offices of conſtable, chancellor, and ſuperintendant of the finances. Conſtantine ſuppreſſed this office, as held by an individual, and created four prefects of the palace, who had under them *vicars,* whoſe power extended over a certain number of countries, forming a dioceſe or department. Theſe officers had the moſt conſiderable influence in their departments, and when they quitted the capital, they left their children with the emperor, as pledges of their fidelity.

Under Auguſtus, and after him, the proconſuls were magiſtrates ſent by the ſenate to correct the exiſting abuſes of the departments: but they had neither the command of troops, nor the adminiſtration of the provinces.

The *conſul,* called alſo rector of the province, had only the name and the enſigns of that office, not the power. Auguſtus governed the departments of the empire, which he had reſerved to himſelf, by means of his prætors and conſuls.

The *correctors* were officers who were charged to reform the abuſes which had crept into the provinces.

The

The *prefidents* were cloathed with a much greater power than that poffeffed by the proconfuls. They were military officers, and had the power of life and death over the army. It was to one of thefe officers that the provinces of the empire were fubjected in each of the great prefectures: thus,

The prefecture of the Gauls, comprehending twenty-nine provinces, was divided into three vicariats, *viz.* Hifpania, Gallia, and Britanny.

I. The vicariat of Hifpania included feven provinces, of which three were under confuls, and four under prefidents.

II. The vicariat of the Gauls included feventeen provinces; fix under confuls, and eleven under prefidents.

III. The vicariat of Britanny comprifed five provinces; two under confuls, and three under prefidents.

The prefecture of Italy included likewife twenty-nine provinces, divided into the proconfulfhip of Africa, and the vicariats of Rome, Italy, Africa, and Illyria. The vicariat of ROME was under confuls, correctors, and prefidents; that of ITALY was under confuls and prefidents; that of AFRICA was under confuls and prefidents; and that of ILLYRIA under one conful, one corrector, and four prefidents.

The prefecture of Illyria included eleven provinces; one under the proconful of Achaia; the vicariat of Macedonia comprehended five provinces, two under confuls, and three under prefidents; the vicariat of Dacia was under one conful, and four prefidents.

The prefecture of the Eaft included forty-eight provinces; *viz.* three under the proconful of Afia; fifteen under the count of the Eaft, a companion to the emperor; fix under the prefect of Egypt; feven under the vicariat of Afia; eleven under the vicariat of Pontus; and fix under the vicariat of Thrace.

We are now arrived to that ftate of the Roman empire in which it was governed by Chriftian emperors, and which may be divided into three diftinct periods. The *firft* will contain the whole time that the Roman world was governed by one emperor only. The *fecond* commences with the divifion of the empire, after the death of Theodofius the Great, and goes down to the extinction of the Weftern empire under Auguftulus. The *third* reaches from the fall of the Weftern empire to the capture of Conftantinople, and the deftruction of the whole empire.

Of the Chriftian Roman Emperors before the Divifion of the Empire.—The adminiftration of Conftantine was, in the early part of his reign, mild, equitable, and politic. Though ftrongly attached to the Chriftian faith, he made no great innovations on the religion of the ftate. He introduced order and economy into the civil government, and repreffed every fpecies of oppreffion and corruption. But his natural temper was fevere and cruel, and the latter part of his reign was deformed by rancour and a moft fanguinary rigour. From this unfavourable change of character he loft the affections of his fubjects; and from a feeling, probably of reciprocal difguft, he removed the feat of the Roman empire to Byzantium, where a new city was raifed; from his name it was called CONSTANTINOPLE; fee the article. The court followed the fovereign: the opulent proprietors were attended by their flaves and retainers. Rome was in a few years depopulated, and the new capital fwelled almoft at once to an enormous magnitude. In an expedition againft the Perfians, Conftantine died at Nicomedia, in the 30th year of his reign, A.D. 337. During this reign the Goths had made feveral irruptions on the empire, and though repulfed and weakened, they began gradually to encroach on the provinces.

Before we proceed with the monarchs, we may juft notice fome particulars relating to the ftate of the Roman empire at this period; for which we fhall be chiefly indebted to Mr. Tytler's Elements, already quoted and referred to.

Inftead of the ancient republican diftinctions, which were founded chiefly on perfonal merit, a rigid fubordination of rank and office now went through all the orders of the ftate. The magiftrates were divided into three claffes, diftinguifhed by the unmeaning titles of, 1, the Illuftrious; 2, the Refpectable; and 3, the Clariffimi. The epithet of *Illuftrious* was conferred on, 1, the confuls and patricians; 2, the prætorian prefects of Rome and Conftantinople; 3, the mafters-general of the cavalry and infantry; and 4, the feven minifters of the palace.

The confuls were created by the fole authority of the emperor; their dignity was inefficient, and their names ferved only to give the legal date of the year. The dignity of patrician was not hereditary, but was beftowed as a title of honour by the emperor on his favourites. The prætorian prefects were the civil governors of the four departments of the empire. Thefe were the Eaft, Illyria, Italy, and the Gauls: to them was committed the fupreme adminiftration of juftice, and of the finances.

The *Refpectables* were the proconfuls of Afia, Achaia, and Africa; and the military *comites* and *duces*, generals of the imperial armies. The *Clariffimi* included the inferior governors and magiftrates of the provinces, refponfible to the prefects and their deputies.

The intercourfe between the court and the provinces was maintained by the conftruction of roads, and the inftitution of regular pofts or couriers; under which denomination were ranked the numberlefs fpies of government, whofe duty was to convey all kinds of intelligence to the feat of empire. Taxes were levied by the fole authority of the emperor, and fubfidies were exacted from all the cities, under the name of free gifts, on various occafions of public concern, as the acceffion of an emperor, the birth of a prince, &c.

An impolitic diftinction was made between the troops ftationed in diftant provinces, and thofe in the heart of the empire. The latter, denominated *Palatines*, enjoyed a higher pay, and more particular favour, and having lefs employment, fpent their time in idlenefs and luxury; while the former, called *Borderers*, who, in truth, had the care of the empire, and were expofed to perpetual hard fervice, had, with an inferior reward, the mortification of feeling themfelves regarded as of a meaner rank than their fellow-foldiers. Conftantine alfo debafed the body of the army by the intermixture of Scythians, Goths, and Germans. This mafs of heterogeneous parts, which internally laboured with the feeds of diffolution and corruption, was kept together for fome time by the vigorous exercife of defpotic authority.

Conftantine had divided the empire among five princes, three of them his fons, and two nephews; but Conftantius, the youngeft of the fons, finally freed himfelf from all his competitors, and ruled the empire alone. During his reign, the Franks, Saxons, Alemanni, and Sarmatians, laid wafte all the fine countries on the banks of the Rhine, and the Perfians made the moft deftructive incurfions on the provinces of the Eaft. Conftantius wafted his time in theological controverfies; but before his death, he appointed his coufin Julian to the dignity of Cæfar. He died A.D. 361.

Julian poffeffed many heroic qualities, and his mind was formed by nature for the fovereignty of a great people; but having been educated under the philofophers at Athens, he had unfortunately conceived a rooted antipathy to the doctrines of Chriftianity. The reformation of civil abufes formed

formed the first object of his attention, after which he endeavoured, but without persecution, to undermine and extinguish the Christian religion. To avenge the injuries which the empire had sustained from the Persians, Julian marched into the heart of Asia, and in an engagement, though crowned with victory, he was slain at the age of thirty-one, after a reign of three years.

Jovian, a captain of the guards, was chosen to succeed Julian, who purchased his safe retreat by the ignominious surrender of five provinces. His reign, of seven months only, was mild and equitable, and he restored the Christians to all their privileges as subjects.

Valentinian was chosen emperor by the army on the death of Jovian, who associated with himself in the empire his brother Valens, to whom he gave the dominion of the Eastern provinces, reserving to himself the Western. Valentinian favoured the Christian faith, but did not persecute its adversaries, which was very unlike the conduct of Valens, who, intemperately supporting the Arian doctrine, set whole provinces in a flame, and drew upon the empire a swarm of invaders, in the disguise of friends and allies, but who, in the end, entirely subverted it. These were the Goths, who, migrating from Scandinavia, had, in the second century, settled on the banks of the Palus Mæotis, and thence gradually extended their territory. In the reign of Valens they possessed themselves of Dacia, and were known by the distinct appellation of Ostrogoths and Visigoths, or Eastern and Western Goths. Valentinian died on an expedition against the Alemanni, and was succeeded in the empire of the West by Gratian, his eldest son, a youth of sixteen years of age. Valens was the scourge of his people. The Huns, of Tartar or Siberian origin, now poured down on the provinces both of the East and West. The Goths fled before them. The Visigoths were allowed by Valens to settle in Thrace; the Ostrogoths asked the like liberty, and, being refused, forced their way into the same province. Valens gave them battle at Adrianople; his army was defeated, and he himself slain in the engagement. The Goths, unresisted, ravaged Achaia and Pannonia, and were several times within sight of the walls of Constantinople.

Gratian took Theodosius as his colleague, who, on the early death of his associate, and minority of his son Valentinian II., governed with great ability both the Eastern and Western empire. Theodosius obtained the surname of Great, and having reigned till A.D. 395, he died, leaving two sons, Arcadius and Honorius, assigning to them separate sovereignties. Arcadius was proclaimed emperor of the East, and Honorius emperor of the West. The Eastern empire comprehended Asia Minor, Arabia, Syria, Egypt, Libya, and the several regions on the Danube. The Western empire included Italy, Spain, France, Britain, Germany, Pannonia, and Africa. The Eastern empire subsisted many ages, but the Western soon became the prey of barbarians.

It may be observed, that the reign of Theodosius was signalised by the downfall of Paganism, and the full establishment of the Christian religion in the Roman empire: for, from the time of Numa to that of Gratian, the Romans preserved the regular succession of the several sacerdotal colleges, the pontiffs, augurs, vestals, flamens, &c. whose authority, though weakened in the latter ages, was still protected by the laws. Even the Christian emperors held, like their Pagan predecessors, the office of pontifex maximus. Gratian was the first who refused that ancient dignity as a profanation. In the time of Theodosius, the cause of Christianity and Paganism was solemnly debated in the Roman senate; Christianity was triumphant, and the senate issued a decree for the abolition of Paganism, the destruction of which in the capital was soon followed by its extinction in the provinces.

Of the Western Empire.—In the reigns of Arcadius and Honorius, the sons and successors of Theodosius, the barbarian nations established themselves in the frontier provinces both of the East and West. Theodosius had committed the government to Rufinus and Stilicho during the minority of his sons: of their fatal dissentions the enemies of the empire took every advantage. The Huns overspread Armenia, Cappadocia, and Syria. The Goths, under Alaric, ravaged the borders of Italy, and laid waste Achaia to the Peloponnesus. Arcadius purchased an ignominious peace, by ceding to Alaric the whole of Greece. This prince, now styled king of the Visigoths, prepared to add Italy to his new dominions. He passed the Alps, and was carrying all before him, when he was defeated by Stilicho, then at the head of the armies of Honorius. In the course of a few months, a torrent of Goths breaking down upon Germany, forced the nations whom they dispossessed, *viz.* the Suevi, Alani, and Vandals, to hasten out of Italy. They joined their arms to those of Alaric, who, being thus suddenly reinforced, determined to overwhelm Rome. Stilicho to ward off the threatened danger, promised him, if he would retire, 4000 pounds weight of gold, which engagement Honorius would not ratify. Alaric was not to be trifled with, and he took ample revenge by the sack and plunder of the city. He was anxious to spare the lives of the vanquished, and to preserve the ancient edifice from destruction. This event happened in August 410. Alaric had, as we have seen, ravaged Greece, some time before; and Arcadius, more wise than his brother, was contented to purchase his friendship, by investing him with the master-generalship of the Eastern Illyricum. He died within a week of the capture of Rome, and was succeeded by Ataulfus, or Adolphus, to whom Honorius gave his sister Placidia in marriage, and, with her, ceded to his brother-in-law a large portion of Spain. With these concessions Adolphus was contented, and, having concluded a peace, he retired into Gaul, A.D. 412. A great part of what remained of Spain had before been occupied by the Vandals. Honorius allowed, soon after, to the Burgundians a just title to their conquests in Gaul. Thus the Western empire was by degrees mouldering from under the dominion of its ancient masters.

In the East, Arcadius died in 408, leaving that empire to his infant son, Theodosius II., whose sister, Pulcheria, swayed the sceptre with prudence and talent during a government of 40 years. Honorius died A.D. 423. The laws of Arcadius and Honorius are, with very few exceptions, remarkable for their wisdom and equity; a singular circumstance, considering the personal character of those princes, and evincing at least that they employed able ministers.

In the reign of Valentinian III., the hordes from the north of Europe again abandoned their own forests and mountains, in quest of new settlements. Under the command of ATTILA (see his article), they defeated the Roman armies, A.D. 452, and threatened total destruction to the empire. He was for a time ably opposed by Ætius, Valentinian's general; the emperor himself being shut up in Rome by the armies of the barbarian, and at length compelled to purchase a peace. On the death of Attila, his dominions were dismembered by his sons, whose dissentions gave a temporary relief to the declining empire. Valentinian was put to death by the guards of his general Ætius, A.D. 455. He was succeeded by Maximus, who had excited the death of Valentinian, and who now married his widow Eudoxia. Within three months of this event he

was

was deprived of his kingdom by Genſeric, king of the Vandals, who was invited by Eudoxia to revenge the murder of her firſt huſband, and deliver her from the power of the tyrant. Maximus fled, but being taken, he was killed, and his body thrown into the Tiber. Genſeric carried Eudoxia and her two daughters into Italy, one of whom he married to his ſon Hunneric, the other he ſent back to Conſtantinople, and married the mother himſelf.

After Maximus, we have a ſucceſſion of ſeven or eight princes, but the events of their ſeveral reigns merit no detail. In the reign of Romulus, ſurnamed Auguſtulus, the empire of the Weſt came to a final period. Odoacer, prince of the Heruli, ſubdued Italy, but ſpared the life of Auguſtulus, on the condition of his reſigning the throne. This occurred A.D. 476. Odoacer retained the poſſeſſion of Italy during 14 years. In this period, the eſtates of the Roman ſenators were divided among his countrymen and ſoldiers. At the extinction of the Roman empire in the Weſt, Rome and Italy came into the poſſeſſion of the Oſtrogoths. Africa was ſeized by the Vandals; Pannonia by the Huns; Spain by the Goths, Alans, and Suevi; Gaul by the Franks; and Great Britain by the Saxons. Hence we ſee the origin of thoſe nations, many of which have proved ſo illuſtrious in hiſtory.

We cannot cloſe this portion of the hiſtory, without ſome reflections relating to the riſe and fall of Rome. The foundations of the greatneſs of this vaſt empire have been enumerated as follow. The fidelity of the citizens to each other, and to the ſtate, was confirmed by the habits of education, and the prejudices of religion. Honour, as well as virtue, was the principle of the republic. The ambitious citizens laboured to deſerve the ſolemn glories of a triumph; and the ardour of the Roman youth was kindled into active emulation, as often as they beheld the domeſtic images of their anceſtors. The temperate ſtruggles of the patricians and plebeians had finally eſtabliſhed the firm and equal balance of the conſtitution; which united the popular aſſemblies with the authority and wiſdom of the ſenate, and the executive powers of a regal magiſtrate. When the conſul diſplayed the ſtandard of the republic, each citizen bound himſelf by the obligation of an oath, to draw his ſword in the cauſe of his country, till he had diſcharged the ſacred duty by a military ſervice of ten years. This wiſe inſtitution continually poured into the field the riſing generation of freemen and ſoldiers; and their numbers were reinforced by the warlike and populous ſtates of Italy, who had yielded to the valour, and embraced the alliance of the Romans. From their inſtitutions of peace and war, Polybius had deduced the ſpirit and ſucceſs of a people, incapable of fear, and impatient of repoſe. The ambitious deſign of conqueſt was attempted and achieved, and the perpetual violation of juſtice was maintained by the political virtues of prudence and courage. The arms of the republic, ſometimes vanquiſhed in battle, always victorious in war, advanced with rapid ſteps to the Euphrates, the Danube, the Rhine, and the ocean; "and the images of gold, or ſilver, or braſs, that might ſerve to repreſent the various nations, and their kings, were ſucceſſively broken by the iron monarchy of Rome."

The riſe of a city, which ſwelled to an empire, may deſerve, as a ſingular prodigy, the reflection of a philoſophic mind: but the decline of Rome was from the natural and inevitable effect of immoderate greatneſs. Proſperity ripened the principles of decay; the cauſes of deſtruction multiplied with the extent of conqueſt; and as ſoon as time or accident had removed the artificial ſupports, the ſtupendous fabric yielded to the preſſure of its own weight. "The ſtory of its ruin," ſays Gibbon, "is ſimple and obvious; and inſtead of inquiring why the Roman empire was deſtroyed, we ſhould rather be ſurpriſed that it ſubſiſted ſo long. The victorious legions, who, in diſtant wars, acquired the vices of ſtrangers and mercenaries, firſt oppreſſed the freedom of the republic, and afterwards violated the majeſty of the purple. The emperors, anxious for their perſonal ſafety, and the public peace, were reduced to the baſe expedient of corrupting the diſcipline, which rendered them alike formidable to their ſovereign and to the enemy. The rigour of the military government was relaxed, and finally diſſolved, by the partial inſtitutions of Conſtantine; and the Roman world was overwhelmed by a deluge of barbarians."

The decay of Rome has often been aſcribed to the tranſlation of the ſeat of empire; but the powers of government were divided, rather than removed. The court of Conſtantinople was erected in the Eaſt; while the Weſt was ſtill poſſeſſed by a ſeries of emperors, who held their reſidence in Italy, and claimed an equal inheritance of the legions and provinces. This impaired the ſtrength, and fomented the vices of a double reign; the inſtruments of an oppreſſive and arbitrary ſyſtem were multiplied; and a vain emulation of luxury was introduced and ſupported between the ſucceſſors of Theodoſius. Extreme diſtreſs, which unites the virtue of a free people, embitters the factions of a declining monarchy. The hoſtile favourites of Arcadius and Honorius betrayed the republic to its common enemies; and the Byzantine court beheld with indifference, or pleaſure, the diſgrace of Rome, the misfortunes of Italy, and the loſs of the Weſt. Under the ſucceeding reigns, the alliance of the two empires was reſtored; but the aid of the Oriental Romans was tardy, doubtful, and ineffectual; and the national ſchiſm of the Greeks and Latins was enlarged by the perpetual difference of language and manners, of intereſt, and even of religion. Yet the event juſtified and did credit to the deciſion of Conſtantine. During a long period, as we ſhall ſee, his impregnable city repelled the victorious arms of barbarians, protected the wealth of Aſia, and commanded, both in peace and war, the important ſtreights which connect the Euxine and Mediterranean ſeas. The foundation, therefore, of Conſtantinople ſeems to have more eſſentially contributed to the preſervation of the Eaſt, than to the ruin of the Weſt.

On the decline or ruin of the Roman empire, great ignorance and darkneſs, as to letters and the uſeful arts of life, began to overſhadow the Weſtern world. A barbarous people, untaught in letters, poured themſelves into the Weſtern provinces of the Roman empire, and gave the firſt blow to learning. Academies were ruined, libraries burnt, and the learned compelled to ſhut up their ſchools and books too. Nor were thoſe, who in that age were denominated Chriſtian prieſts, leſs concerned in the deſtruction of letters; for as they had been loaded with contempt and injuries, when Paganiſm prevailed, by the philoſophers, they not only armed themſelves againſt thoſe teachers, but endeavoured to forbid their writings, as containing tenets the moſt dangerous and pernicious to young perſons. Both haſtened the deſtruction of letters: nevertheleſs the age was not deſtitute of learned men, of whom the following have, among others, been enumerated. Thoſe profeſſing Chriſtianity are Sulpicius Severus, Cyril of Alexandria, Socrates, Sozomen, Theodoret, Iſidore, Sidonius Apollinarius; and among the Pagans, Zoſimus and Olympiodorus were of the greateſt note.

For the Roman ſenate, their magiſtracy, conſuls, ſoldiery, tribes, courts, names, weights, meaſures, coins, and other matters relating to the antiquities of that people, their policy, religion, law, cuſtoms, &c. ſee the reſpective articles in this work.

Of the Eaſtern Empire.—The emperors who reigned in the Eaſt, previouſly to the ruin of the Weſtern empire, were Arcadius, Theodoſius II., of whom we have ſpoken, Marcian, who married Pulcheria, the ſiſter of Theodoſius, and Leo the Thracian, who reigned 17 years, and died in 474. He was ſucceeded by his grandſon, Leo, the boy who died in his cradle. His father, Zeno, followed, who, in 475, was driven from the throne by Baſiliſcus, an uſurper; but in the following year he recovered it.

The period in which the emperors reigned ſingly, after the deſtruction of the Weſtern empire, includes almoſt a thouſand years, extending from 476 to the year 1453; in which year Conſtantinople was taken by Mohammed II. We ſhall only notice ſome of the moſt celebrated, beginning with Zeno, who, as we have juſt obſerved, had been, after a ſhort rebellion, reſtored to the throne.

Auguſtulus, at the command of Odoacer, ſignified his reſignation to the ſtill exiſting aſſembly of the Weſtern empire; and that aſſembly, in their laſt act of obedience to the Roman prince, ſtill affected the ſpirit of freedom, and the forms of the conſtitution. An epiſtle was addreſſed to Zeno, in which they ſolemnly diſclaim the neceſſity, or even wiſh, of continuing any longer the imperial ſucceſſion of Italy; ſince, they ſay, that it is their opinion, the majeſty of a ſole monarch is ſufficient to pervade and protect the Eaſt and the Weſt. They, therefore, in their own name, and in the name of the people, conſent that the ſeat of univerſal empire ſhall be transferred from Rome to Conſtantinople: they renounce the right of chooſing their maſter, the only veſtige that yet remained of the authority which had given laws to the world; and they add, that the republic might ſafely be confided in the civil and military virtues of Odoacer, and humbly requeſt that the emperor Zeno would inveſt him with the title of patrician, and the adminiſtration of the dioceſe of Italy. The deputies of the ſenate were received at Conſtantinople with ſome marks of diſpleaſure and indignation; and when they were admitted to the audience of Zeno, he at firſt reproached them with the ill uſage of ſome of their emperors, particularly of Anthemius and Nepos. The firſt, ſaid he, you have murdered, and the ſecond you have expelled; but while he lives, he is your lawful ſovereign. Zeno, notwithſtanding his harangue, very ſoon abandoned the cauſe of his abdicated colleague. His vanity was gratified by the title of ſole emperor, and by the ſtatues erected to his honour in the ſeveral quarters of Rome. He entertained a friendly correſpondence with Odoacer; and he gratefully accepted the imperial enſigns, the ſacred ornaments of the throne and palace, which the barbarian monarch was not unwilling to remove from the ſight of the people. Zeno died in the year 495, and was ſaid to have been entombed while he was in one of his drunken fits, and before he was dead. He was ſucceeded by

Anaſtaſius I. who married Adriadne, Zeno's widow, and by her influence was raiſed to the throne. See ANASTASIUS.

Juſtin, of whom we have, in the alphabetical order, given a full account, followed Anaſtaſius, and after a reign of nine years he died, leaving his power to JUSTINIAN, ſee his article, who deſtroyed the kingdom of the Vandals in Africa by means of his general Beliſarius, and that of the Oſtrogoths by Narſes. He is particularly famous in having built the church of St. Sophia, and in having aboliſhed the conſulſhip, long ſince only a name without power. He died A.D. 565, and was ſucceeded by Juſtin II., who eſtabliſhed the exarchate of Italy, and who died mad in the year 578. He was followed by Tiberius, one of the captains in Juſtin's guards, who died in about four years, having firſt appointed his own great captain Mauritius as a ſucceſſor. Mauritius, and all his family, were murdered by Phocas, who exerciſed the ſame cruelty in his government, as he had in his way to it. He was dethroned by Heraclius in 611, who ſucceeded him. During the reign of Heraclius, the Perſians made very deſtructive ravages in the empire; this was the period, alſo, in which Mohammed, prince of the Arabians, founded the Mohammedan religion and power. This new power quickly weakened the empire, by depriving it of almoſt all its provinces in Aſia and Africa. Heraclius died of a dropſy, after a reign of about 30 years. In the courſe of a few months, Conſtantine, Heracleonas, and Conſtans, all aſcended the throne; the two firſt were cut off in a few months. The latter attempted to fix the ſeat of empire at Rome, but changing his plans, he went to Sicily, where he was killed, leaving three ſons to ſucceed him, who held the government during the remainder of the ſeventh century. In the eighth, we have Leo Iſauricus, or Iconomachus, ſo called from the perſecutions which he inſtituted againſt the worſhippers of images; alſo the empreſs Irene, who reſtored image worſhip, and who cruelly put out the eyes of her own ſon Conſtantine, for preſuming to take the government into his own hands when he was of age.

In the ninth century, the chief among the Eaſtern emperors were Nicephorus, who dethroned Irene, and who acknowledged Charles the Great, king of France, to be the emperor of the Weſt. Alſo, Leo VI., ſurnamed Philoſophus, the author of the conſtitutions that bear his name.

In the tenth century flouriſhed, among many other emperors, Conſtantine IX., ſon of Leo VI., who took poſſeſſion of the kingdom of Naples, after driving out the Saracens; and Romanus, the ſon of Conſtantine IX., who was likewiſe ſucceſsful againſt the Saracens, but he died of debauchery. Nicephorus Phocas, a general of Romanus, married his widow, and aſſumed the government in prejudice to the ſons of his late maſter. Nicephorus conquered the Saracens, and took Antioch; but he loſt Apulia and Calabria, which were taken by Otho the Great, the emperor of Germany. Nicephorus was at length aſſaſſinated by his ſucceſſor, John Zimiſces, who aſſociated with himſelf on the throne Baſilius and Conſtantine, the two ſons of Romanus. Zimiſces was poiſoned by his chamberlain; Baſilius and Conſtantine recovered Apulia and Calabria, and they reigned together fifty years.

In the 12th century, Apulia was loſt by Romanus Argyropulus, and in the ſame period we have Alexius Comnenus, under whom the Cruſades took their riſe; and John Comnenus, the ſon of Alexius, whoſe excellent diſpoſition obtained for him the name of Colojoannes. In his wars with the Turks he was mortally wounded, and was ſucceeded by his ſecond ſon, Manuel Comnenus, who has been characterized for his great perfidy. He has been charged with poiſoning the proviſions which he had engaged to furniſh for the army of the emperor Conrad, and at the ſame time betrayed his deſigns to the Turks, againſt whom he was marching. He was ſucceeded by Alexius II., his ſon, whoſe eyes were torn out, and himſelf depoſed and murdered by his couſin Andronicus, who had previouſly to this aſſaſſinated the empreſs mother. Andronicus ordered a general maſſacre of all the

the Latins at Constantinople, and his cruelties not being confined to them, he was at length torn to pieces by his own people. The territories of his successor, Isaac Angelus Comnenus, were ravaged by the emperor Barbarossa; the emperor himself dethroned, and his eyes put out by his brother Alexius the tyrant, who seized on the reins of government, but was himself soon detested, as well on account of his conduct towards Angelus, as for the debaucheries and cruelties of which he was guilty. The crusaders, wishing to free the people from this tyrant, laid siege to the city, and took it. Alexius was glad to escape with his life, and young Alexius, the son of Isaac, was placed on the throne. This young prince, with the assistance of the Latins, restored his father. His coadjutors, in this act of piety, not receiving the price stipulated for their services, plundered Constantinople, and set it on fire. Upon this the Greeks revolted, and chose Alexius Ducas for their leader, who having caused the young Alexius to be strangled, was himself declared emperor. He was, however, deposed by the Latins, in the year 1204, and this was the commencement of what has been called the

Latin Empire.—Baldwin, earl of Flanders, was the first monarch of this dynasty. This prince was killed in a war with the Bulgarians. About the year 1206, David Comnenus, grandson of Andronicus, made himself master of Trebisond, a city of Asiatic Turkey, on the Black sea, which was afterwards considered as the capital of the Greek empire, and continued so till 1462, when it was taken by Mohammed II., and the reigning emperor, with his family, were carried prisoners to Constantinople, where they were mostly put to death.

Baldwin was succeeded, in the Latin empire, by Henry, at the same time that Theodore Lascaris was acknowledged emperor of the Greeks. These two princes made peace. But Henry was afterwards poisoned at Thessalonica, and was succeeded by Peter de Courtenay, a grandson of Lewis le Gros, who was hailed emperor while he was at Auxerre, of which he was the count. He was murdered by Theodore Angelus Comnenus, and was succeeded, in 1220, by Robert, the second son of Peter, the eldest having refused the crown. This Latin emperor made peace with Theodore Lascaris, in order that he might revenge the death of his father, by turning his arms against Theodore Angelus; but Lascaris dying, and being succeeded, in 1222, by John Ducas, Robert found employment in defending himself and his own rights. Under John Ducas the Latin empire was restrained within very narrow limits, and on the death of its emperor, Robert, in 1228, Baldwin II. Robert's brother, was raised to the throne. Baldwin was but eleven years old when he came to the crown. During his reign the Bulgarians laid siege to Constantinople, but were obliged, by the efforts of the Genoese and Venetians, to raise it. Baldwin went into the West to seek succours against his enemies; in the mean time John Ducas died, and was succeeded, in 1255, by Theodore Lascaris II., whose reign was short; and he was succeeded, on the Greek throne, by Michael Paleologus in the year 1260, who, in the following year, attacked and took Constantinople, and thus put an end to the Latin empire, after it had subsisted about fifty-seven years.

New Empire of the Greeks.—Michael Paleologus having obtained the sovereignty of both empires, endeavoured by all the means in his power to unite the Greek and Latin churches, but without effect. His whole reign, which lasted almost twenty-four years, was greatly agitated by dissentions from within his kingdom, as well as by external enemies. He was succeeded by

Andronicus Paleologus in 1283, who, during a long reign of 46 years, conducted himself extremely ill, suffering himself to be led into every fault by ambitious and designing persons; of these the chief actors were the clergy, to whom he was ever subservient. During his government the Turks made dreadful ravages on the empire. He was at last dethroned by his grandson,

Andronicus II. who had been associated in the government with the late emperor. In this reign also the Turks made great progress, notwithstanding the efforts of Andronicus to oppose them. After a reign of about 17 years he was succeeded by his son,

John Paleologus, who was very young when he came to the throne, and during his minority the government was committed to John Cantacuzenus, who, for some time, performed all the duties connected with his high station on principles of wisdom, united to great moderation. But in 1345 he assumed the imperial title in Thrace, and in 1347 took Constantinople, compelling the lawful prince, John, who had married his daughter, to retire to Salonica. But the exiled emperor, with the aid of the Genoese, obtained his rights, and compelled the usurper to quit the throne and capital; see his article. During the reign of John, the Turks were continually making inroads on the empire, and were often at the very gates of Constantinople. The eldest son of the emperor conspired against his father, but was defeated in his rebellions. During this reign the Genoese made themselves masters of Lesbos, and Amurath I. took the city of Adrianople. John died in 1391, and was succeeded by his second son,

Manuel, who, on the death of his father, was at the court of Bajazet: he made his escape, and came to Constantinople, where he was crowned. He was successful in his wars upon the Turks, took Bajazet prisoner, and afterwards defeated the son, so that the Turks were driven entirely from Constantinople. He was embroiled in a contest with the sultan Amurath: this prince laid siege to Constantinople, on which occasion cannon were, for the first time, employed in the armies of the East. At length the Turks and the Greeks made peace, and in a very short time after Manuel died, and was succeeded by

John II. in the year 1425, who made a most disgraceful peace with Amurath. In a short time he perceived his error, and sought on all sides for assistance. To obtain the requisite aid from the princes in the West, who had refused him succours on account of the schism of the Greeks, he laboured hard to reunite the two churches. While he was losing his time at the council of Ferrara, the Turks were making great progress. After this, Amurath was defeated by the celebrated Huniades, king of Hungary. At length John made peace with Amurath, and ended his days in peace. His brother,

Constantine Dragases, succeeded him in 1448, and upon the death of sultan Amurath, the empire of the Turks fell to Mohammed II. With this high-minded prince Constantine had the temerity to embroil himself, of which he had ample occasion to repent, for Mohammed laid siege to Constantinople, which he took, after the most extraordinary efforts of courage, as well on the part of the besieged, as on that of the besiegers. This event took place on the 29th of May, 1453. Constantine, not being able to save his capital, refused to survive its hard fate, and was killed in attempting to defend it. Mohammed did every thing in his power to stop the carnage, and afterwards caused the city to be the capital of his empire. Such was the end of the Greek empire, which had succeeded to the Latin empire.

Thus have we traced the progrefs of the Eaftern empire, till it no longer exifted; yet for fome ages, as we have feen, it not only firmly but proudly lifted up its head, confcious of its vaft fuperiority over the other exifting governments of the world, particularly in the reign of Juftinian, who overturned the Vandals in Africa, and the Goths in Italy; but in procefs of time, as has been fhewn, it declined in its power, and was difmembered of its parts one after another. As in almoft all other cafes, the mifconduct of the emperors not only haftened the ruin of the empire, but was the primary and leading caufe of it. The Bulgarians claimed and obtained a part of the empire; as did the Saracens, who poffeffed themfelves of Syria, Paleftine, Egypt, Cilicia, and all the adjacent regions; and after that, overruning the reft of the Roman world, laid fiege to Conftantinople. Thefe were the followers of the prophet Mohammed, who, believing the whole world was deftined for them as an inheritance, attacked the neighbouring nations with a fury, that, in many cafes, was abfolutely irrefiftible. It was in this ftate of things, when the empire could fcarcely defend itfelf againft thefe Saracens, that Conftantinople, as we have feen, was taken by Baldwin, earl of Flanders. It was at this period that another emperor took his ftation at Trebifond, that city and the regions round it being torn from the reft of the Roman empire. At laft the Turks totally deftroyed that empire. They firft, in the reign of Heraclius, paffing through the Cafpian ftraits, wandered over divers countries in the Eaft, embraced the Mohammedan religion, and were divided into feveral principalities. But the other tribes becoming extinct, the pofterity of Othoman alone took the lead, and ever fince the Turkifh fovereigns have affumed the name and title of Othomans, or Ottomans. Thefe, having fubdued the greateft part of the provinces which had been poffeffed by the Saracens, fwallowed up the reft of the Roman empire. Conftantinople, fince its capture in 1453, has been the feat of the Turkifh emperors; of courfe it claims no longer our notice in this article.

Affairs of Rome after the Ruin of the Weftern Empire.— We have already obferved, that Italy was fubdued by the Heruli, whofe prince, Odoacer, out of contempt to Rome, fixed his feat at Ravenna. Thefe Heruli were, however, foon driven out of Italy by the Oftrogoths, whofe king, Theodoric, erected a new kingdom in Italy, and chofe Verona to be the royal feat for him and his pofterity. This kingdom lafted from the year 493 to 553; but in 541 Totila fucceeded to the throne of the Goths, who in the courfe of his reign captured the city of Rome, and abandoned it to his foldiers, intending in the end to have razed it to the ground, but was prevented from executing his plan by Belifarius. Teia, the fucceffor of Totila, and the laft king of the Oftrogoths, was defeated and flain by Narfes, who fucceeded Belifarius as general of the armies of Juftinian. By this general the kingdom of the Goths in Italy was totally deftroyed. Soon after the Longobards erected another kingdom in Italy, and claimed, under their king Alboin, that part of Italy which is ftill called Lombardy. Their royal feat was Ticinum or Pavia, and their kingdom flourifhed from 568 to 774, when Charlemagne having taken their capital, carried their laft prince, Defiderius, with his family, into France. While the Lombards ruled in Italy, the other parts of that country were in fubjection to exarchs or prefects, who were ufually fent by the emperor to Conftantinople. Thefe, in fome meafure, refifting the Lombards, defended the remains of the empire there, and fixed their feat at Ravenna. This exarchate lafted 185 years, *viz.* from 568 to 752, in which year Aiftulphus, king of the Lombards, took Ravenna by force. The kingdom of the Lombards being extinct, all Italy, which had been comprehended under the exarchate and kingdom of the Lombards, fell to the kings of France. Charlemagne was firft proclaimed patrician, and foon after emperor, of the Roman people. As the people were prompted to this act by the bifhop of Rome, Charles gave a large part of the exarchate and other lands to the bifhops of Rome, who became the temporal as well as the fpiritual fathers of the people. They contrived at this period a peculiar kind of dominion, which received great ftrength and advantage from the general ignorance that then prevailed in the Weft. The bifhops of Rome claimed to be the vicars of Chrift, and fucceffors to Peter, chief of the apoftles, and had therefore a right to prefcribe laws to all the Chriftian world. Formerly, on account of the pre-eminence of the city of Rome, only the bifhops of that city claimed a fuperiority in matters of religion. But when they faw that the bifhops of Conftantinople affumed to themfelves, becaufe the feat of empire had been transferred to that city, the title of oecumenical or univerfal patriarchs, then the bifhops of Rome pretended they had a right to the primacy as fucceffors to the apoftle Peter; and at length they were not fatisfied with their fupremacy in matters of religion, but arrogated to themfelves the power of difpoffeffing princes of their kingdoms. Gregory VII. laid the foundation of this claim, a man, whofe ambition, it has been well faid, was fcarcely to be fatisfied by the poffeffion of a world. The other bifhops were not all equal in power, but he who dwelt in the metropolis took the lead of the other bifhops in that province. At firft he was called metropolitan, and in the eighth century he took the name of archbifhop. The moft eminent of thefe metropolitans were thofe of Rome, Conftantinople, Antioch, and Alexandria, becaufe thefe were the principal cities of the Roman empire. And next to thefe, on account of the fuppofed fanctity of his city, was the bifhop of Jerufalem. The others vigoroufly defended their privileges againft the bifhop of Rome, and the controverfies that arofe thereupon, gave occafion at length to the fchifm between the Greek and Roman churches, to which we have had occafion to refer.

The fee of Rome maintained its authority without much interruption till the 14th century, when it began to totter, on account of the fchifms that arofe among the Roman pontiffs, which lafted nearly half a century, there being two popes at a time, the one at Rome, the other at Avignon. But this fchifm being terminated the popes recovered their former ftrength. It was about this fame period that Nicholas Gabrini di Rienzi, (fee Gabrini,) without rank, without money, without friends, alliances or military force, led on by ambition, and fupported by his eloquence alone, obtained for a fhort time the fovereignty of Rome; and though he could not, as he propofed, make her the miftrefs of the world, he, however, protected fome, and awed other fovereigns, and was admitted an arbiter of kingdoms.

In the fifteenth century the pontiff's authority was again fhaken, as well by difputes between the emperor and the popes, three of whom were depofed by the council of Conftans, two others by the council of Pifa, and one by the council of Bafil, as by the intrepidity of a fecond Gabrini, in the character of Stephen Porcaro, of whom, his name having efcaped us in the alphabetical order, we fhall fay a few words. He was of noble birth; his reputation was fpotlefs; his tongue was armed with eloquence; his mind was enlightened with learning; and he afpired to free his country and immortalize his name by the glory of his deeds.

deeds. "The dominion of priests," says Gibbon, "is most odious to a liberal spirit." Petrarch was now the oracle of the Italians, and as often as Porcaro revolved the ode, which describes the patriot and hero of Rome, he applied to himself the visions of the prophetic bard. His first trial of the people's feelings was at the funeral of Eugenius IV. In an elaborate speech he called the Romans to liberty and arms. For this act he had, by the existing laws of the state, forfeited his life; but the benevolence of the new pontiff, who viewed his character with pity and esteem, attempted by an honourable office to convert the patriot into a friend. He was again guilty of the same offence, and was a second time pardoned. The humane pontiff now removed him from the scene of temptation to Bologna, with a liberal allowance for his support, and the easy obligation of presenting himself each day before the governor of the city. But he formed a party at Rome, and a new conspiracy was excited. His nephew, a daring youth, assembled a band of volunteers, and on the appointed evening a feast was prepared at his house for the friends of the republic. Their leader, who had escaped from Bologna, appeared among them in a robe of purple and gold: his voice, his countenance, his gestures, bespoke the man who had devoted his life to the glorious cause. In a studied oration, he expatiated on the motives and the means of their enterprize; the name and liberties of Rome; the sloth and pride of their ecclesiastical tyrant; the active or passive consent of their fellow citizens; three hundred soldiers and four hundred exiles, long exercised in arms or in brooding over their wrongs; the licence of revenge to edge their swords, and a million of ducats to reward their victory. "It would be easy," he said, "on the next day, the festival of Epiphany, to seize the pope and the cardinals before the doors, or at the altar, of St. Peter; to lead them in chains under the walls of St. Angelo; to extort, by the threat of instant death, a surrender of the castle; to ascend the vacant Capitol; to ring the alarm-bell, and to restore in a popular assembly the ancient republic of Rome. While he was triumphing in his own mind, he was already betrayed. The senate, with a strong guard, invested the house; the nephew of Porcaro cut his way through the crowd, but the unfortunate Stephen was drawn from a chest, lamenting that his enemies had anticipated by three hours the execution of his design. After such manifest and repeated guilt, the pope, though still inclined rather to pity than punishment, could say nothing in his favour. Porcaro, and nine of his accomplices, were hanged; and amidst the fears and invectives of the papal court, the Romans pitied, and almost applauded, these martyrs of their country. "But," says the eloquent historian of the Decline and Fall of the Roman Empire, "their applause was mute, their pity ineffectual, their liberty for ever extinct; and, if they have since risen in a vacancy of the throne or a scarcity of bread, such accidental tumults may be found in the bosom of the most abject servitude." Of the struggles of the people of Rome we have, therefore, nothing more to record.

But the independence of the nobles, which was fomented by discord, survived the freedom of the commons, which must be founded in union. Rapine and oppression were long maintained by the barons of Rome; their houses were a fortress and a sanctuary: and the criminals whom they protected from the law, repaid the hospitality with the service of their swords and daggers. The private interests of the pontiffs, or their nephews, sometimes involved them in these domestic feuds. Under the reign of Sixtus IV. Rome was distracted by the battles and sieges of the rival houses; after the conflagration of his palace, the prothonotary Colonna was tortured and beheaded; and Savelli, his captive friend, was murdered on the spot, for refusing to join in the acclamations of the victorious Ursini. But the popes no longer trembled on their throne: they had strength to command, if they had resolution to claim, the obedience of their subjects; and the strangers who observed these partial disorders, admired the easy taxes and wise administration of the ecclesiastical state.

The spiritual thunders of the Vatican depend on the force of opinion; and if that opinion be supplanted by reason or passion, the sound may idly waste itself in the air, and the helpless priest will be exposed to the brutal violence of a noble or plebeian adversary. But after their return from Avignon, the keys of St. Peter were guarded by the sword of St. Paul. Rome was commanded by an impregnable citadel; the use of cannon is a powerful engine against popular seditions; a regular force of cavalry and infantry was enlisted under the banners of the pope; his ample revenues supplied the resources of the war; and, from the extent of his domain, he could bring down upon a rebellious city an army of hostile neighbours and loyal subjects. Since the union of the duchies of Ferraro and Urbino, the ecclesiastical power extends from the Mediterranean to the Adriatic, and from the confines of Naples to the banks of the Po; and as early as the sixteenth century, the greater part of that spacious and fruitful country acknowledged the lawful claims and temporary sovereignty of the Roman pontiffs. For the successive changes that have occurred in Italy from that time to the year 1811, we refer our readers to the article ITALY, in the New Cyclopædia; and we shall, probably, by the time we come to the article STATE, *Holy Roman*, be able to give a farther account of the subject, to the general peace, we earnestly hope, of 1815.

In the mean time, we shall lay before our readers an account of Rome as it appeared in the fifteenth century to an accurate and feeling mind, and then conclude the article with some account of the present state of the city.

View of Rome in the Fifteenth Century.—In the last days of pope Eugenius IV. two of his attendants, the learned Poggio and a friend, ascended the Capitoline; reposed themselves among the ruins of columns and temples; and from that commanding spot, they viewed the wide and various prospect of desolation. The place and the object gave ample scope for moralizing on the vicissitudes of fortune, which spares neither man nor the proudest of his works, which buries empires and cities in a common grave; and it would naturally be inferred, that in proportion to her former greatness, the fall of Rome was the more awful and deplorable. The description of Poggio, who was one of the first that raised his eyes from the monuments of legendary, to those of classic superstition, is as follows:

1. Besides a bridge, an arch, a sepulchre, and the pyramid of Cestius, he could discern, of the age of the republic, a double row of vaults in the salt-office of the Capitol, which were inscribed with the name and munificence of Catullus. 2. Eleven temples were visible in some degree, from the perfect form of the Pantheon, to the three arches, and a marble column of the temple of Peace, which Vespasian erected after the civil wars of the Jewish triumph. 3. Of the number, which he rashly defines, of seven thermæ or public baths, none were sufficiently entire to represent the use and distribution of the several parts; but those of Diocletian and Antoninus Caracalla still retained the titles of the founders, and astonished the curious spectator, who, in observing their solidity and extent, the variety of marbles, the size and multitude of the columns, compared the labour and expence with the use and importance. Of the baths of

of Conſtantine, of Alexander, of Domitian, or rather of Titus, ſome veſtige might yet be found. 4. The triumphal arches of Titus, Severus, and Conſtantine, were entire, both the ſtructure and the inſcriptions; a falling fragment was honoured with the name of Trajan; and two arches then extant, in the Flaminian way, have been aſcribed to the baſer memory of Fauſtina and Gallienus. 5. After the wonder of the Coliſeum, Poggius might have overlooked a ſmall amphitheatre of brick, moſt probably for the uſe of the Prætorian camp: the theatres of Marcellus and Pompey were occupied in a great meaſure by public and private buildings; and in the circus Agonalis and Maximus, little more than the ſituation and the form could be inveſtigated. 6. The columns of Trajan and Antonine were ſtill erect; but the Egyptian obeliſks were broken, or buried. A profile of gods and heroes, the workmanſhip of art, was reduced to one equeſtrian figure of gilt braſs, and to five marble ſtatues, of which the moſt conſpicuous were the two horſes of Phidias and Praxiteles. 7. The two mauſoleums or ſepulchres of Auguſtus and Adrian could not totally be loſt; but the former was only viſible as a mound of earth; and the latter, the caſtle of St. Angelo, had acquired the name and appearance of a modern fortreſs. With the addition of ſome ſeparate and nameleſs columns, ſuch were the remains of the ancient city: for the marks of a more recent ſtructure might be detected in the walls, which formed a circumference of ten miles, included three hundred and ſeventy-nine turrets, and opened into the country by thirteen gates.

Of the Government of Rome under the Popes.—For this part of our article we ſhall be chiefly indebted to the juſtly denominated "Claſſical Tour through Italy," by the Rev. I. C. Euſtace, whoſe partiality for whatever is papal, may render him, perhaps, ſomewhat partial as an hiſtorian. In ſpeaking of this government, as it exiſted previouſly to the ravages of the French at the cloſe of the laſt century, he ſays, though deſpotic above all controul, it is exerciſed by the pontiff with mildneſs, and ſubmitted to by the people with reſpect. The ſacred character of the biſhop influences both the ſovereign and the ſubject. The government is elective; promotion depends in a great degree upon talents and virtues; and, conſequently, there is a ſtimulus to exertion and a ſcope for honourable ambition. As for the origin of the temporal ſovereignty of the popes, it may be moſt honourably and firmly eſtabliſhed on the conſent of the people. After the expulſion of the Goths, when the arms of the Eaſtern emperors had re-conquered, but were incapable of protecting Italy; when the incurſions and menaces of the Lombards kept the city in conſtant alarm, and peſtilence and famine had preyed upon it; the Romans naturally turned their eyes to their biſhops, and found in them the ſupport which they had vainly ſolicited from their ſovereigns. The pontiffs had till that period been as eminent for their virtues as for their ſtation, and when forced by public diſtreſs to take a conſiderable ſhare in the adminiſtration of the ſtate, they diſplayed a prudence equal to their ſanctity, and a benevolence as extenſive as the poſſeſſions of the Roman church. "We ſee them," ſays Mr. Euſtace, "in the ſeventh, eighth, and ninth centuries, protecting Rome on one ſide againſt the attacks of the Lombards, and ſecuring it on the other from the rapacity and treachery of the exarchs, repairing its walls, feeding its inhabitants, engaging diſtant princes in its intereſts, and finally reſtoring the majeſty of its name in the new empire. Rome, indeed, ſeems to owe her exiſtence to her pontiffs; and had not the chair of St. Peter replaced the throne of the Cæſars, and the ſeat of empire become the ſanctuary of religion, Rome would probably have ſunk into a heap of uninhabited ruins, and left to poſterity nothing more than the *whiſtling of a mighty name.*"

From the re-eſtabliſhment of the Weſtern empire to the tenth century, the popes employed their influence in oppoſing the growing power of the Saracens, and in protecting the coaſts of Italy, and the capital itſelf, againſt the predatory incurſions of thoſe barbarians. Shortly after commenced their conteſts with the German Cæſars: but however much the popes may be cenſured, as eccleſiaſtics, in thoſe deſtructive quarrels; as princes and as Romans they may claim indulgence, as they ſtruggled againſt foreign influence, and finally ſucceeded in freeing Italy from the yoke of a German, a barbarian, and an abſentee ruler. The diſputes of the popes with the barons and the Roman people were founded on the juſt oppoſition of a firm government, to the arrogance and tyranny of an ariſtocratic body on the one ſide, and to the licentiouſneſs of a turbulent populace on the other. But Rome has juſt cauſe to deplore and condemn the folly and the perverſity of her paſtors, when they forſook her venerable walls, and ſubmitted to voluntary exile, alternately the inſtruments and victims of French intrigue and ambition. Of all the diſaſters that befel Rome in the long ſeries of her eventful hiſtory, this, perhaps, was the moſt pernicious both in its immediate effects and diſtant conſequences, and to it may be aſcribed the degradation of the nobleſt monuments, the depopulation of the capital and its neighbourhood, and the evils that anarchy and tyranny never fail to bring in their train. Theſe evils continued to operate long after their efficient cauſes had ceaſed to exiſt, and the popes, during many ages after their re-eſtabliſhment in Rome, had to ſtruggle with the reſtleſs and unbridled paſſions excited by the guilt or the folly of their abſentee predeceſſors. Sixtus Quintus ſucceeded in breaking the ſpirit of the barons, and having brought the people to ſubmiſſion, he reſtored order, peace, and induſtry, to the Roman ſtates.

From this period Rome rapidly increaſed in proſperity, riches, and population, and became the ſeat of the arts and ſciences, the centre of political negociation, and not unfrequently of courtly intrigue. Moſt of the ſucceeding popes took an active part in the public tranſactions of the times, ſometimes as mediators, but too frequently as parties concerned, with a view to national intereſts, or to family aggrandizement. Their conduct, in this reſpect, though little conformable to the principles of their profeſſion, was advantageous to their territories, as it brought wealth to the inhabitants, and reflected luſtre on a city, at the ſame time the metropolis of the Chriſtian world, and the capital of an extenſive and flouriſhing country.

The reformation produced at the time little or no diminution of the temporal greatneſs and conſideration of the popes: ſo little indeed, that in the century following that event, Rome ſeems to have enjoyed a ſplendour and proſperity not witneſſed within her walls ſince the fall of the empire. Hence it has been obſerved, "that if Pyrrhus's ambaſſador could with propriety call the Roman ſenate in his time a congreſs of kings, a ſimilar appellation might with equal veracity be applied to the modern ſenate of Rome, the college of cardinals, during the ſeventeenth century. That aſſembly was, ſtrictly ſpeaking, compoſed of princes, the ſons, nephews, brothers, or uncles of the firſt ſovereigns in Europe; men who not unfrequently, as ſtateſmen and miniſters, had held the reins of empire at home, or as ambaſſadors, repreſented their royal relatives abroad. They either generally reſided or frequently aſſembled at Rome, not only to diſcharge their duties about the perſon of the pontiff,

tiff, but to fupport the interefts of their refpective courts; and in order to attain this object the more effectually, they difplayed a fplendour and a magnificence nearly royal. The officers of their houfehold were often nobles of high rank; their fecretaries and chaplains were men of talents and bufinefs; a long train of guards, fervants, and retainers, attended their perfons when they appeared in public, and the blaze of the purple, in itfelf fo dazzling, was heightened by all the adventitious circumftances of birth, power, and opulence. The union of fo many illuftrious perfonages, vyeing with each other in talents and magnificence, gave Rome the appearance of an univerfal court, where all the fovereigns of Europe were affembled to difcufs the general interefts of Chriftendom, and to difplay their rival glories in peace and fecurity."

From this epoch the character of the pontiffs became more epifcopal and pacific, and they have chiefly been occupied with the government of the Catholic church over which they prefide, and with the civil adminiftration of their own territories, which, as we have feen, are fufficiently extenfive to engrofs their utmoft attention. The arts and fciences have at all times, but particularly in the latter centuries, met with fpecial encouragement from the popes; and Rome, enlivened by their conftant prefence, embellifhed by their munificence, and fed by the produce of feveral extenfive, populous, and well-cultivated provinces, had gradually refumed her robes of glory, and began to promife herfelf once more the return of her former dignity and profperity. "She had," fays Mr. Euftace, "been great even in her fall, and venerable in her difafters. She had ceafed to be the miftrefs of the world in arms, but fhe ftill remained the miftrefs of the world in arts; fhe was no longer the capital, but fhe was the metropolis of Europe; not the refidence of the firft fovereign, but the fee of the firft paftor. She had not been fubjected to flavery as Athens; fhe had not been reduced to a heap of ruins, as Babylon. She ftill reigned widowed, but independent; and ftill claimed and enjoyed the veneration of kings and of nations. Without fleets or armies fhe repofed in fearlefs tranquillity: public reverence, more mighty than military power, covered her head with an invifible ægis, guarded her frontiers, and fecured her repofe. Even the nations which had forfaken her communion, and in days of irritation had defied the thunders of her fulminating pontiffs, now looked towards her with refpect, and beheld with affection and reverence the benevolence, the fanctity, and the humility of her paftors. Such was the ftate of Rome during the eighteenth century; a ftate happy in the enjoyment of peace, plenty, and increafing improvement, and big with the hopes of future and accumulating profperity. The French invafion clofed the fcene. See ITALY.

Of the Prefent State of Rome.—The modern city poffeffes many features of ancient Rome. The fame roads lead to her gates—the fame aqueducts pour the fame ftreams into her fountains—the fame great churches that received the mafters of the world under the emperors, are ftill open to their defcendants—the fame venerable walls that inclofed fo many temples and palaces in the reign of Aurelian, ftill exift. Modern Rome lies extended principally on the plain, and is fcattered thinly over the hills, bordered by villas, gardens, and vineyards. Its population is fuppofed to amount to 200,000 fouls. The ftreets are well built and paved, narrower, in general, than thofe in London, and wider than thofe in Paris: the houfes being low, the ftreets are light and airy: they are many of them very long and ftraight, and not unfrequently terminated by an obelifk, a fountain, or a church. The houfes are of ftone, but plaftered or ftuccoed, as at Vienna, Berlin, &c. This city contains 46 fquares, 5 monumental pillars, 10 obelifks, 13 fountains, 22 maufoleums, 150 palaces, and 346 churches.

Of the fquares, the moft remarkable is the Piazza Navona, which gradually rofe on the ruins of the Circus Agonalis. It is adorned by the handfome church of St. Agnes, and refrefhed by three fountains decorated with ftatues. One of thefe fountains is an object of great admiration, and is thus defcribed. Four figures, reprefenting four rivers, recline on a craggy rock: on its top ftands an Egyptian obelifk; from its hollow fides rufhes a perpetual ftream. Thefe three fountains are fo managed during the heats of Auguft, as to inundate the whole fquare on Saturdays and Sundays, and afford a very refrefhing exhibition to the Roman gentry, who parade along in their carriages, and to the common people, who always collect in crowds to behold the enlivening fcene. Modern Rome is ten miles in circumference, but this extent comprehends gardens and uninhabited places, and it is defended by the caftle of St. Angelo. In the Rione di Monte is the church of St. Giovanni in Laterano, dedicated to St. John in the feventh century, and raifed on the ruins of a palace built by Conftantine, in the year 324. Near this church is the baptiftery of Conftantine, celebrated for its ornaments, its antiquities, paintings, columns, and ftatues. Before the church is an obelifk, conftructed at Thebes, in Upper Egypt, and brought down the Nile to Alexandria, from whence, by order of Conftantius, it was conveyed to Rome. The church of St. Stephen, found alfo in this part of Rome, called the *round*, from its form, is an ancient temple of Faunus; it is fupported by fixty pillars of granite or marble of the ifland of Paros. The church of the holy crofs of Jerufalem was built by Conftantine, and is celebrated for its relics, its columns, and its paintings. The ruins of a temple, dedicated to Venus and Cupid: the monaftery of St. Eufebius, built on the ruins of the baths and palace of Gordianus: Trajan's pillar, one of the moft beautiful monuments of ancient Rome: the remains of the baths of Titus, of temples dedicated to Concord, to Peace, to Jupiter Tonans, to Jupiter Stator, with many other churches, palaces, and monuments of antiquity, are to be found in this quarter of Rome.

In the Rione di Trevi is found the church of the Twelve Apoftles, firft built in the reign of Conftantine, and rebuilt by Clement XI. This ward likewife contains a church, dedicated to our Lady of Loretto, adorned with Corinthian pillars and the moft beautiful ftatues; the church of St. Mary in Trivio, built or repaired by Belifarius; the churches of St. Vincent, of Anaftafius, and many fuperb palaces. The Rione di Colonna contains, befides churches, the Piazza di Colonna, of which the buildings are handfome: in this fquare is a fountain, and a marble column of Antoninus, conftructed in the time of Commodus, and all of marble: in this ward is the great hall of Juftice; the houfe of the miffionaries, whither all ecclefiaftics of Rome retire for ten days before they receive holy orders, with feveral palaces and monuments of antiquity. The Rione di Campo di Marzo contains the ancient Campus Martius; in this are found feveral beautiful churches and magnificent palaces; among other buildings is the Clementine college, founded by pope Clement VIII. The Rione di Ponte takes its name from the bridge of St. Angelo; in it are found a college for one hundred ftudents, Hungarians and Germans. The Rione della Regola, near the Tiber, contains the Farnefe palace, in which is feen the celebrated coloffal ftatue of Hercules, and many others: this palace was built by Michael Angelo, with the ftone taken from Vefpafian's amphitheatre;

theatre; the gallery was painted by Hannibal Caracci; and the Monte della Pieta, eftablifhed in the year 1539, for the purpofe of lending money on pledges without intereft. The Rione di St. Euftachio contains the beautiful church of St. Charles aux Catinari, in which, among many others, is a beautiful picture reprefenting the death of St. Anne; the church of St. Andre de la Valle, which contains fome excellent paintings; the college de Sapienza is, perhaps, the moft celebrated in the univerfe; this magnificent building was begun under Leo X. from the defign of Michael Angelo; the palace of Juftiniani, adorned with a great number of bas reliefs, and antique ftatues; many of them found on the fpot on which were the baths of Nero, and the palace is now erected: the Theatre d'Argentina, and many other palaces, antiquities, and churches. The Rione della Pigna contains the Piazza della Rotondo, in which is a beautiful fountain of white marble, ornamented with an obelifk and dolphins, which fpout out the water. The Roman college is a vaft and fuperb edifice, built in the time of Gregory XIV. for the ftudy of the languages and fciences; here is kept the mufæum of father Kircher, and the library is well furnifhed: the church of St. Maria della Sopra Minerva, fo called from a temple of Minerva which anciently ftood there. The ward of the Rione di Campitelli, or Du Capitole, contains the Capitolinus mountain, the Palatine, and part of mount Cœlius; the church of St. Mary in Campitelli, rebuilt in the year 1656, by the people of Rome. Here are found many beautiful ftatues and pictures, by the moft celebrated mafters; the Tarpeian rock, now called Monte Caprino; the remains of the temple of Jupiter Tonans; and the church of St. Peter in Carcere; part of the prifon conftructed by Ancus Martius; the ruins of a temple of Concord; the church of our Lady of Confolation; the church of St. Sebaftian, built in the ancient Hippodrome. In this ward is found likewife the Colifeum, a fuperb building, conftructed at the command of Vefpafian, by the Jews brought from Jerufalem, and deftined for the combats of gladiators and public fpectacles. In the Rione di St. Angelo is the church of St. Angelo, which gives name to the ward, was built in the eighth century; near it is the theatre of Marcellus, built by Auguftus, and capable of holding 30,000 fpectators; the palace of Savelli, and the palace of Mattei, celebrated for the pictures and ftatues which they contain; and many others. The ward of the Rione di Ripa, on the fide of the river, includes the Aventine mountain, and the ifland of St. Bartholomew, inhabited at the time of the expulfion of the Tarquins, and then called Tiberina and Lycania; the church of St. Bartholomew was founded on the ruins of an ancient temple of Efculapius. This ifland is joined to the reft of the city by two bridges. The church of St. Nicholas in Carcere is built near the common prifon; St. George in Valebro; the arches of Septimius Severus and Janus; St. Mary in Cofmedin, built by the earlieft Chriftians, on the ruins of a temple of Modefty; St. Paul without the walls is a patriarchal church, and, next to St. Peter, one of the largeft in Rome, built by Conftantine; the immenfe ruins of the baths of Caracalla, in which it is faid 3000 perfons might bathe at one time; the grand circus; the tomb of Ceftius; the catacombs or vaults dug in the ftone or folid earth, and ufed for depofiting of the dead in this ward. The Rione di Tranftevere is on the other fide of the Tiber, and includes the mountain Janiculus; in the church of St. Peter in Montorio is the celebrated picture of the Transfiguration, by Raphael, by fome thought to be the moft perfect painting that exifts; the baths of Severus; the Naumachium of Auguftus; and the temple of Fortune. The Rione di Borgo, or Rione del Vatican; this, too, is beyond the Tiber, and is joined to the reft of the city by means of the bridge of St. Angelo, anciently Pons Œlius; in it is the caftle of St. Angelo, anciently called Moles Adriani, from its founder; it is circular, and exceedingly ftrong: here the papal crown is kept, and prifoners of ftate are confined; it communicates with the Vatican by a long covered gallery. The church of St. Peter is the chêf-d'œuvre of Italy, the largeft and moft beautiful church in the world. It was projected by Nicholas V.; Julius II. laid the firft ftone in the year 1506; but the whole building was not finifhed till the next century: it is faid to cover 20 acres, and to have coft upwards of one million fterling. The original artift was Bramante, but the greater part was from the plan of Michael Angelo, who raifed the cupola; Maderni finifhed it in the year 1621. The pavilion of the great altar of this church, and the four wreathed pillars of Corinthian brafs which fupport it, were formed out of the fpoils of the Pantheon. The Pantheon, originally dedicated to the honour of all the gods, is now a Chriftian temple, and is ftill the moft perfect of the Roman temples that now remain, and notwithftanding the depredations it has fuftained from Goths, Vandals, and Popes, is ftill a beautiful monument of Roman tafte.

The pope has three fine palaces, of which the principal is the VATICAN, which fee. The library of this palace is the largeft and moft complete in the world, rich, efpecially in manufcripts, in all languages, and all ages. In Rome, the lover of the fine arts will, after all the depredations of the French, meet with innumerable paintings by the moft celebrated mafters in the world, and with the fineft works of fculpture. Befides the univerfity, which confifts of feveral noble colleges, there are numerous academies and literary focieties.

The relative fituation of Rome, with regard to other European capitals, is as follows: it is 380 miles from Vienna, 560 from Paris, 740 from Amfterdam, 810 from London, and 900 from Madrid. It ftands within 10 miles of the Tufcan fea. Univerfal Hiftory. Holberg's Introduction. Tytler's Elements of General Hiftory. Playfair's Chronology. Gibbon's Hiftory of the Rife, &c. Encyclopédie Méthodique. Euftace's Claffical Tour, 2d edition.

ROME, *Citizen of*, at firft, was only a citizen of Rome: at length, the right of citizenfhip was given to other cities and people, both in Italy and the provinces. It was thus St. Paul was a Roman citizen, Acts, xvi. 21. 37, 38. xxii. 25, 26, 27. xxiii. 26; the city of Tarfus, in Cilicia, a native of which he was, having the right of Roman citizens. See MUNICIPAL *Cities*, and PAUL.

ROME DE L'ISLE, JOHN BAPTIST LOUIS, in *Biography*, was born, in 1736, at Gray, in Franche-Comtè. He applied himfelf, from a very early period, with earneftnefs to the ftudy of natural hiftory and mineralogy; and by his difcoveries and writings he acquired a confiderable reputation. In 1766 he publifhed "A Letter to M. Bertrand on Frefh-Water Polypes." He drew up defcriptive catalogues of many rich collections of minerals and madrepores, of which the moft diftinguifhed was that of Davila, in 3 vols. 8vo. 1767. In 1779 and 1781 he publifhed a work, entitled "L'Action de Feu central banni de la Surface du Globe, et le Soleil retabli dans fes Droits." In 1783 he publifhed that work by which he is beft known, entitled "Chriftallographie ou Defcription des Formes propres à tous les Corps du Regne minerale," 4 vols. In this elaborate performance, the author gives a defcription of the forms proper to every fubftance of the mineral kingdom, in a faline, ftony, and metallic combination; with figures of all the known cryftals, arranged according to the number and dif- pofition position of their angles. He asserts, which is generally admitted, that every species in the mineral kingdom always takes a polyhedral form, which is regular, constant, and peculiar to itself. Besides the works already mentioned, he published "Caractères extèrieurs des Mineraux," 8vo. 1784; and "Metrologie ou Tables pour servir a l'Intelligence des Poids et des Mésures des Anciens d'àpres leur Rapport avec les Poids et les Mésures de la France," 8vo. 1789. This philosopher died at Paris, in 1790.

ROMÉ, in *Geography*, a town of Brasil, in the government of Goyas; 85 miles E. of Villa Boa.

ROME, a post-town of America, in the county of Oneida, and state of New York, situated on the Mohawk river; 8 miles W. of Whitestown. This town was taken from Stauban, and incorporated in 1796. N. lat. 43° 12'. W. long. 75° 30'.

ROME *du Tarn, St.*, a town of France, in the department of the Aveiron, on the Tarn; 4 miles N. of St. Afrique.

ROME *Scot.*
ROME *Peny.* } See PETER-*Pence*.

ROMELIA, in *Geography*. See ROMANIA.

ROMELSO, a clutter of small islands on the west side of the gulf of Bothnia. N. lat. 64° 55'. E. long. 21°.

ROMENAY, a town of France, in the department of the Saone and Loire; 15 miles N.N.E. of Macon.

ROMENO, a town of the county of Tyrol; 13 miles S.W. of Bolzano.

ROMERSBERG, a mountain of Bavaria, in the principality of Aichstatt; 5 miles W. of Aichstatt.

ROMERSGEHAG, a town of Germany, in the bishopric of Fulda; 14 miles S. of Fulda.

ROMERSTADT, or ROMAROW, a town of Moravia, in the circle of Olmutz, near which are some iron mines; 20 miles E.N.E. of Olmutz. N. lat. 49° 50'. E. long. 17° 9'.

ROMESCAMPS, a town of France, in the department of the Oise; 6 miles N.W. of Grand Villiers.

ROMETTA, a town of Sicily, in the valley of Demona; 5 miles N.W. of Messina.

ROMFORD, a market-town and parish in the liberty of Havering-atté-Bower, county of Essex, England, is situated at the distance of 17 miles S.W. from the county town of Chelmsford, and 12 miles E.N.E. from London. This town is supposed by Stukeley to occupy the scite of the Roman station Durolitum. The same author conjectures that its present name is a contraction for Romanford; and in this opinion he is supported by Mr. Lethieullier. Lysons, however, derives it from the Saxon words *Rom* and *Ford*, which signify the Broad-Ford, in allusion to an ancient passage through a rivulet which flows past the western extremity of the town. Romford is first mentioned in record in the Red Book of the Exchequer; where it is said that, in 1166, Roger Bigod, duke of Norfolk, held "the wood of Romford by serjeancy, and payment of five shillings a-year." It is next noticed in 1277, at which time the manor formed part of the possessions of Adam de Cretinge. It afterwards passed to Thomas de Brotherton, earl of Norfolk, from whom it descended by marriage to the Mowbrays, dukes of Norfolk; but on the death of John, the fourth duke, without male issue, in 1477, it became vested in James, lord Berkeley. Since that period it has belonged to different families, and is now the property of a gentleman named Newman.

Romford is governed by a bailiff and wardens, who, though forming no corporation, are empowered by letters patent to hold a weekly court, for the trial of all causes, whether civil or criminal, high treason not excepted. In ecclesiastical jurisdiction, however, it is subordinate to Hornchurch, except so far as concerns the maintenance of the poor; in which particular it was recognised as a separate parish, in the year 1786. The privilege of holding a weekly market was first granted to the inhabitants by king Henry III.; but at present here are three: one on Monday, for the sale of calves; another on Tuesday, for hogs; and a third on Wednesday, for corn and cattle. There is likewise an annual fair on the 24th of June. The church or chapel of Romford is an ancient structure, and was probably erected about the commencement of the 15th century, when the inhabitants obtained a bull from the pope, authorising them to consecrate a cemetery adjoining the town, for the burial of their dead, who had, previously to that time, been carried to Hornchurch burying-ground. In this chapel were, in Catholic times, a guild and a chantry; the former of which was valued at 4*l.* 10*s.* 2*d.*, and the latter at 13*l.* annual revenue, at the era of the dissolution. The principal monuments here are those of sir George Hervey, knight, lieutenant of the Tower, who died in 1605, and his lady, both of whom are represented kneeling; and of sir Anthony Cook of Gidea-Hall, and his lady, whose effigies are exhibited in similar positions. On the latter tomb are several inscriptions in Latin, said to have been written by the daughters of the deceased, who were the most learned females of the age. Not far from the church is a charity-school for forty boys, and another for twenty girls, which were founded and endowed in 1728; and at a short distance from the western end of the town are barracks for the accommodation of a regiment of cavalry, erected in 1795. According to the population census of 1811, the parish of Romford, including the Town ward, Collier-row ward, Harold's-wood ward, and Noah-hill ward, contains 620 houses, and 3244 inhabitants.

The district called Havering-atté ward, which comprehends the three adjacent parishes of Hornchurch, Romford, and Havering, anciently constituted part of the demesnes of Saxon kings; and even to this day it possesses peculiar privileges, both as prescriptive rights, and by charter, granted by Henry IV., and since confirmed by several of his successors. Near the village of Havering-atté-Bower was formerly a palace, which tradition ascribes to king Edward the Confessor, and which subsequently became the occasional residence of more than one monarch of the Norman line. The situation of this palace is very fine, and commands extensive views over parts of Essex, Hertfordshire, Kent, Middlesex, and Surrey, as well as of the river Thames. The surrounding park, now the property of the crown, but let on lease, exceeds a thousand acres in extent. To the westward of this park, about two miles, lies Hainault-Forest, in which is a very remarkable tree, called Fairlop-oak, which Gilpin informs us, in his "Remarks on Forest Scenery," is traced by tradition "half way up the Christian era." It is generally said to be the largest tree in this kingdom, measuring 36 feet in girt near the base or root, and spreading its branches over a circumference of 300 feet. At Hempstead, in Essex, is a tree of much larger dimensions. Round the Fairlop-oak, on the first Friday in July, is held an annual fair, which appears to have originated from a gentleman, named Day, who commenced the practice of dining with his friends annually under its shade.

About a mile to the eastward of Romford is Gidea-Hall, an ancient seat of the Cook family; and near it stands Hare-Hall, a mansion formerly belonging to John Arnold Wallenger, esq. The house was built under the direction of Mr. Payne, in 1769, and is constructed of Portland stone;

ſtone; it conſiſts of a centre, with two wings, connected by colonnades. A ſmall villa in this neighbourhood, at Hare-ſtreet, is the reſidence of Humphrey Repton, eſq., diſtinguiſhed for his taſte and talents as a landſcape-gardener. He is alſo author of two or three elegant volumes on picturesque ſcenery, and the principles of taſte, as diſplayed in the embelliſhment of parks and gentlemen's manſions. His ſon, John Adey Repton, is alſo juſtly celebrated for his intimate knowledge of the principles and hiſtory of the ancient architecture of England. Four miles to the eaſtward is the village of Brentwood, or Burnt-wood, which was anciently a market-town; but this privilege is now loſt. Its former importance, however, may be conjectured from the fact of the county aſſizes having been held here for many years. The remains of the town-hall and priſon are ſtill diſcernible in the main ſtreet, which ſtretches itſelf along the Harwich road, and abounds with inns and public houſes for the accommodation of travellers. Here is a grammar-ſchool, founded in 1537 by ſir Anthony Brown. Camden ſuppoſed the Roman ſtation of Cæſaromagus to have been ſituated at or near Brentwood; but this opinion is not ſupported by any facts, or even probability.

Five miles weſtward from Romford is Wanſtead-Houſe, the ſeat of William Pole Tilney Long Welleſley, eſq., M.P., who acquired it by marriage with Miſs Tilney Long, eldeſt daughter and co-heireſs of the late ſir James Tilney Long. It is a very ſpacious and magnificent building, meaſuring 260 feet in front, and nearly 80 feet in depth. In the centre of the principal front is a grand portico, ſupported on ſix Corinthian columns, and having on each ſide a flight of ſteps, and in the tympanum the arms of the Tilney family, finely ſculptured. The houſe is divided into two ſtories, the uppermoſt of which contains the ball-room and principal apartments. Several of the rooms contain a collection of fine paintings by eminent artiſts. The gardens and pleaſure-grounds were laid out by Richard Child, previouſly to the erection of the houſe; but latterly great alterations and improvements have been made in the former, under the direction of Mr. Repton, who has very properly revived part of an old and almoſt exploded faſhion, in decorating the lawn immediately adjoining the houſe with flowers, beautiful ſhrubs, &c. to regale and "delight the ſenſes of ſeeing and ſmelling." At the ſplendid manſion of Longleat, Wiltſhire, this has been adopted on a large ſcale, and with ſingular beauty. (See WARMINSTER.) Oppoſite the back front is an eaſy aſcent, through an agreeable viſta, to the river Roding, which is formed into canals, and has near it a curious grotto, conſtructed by the ſecond earl Tilney, at an expence of 2000*l.*, excluſive of its coſtly materials. Within the park, on its ſouthern ſide, a teſſellated Roman pavement was diſcovered in the year 1735. It was about 20 feet long, and was conjectured by Mr. Lethieullier to have been the pavement of a banquetting-room. In the centre was the figure of a man, and around him a great variety of ornaments. The Hiſtory and Antiquities of the County of Eſſex, by Philip Morant, M.A., 2 vols. folio, Lond. 1767. Lyſons's Environs of London, 4to. 1796. Beauties of England and Wales, vol. v. by John Britton and E. W. Brayley, 8vo. Lond. 1803.

ROMHILD, a town of Germany, in the county of Henneberg; eight miles S.E. of Meinungen. N. lat. 50° 26′. E. long. 10° 42′.

ROMI, a town of Aſiatic Turkey, in the province of Diarbekir; 45 miles S. of Kerkiſieh.

ROMIEU, M. of Montpellier, in *Biography*, publiſhed in 1743 and 1751, what he called "A New Diſcovery of the grave Harmonics," meaning the third ſound, reſulting from the coincident vibrations of two acute ſimultaneous ſounds; a phenomenon which Tartini had diſcovered in 1714, and upon which he afterwards built his ſyſtem, or "Trattato di Muſica," publiſhed in 1754.

This diſcovery of Tartini excited the envy, not only of Romieu, but of d'Alembert, Serre of Geneva, the abbé Rouſſier, Laborde, &c. The firſt attempt was to rob him of the honour of the *diſcovery*, and then to depreciate his explanations, and the *conſequences* which he derived from the phenomenon. But it appears to us, on the moſt careful and minute enquiry, that they have egregiouſly failed in both. With reſpect to his *diſcovery*, Tartini himſelf, and his zealous diſciple count Taxis, of Venice, have clearly authenticated his title to it. (Riſpoſta di Tartini alla critica del di lui Tratt. di Muſ. Ven. 1767—et Riſpoſta di un Anonimo al Sigr. Rouſſeau circa al ſuo ſentimento in propoſito d'ahcune propoſ. del Giuſ. Tartini, Ven. 1769.)

And the long extracts given from Romieu's laboured memoir on the ſubject of his diſcovery of the *terzo ſuono*, by Laborde, in his "Eſſai ſur la Muſique," have ſo much puzzled the cauſe, that he may be truly ſaid to "explain the thing till all men doubt it," &c.

Tartini himſelf, by his notation of each *third ſound*, produced, as is ſuppoſed, by the coincident vibrations of any two ſimultaneous intervals, is clear and evident. Stillingfleet's commentary of Tartini's "Trattato di Muſica," and Rouſſeau's analyſis of his ſyſtem, do juſtice to his ingenuity and profound harmonical knowledge, without concealing his defects.

Perhaps we have no right to imagine ourſelves unprejudiced in this diſcuſſion; having been ſo long accuſtomed to regard Tartini as a great practical muſician, and an exquiſite compoſer, we may have been inſenſibly inclined to reſpect his theory, and, indeed, whatever he has produced; for what more can ſcience do for any muſician in the practice of his art, than it has done for Tartini? Has it taught his mathematical opponents, of the old French ſchool, to compoſe elegant, graceful, ſpirited, or fanciful muſic? or even informed them in what good muſic conſiſts? See TARTINI and TERZO SUONO.

ROMIEU, *La*, in *Geography*, a town of France, in the department of the Gers; five miles E. of Condom.

ROMILLY, a town of France, in the department of the Aube, and chief place of a canton, in the diſtrict of Nogent ſur Seine; nine miles E.N.E. of it. The place contains 2175, and the canton 6888 inhabitants, on a territory of 267½ kiliometres, in 15 communes.

ROMISHORN, a town of Switzerland, in the canton of Zurich; nine miles E.S.E. of Conſtance.

ROMKALA, a town of Aſiatic Turkey, in the government of Maraſch, on the right bank of the Euphrates, where the river Simeren joins it. This town has a caſtle, much ruined, which was the work of the Greek emperors, and which is ſituated at the N. end of a chain of mountains over the river. It ſtands on a path, ſeparated from the mountains, to the ſouth, by a deep foſſée cut in the rock, and originally intended, as it is ſaid, to be made ſo deep that it might be ſupplied with water by the river Simeren, and thus the place be inſulated. On the W. ſide is the aſcent, having four terraces cut in the rock, and ſituated above one another, each having a gate-way, and connected by ſteps. In the caſtle are two churches; 50 miles N. of Aleppo. N. lat. 36° 35′. E. long. 37° 45′.

ROMKERA, a town of Hindooſtan, in Viſiapour; 28 miles N.E. of Poonah.

ROMKINT, a town of Asia, in the country of Karasm; 230 miles N.W. of Samarcand.

ROMMEN, a town of Prussia, in the palatinate of Culm; eight miles S.E. of Lautenburg.

ROMMENDAL, a town of Norway; 24 miles N. of Berga.

ROMNA, a town of Russia, in the government of Tchernigov; 88 miles N.E. of Tchernigov. N. lat. 50° 36′. E. long. 33° 24′.

ROMNEY, George, in *Biography*, was born at Dalton, in Lancashire, in December 1734. His father was a native of the same place, where, upon a small patrimonial estate, he followed the threefold occupation of merchant, builder, and farmer; but as his family was large, the joint profits of his triple concerns barely afforded the means for its maintenance. At the age of 12, George was taken from the village school, where he had imbibed the rudiments of learning, and engaged by his father to superintend the workmen. He employed his leisure hours in carving, and being fond of music, made a violin for himself, which he preserved till his death.

He was first tempted to draw, from seeing some ordinary prints in a periodical magazine, which he imitated with considerable success; and his first attempt at drawing a portrait was from memory, when endeavouring to describe the features of a stranger whom he had seen at church. When he was about 15, his mind was led astray from the occupations in which his father had engaged him, by the society and conversation of a peculiar, but ingenious man, named Wilkinson, who resided at Dalton. He was afterwards placed under the care of a Mr. Wright, a cabinet-maker at Lancaster; but he, soon perceiving the turn of Romney's mind for drawing, advised his father to leave him at liberty to indulge his propensity, and become a painter. At the same time he recommended an artist of the name of Steele, as a preceptor for the youth; and with him he continued to study and practise for a short time only, in which, however, he acquired, to a certain extent, the knowledge and use of the materials of the art.

When he left Steele, and had begun to practise portrait painting as a means of subsistence, he became anxious to visit, and tempt his fate in the metropolis. He laboured therefore very hard, painting portraits at low prices, and occasionally producing pictures of historical subjects, which he disposed of by way of raffle at Lancaster. By these means he acquired a sum of nearly a hundred guineas; of which taking thirty pounds to pay his travelling expences, and leaving the remainder with his wife, he set out to put his long intended project into execution, in the year 1762.

He first resided in the city, where he painted portraits at five guineas a head, and acquired considerable practice through the friendly assistance of Mr. Braithwaite, then of the post-office. In 1764 he visited France, in company with Mr. Greene, of Gray's Inn. There he was introduced to Vernet, and, by his friendly assistance, obtained admittance to the gallery of the duke of Orleans, the Luxembourg, and other repositories of art. On his return, he took up a residence in Gray's Inn, to be near his travelling companion; and, by a picture of judge Yates, obtained favour among gentlemen of the robe, and afterwards produced many excellent pictures of persons eminent in that profession. In 1765 he obtained a prize from the Society for the Encouragement of Arts and Sciences, for an historical picture, the subject of which was the death of king Edmund. In 1768 he quitted Gray's Inn, and went to live in Great Newport-street, where he continued to advance in reputation and practice; exhibiting with the incorporated society of artists in Pall Mall, and in Spring Gardens.

Though thus rapidly gaining public respect as an artist, Romney was himself so conscious of his want of style, and the necessity of cultivating his taste by seeing the great models of antiquity, that he nobly resolved upon relinquishing, for a time, the pecuniary advantages his talents acquired him, (which now amounted to 1200*l.* a-year,) and visit Italy, where alone he could, at that time, attain the object of his desire. He accordingly arranged a plan of travel with Mr. Ozias Humphrey, a miniature painter of celebrity, and on the 20th March 1773, they set forward on their journey, through France, to Rome. There, and at other places, where the best works of art were to be found, he remained two years; leading a life recluse and studious, and making some few copies.

On his return, in July 1775, he took the house in Cavendish-square, where he resided till he retired, in 1798, from public practice, to live at Hampstead, in a house he had built; and where he hoped to recruit a weakened constitution by tranquil enjoyment, and the beneficial effects of purer air. During the preceding 20 years, Romney had enjoyed uninterrupted success in the practice of his profession, to which he was so ardently attached, that his whole delight was in it. His talents, in return, were highly esteemed, and encouraged by an immense influx of employment. He, in measure, divided the attention of the town with Reynolds, and indeed by numbers was preferred before him; but he wanted the suavity of mind and manners which his accomplished rival enjoyed. Timid and reserved, and, at the same time, ardent and enterprising, his imagination was tremblingly alive to those irritating circumstances, by which vulgarity and ignorance constantly wound the mind of the portrait painter, and subject him to mortification and disgust. The slightest appearance of coldness in a friend, or of hostility in a critic, was often sufficient to obstruct the exertions of his faculties. This timidity and reserve were the reasons that, amidst the immense crowd of persons to whom, of course, by his professional practice, he was known, there were few with whom he lived in friendly intercourse. His mind dwelt constantly on the art he delighted and excelled in, and among those only who sympathized with his peculiarities, was he happy to associate.

Romney was subject to occasional depression of spirits, which the kind attentions of his friend Hayley, and the invigorating air of the Sussex Downs, among which that friend resided, and where our painter usually spent his summer months, often partially removed. On the approach of age, he was less able to cope effectually with attacks of that nature, and they gained strength upon him to an alarming degree. In 1797 he felt a slight paralytic stroke, which affected his eye and his hand, and prevented him from continuing his professional labours. He then retired, as we have said, to Hampstead, but finding his health still decline, he, in 1799, revisited his native country; and at Kendal received from a wife, whom, though deserted for so long a space of time, he had supported, and protected from poverty, a kind and affectionate attention till his death, (which occurred in Nov. 1802,) having unhappily survived the loss of that faculty which is the distinguishing glory of man, and relapsed to the helpless state of infancy.

Of Romney, as an artist, it is by no means easy to appreciate the just character. That he possessed genius and talents in an eminent degree, no one can deny. The learned editor of Pilkington's Dictionary has said, "that he was made for the times, and the times for him." It had perhaps been more just to have observed, that Romney was made for better times than thofe in which he lived. His perception of art was far purer than moft of his contemporaries, at leaft in this country, were capable of enjoying; and it muft be remembered, that no one ever fet forth in the career of an artift under greater difadvantages than he did. The tafte he imbibed for fimplicity and grandeur, on feeing, at an advanced period of his life, the works of the ancient artifts, prove what might have been fairly expected of him, had he happily been born under more favourable circumftances; and early initiated, under good inftructors, in the myfteries of the art he cultivated with fo much fuccefs without thofe aids. Till the time he was twenty-two he had feen no better painting than the fign of a public houfe, in the place where he was born; but to his active, enterprifing fpirit, all nature was a fchool; and at an age when others are employed in laying by ftores of ideas from books, and thence forming regulations to guide their future progrefs in art, he was induftrioufly obferving and reflecting upon the grand fcenery around him, and the various characters of the objects among which he lived. Thus, the little learning he had imbibed from the few literary works he had feen was called into immediate action, and his progrefs in real knowledge became equal to what is ufually obtained in the ordinary way, with greater affiftance from books and mafters.

The purfuit of painting, however, requires a knowledge of certain rules in the arrangement of lines; of the beauty and power of contraft in light and fhade, and in form and colour; as well as of the fpeedieft and moft efficient modes of execution. This fcience, being the refult of repeated obfervations upon the principles by which Nature produces her moft agreeable and fublime effects, is moft readily obtained, by a careful infpection of good works of art wherein it is exemplified. Such advantage was not Romney's. He had to feparate for himfelf the partial, from the general effects of nature; and the inequality with which he, in this point, met the rivalry of more fortunate artifts, is too evident in moft of his productions. Frequently, his chiarofcuro is ill conducted, and his harmony of forms and colours imperfect; even in pictures produced when enjoying the height of his intellectual power, and at the happieft period of his executive fkill: at the fame time they exhibit great fertility of invention, with fweetnefs and delicacy of fentiment.

He was happily endowed with an inquifitive mind, that delighted in fcience, and purfued it warmly, with the beft means he had: and he poffeffed a verfatility of genius, which is exemplified by the variety of fubjects he chofe for reprefentation. Both the comic and ferious impreffions of the mind had charms for him. Early in life he painted two pictures from Triftram Shandy; one, of the arrival of Dr. Slop at Shandy-hall, after the unlucky cataftrophe he met with on the road; which afforded fcope for fentimental comic humour; the other from the affecting ftory of the death of Le Fevre: both of them were highly approved for truth and propriety of feeling and expreffion, though differing fo widely in their effects upon the mind. His journey to Italy expanded his view of art: new fcenes, and new fources of information, were prefented to him, of which he did not neglect to avail himfelf. The works of fancy he produced after his return home exemplify the ufe he made of the two years he fpent among the unrivalled productions of art he there met with. The purity and perfection of ancient fculpture appear to have made the deepeft impreffion upon his mind: and he afterwards affiduoufly cherifhed the tafte he then imbibed, by procuring a collection of cafts from the beft models of ancient ftatues, groups, baffo-relievos, &c. which he would fit by the hour to contemplate; examining their appearances under all changes of fun-fhine, and common day-light; and with lamps, prepared on purpofe, he would try their effects in various modes of illumination, with rapturous delight. Hence, grandeur and fimplicity became the principal objects of his ambition; he perceived thefe qualities diftinctly, and employed them judicioufly; even whilft imitating nature in his moft ufual occupation,—portrait painting. To prefent his figure, or tell his ftory, with fimple undifturbed effect, rejecting all unneceffary minutiæ, was the point he aimed at and obtained.

On his return from the continent, his zeal for hiftorical painting revived, or rather became ftrengthened. In feveral epiftles to Mr. Hayley, he laments his confinement to portraits: in one he fays, "this curfed portrait painting, how I am fhackled with it! I am determined to live frugally, and cut it fhort as foon as I can." In another, he mentions his "wifh to be retired, in order to compofe with more effect and propriety." And whenever he returned to London from Eaftham, the hofpitable retreat of his admiring correfpondent and friend, whofe playfulnefs of fancy was a conftant and ufeful ftimulus to Romney's dejected and defponding mind, he felt it a weight of drudgery again to fall into the trammels of portraiture: yet from the enjoyment he by nature found in the practice of his profeffion, a fhort time inured him afrefh to it, and ftill he felt pleafure in tracing the features of each new face that prefented itfelf; till again his exhaufted frame required the exhilaration of retirement, and the refrefhment afforded by pure uncontaminated air, free from the grofs vapours that hover in the region of a great and populous city. It is not a little furprifing, that amidft his continual labours in that branch of the art he more immediately profeffed, he fhould have found time to produce fo great a number of fancy pictures as he left behind him. He alfo frequently fpent his evenings in making large cartoons in charcoal, of fubjects which fuited his fancy;—generally of a fublime caft. Amongft thefe, was one of the dream of Attoffa, from the Perfian of Æfchylus, which was conducted with the tafte and feeling of the ancient Greek artifts.

He was in general fortunate in the choice of his hiftorical fubjects; and certainly, in this refpect, had far the advantage of his great rival, fir Jofhua Reynolds: and no lefs fo in the power of expreffion, which he fcarcely ever failed to obtain: whilft the latter, in his hiftorical pictures, has rarely been fo happy. Reynolds gave beauty and grace to his figures: Romney imparted foul. The former delights the eye with the harmony and richnefs of colour, and beauty of effect; the latter thrills and gratifies the heart with truth and force of expreffion, in action and countenance; wrought with more fimplicity, but with lefs art. His picture of Ophelia feated upon a branch of a tree, the breaking of which threatens her deftruction in the ftream below, whilft the melancholy diftraction vifible in her lovely face accounts for her apparent infenfibility to danger, is a fufficient proof of this affertion. His compofition alfo of "Titania and her Indian Votarefs," in the poffeffion of Mr. Beckford; "Titania, Puck, and the Changeling," at fir John Leicefter's, and others of his works of the like playful and interefting kind, might be brought forward to fupport it. In portraiture, however, the juftly exalted prefident of the Royal Academy ftood alone, and Romney was not able to cope with him. In the compofition of his figures, our artift exhibited the tafte he had acquired by the ftudy of the antique; and he admirably varied the characters of his heads. The arrangement of drapery which he adopted, partook largely of the fame ftyle; and being well underftood, was painted with great dexterity;

dexterity; though it muſt be confeſſed, that in form, it was not unfrequently better adapted to ſculpture than to painting. His ſtyle of colouring was ſimple and broad. In that of his fleſh he was very ſucceſsful; exhibiting a great variety of complexion, with much warmth and richneſs. It was not always, however, that his pictures were comp!... in the general tone; but crude diſcordant colours were ſometimes introduced in the back-grounds, which not being blended or broken into uniſon with the hue of the principal figures, interrupted the harmony of the whole. The executive part of his works was free, learned, and preciſe, without being trifling or minute, poſſeſſing great ſimplicity, and exhibiting a purity of feeling conſonant with the ſtyle of his compoſitions. He aimed at the beſt of all principles in the imitation of nature, *viz.* to generalize its effects; he even carried it ſo far as to ſubject himſelf to the charge of negligence in the completion of his forms: but the truth of his imitation is ſufficiently perfect to ſatisfy the minds of thoſe who regard nature ſyſtematically, and not individually, or too minutely. In a word, every lover of art who knows how to appreciate truly what is moſt valuable in painting, will hold the name of Romney in increaſing eſtimation, the more frequently and impartially he examines his productions.

ROMNEY, *New*, in *Geography*, one of the Cinque-ports, locally ſituated, partly within the liberty of Romney Marſh, partly within the level of Walland Marſh, and partly in the lower half hundred of St. Martin's Pountney, lathe of Shepway, county of Kent, England. It is diſtant 37 miles S.E. from Maidſtone, and 71 miles S.E. by E. from London. This town is deſcribed as having riſen from the ruins of Old Romney, at leaſt a century previous to the Norman conqueſt. Subſequent to that event, it was beſtowed by king William I. on Odo, biſhop of Baieux, and earl of Kent, and was declared to be privileged as one of the Cinque-ports, having Old Romney, Lydd, Dengemarſh, and Oſwardeſtone, and part of Promhill pariſh, annexed to it as members, which were to ſend out jointly five veſſels of war, with twenty-one men and one boy to each of them. At this period, and for many years afterwards, New Romney was a very flouriſhing place. It was divided into twelve wards, and contained within its liberty five pariſh churches, a priory, and an hoſpital for the ſick. In the reign of Edward I., however, a great part of it was deſtroyed by a dreadful tempeſt and convulſion of nature, which likewiſe choaked up its haven, and thereby prevented its revival as a commercial and ſhipping town. When Henry VIII. aſcended the throne, the ſea had retired from it nearly two miles, and all its churches were demoliſhed, except that of St. Nicholas, which is ſtill ſtanding. Henry therefore united the whole liberty into one pariſh, as it continues at the preſent day.

In very early times the Cinque-ports were enfranchiſed with various privileges and cuſtoms, though of what antiquity they are, or when ſo enfranchiſed, has not been determined with any certainty; they are held therefore to enjoy their privileges by preſcription, though theſe were confirmed by Magna Charta, and ſince by a charter of king Edward I. New Romney, as one of theſe ports, is conſequently a corporation by preſcription; but in Edward III.'s time it was incorporated by charter, firſt by the ſtyle of "barons of the town and port of New Romney," and afterwards by that of "jurats and commonaltie of the town and port of New Romney." Queen Elizabeth again incorporated this town, and under her charter the corporation now conſiſts of a mayor, twelve jurats, a chamberlain, recorder, town-clerk, and twenty-ſix common council-men. The mayor, who is coroner by virtue of his office, is choſen on Lady-day, yearly; and together with the jurats, who are the excluſive juſtices within the liberty, hold a court of general ſeſſions of the peace and gaol delivery, and alſo a court of record. Romney returns two members to parliament, who are uſually ſtyled barons, and are elected by the mayor, jurats, and freemen. The firſt return mentioned on record, is in the forty-ſecond year of Edward III. ſoon after its ſeparate incorporation.

The town of Romney ſtands on elevated ground in the centre of a marſhy country. It conſiſts principally of one broad well-paved ſtreet, interſected by a ſecond, in which the hall or brotherhood houſe is ſituated, where the mayors, jurats, and commons of the Cinque-ports, and of the two ancient towns of Rye and Winchelſea, uſually keep their court, called the brotherhood; but as it is too ſmall for the purpoſe, the court called the Gueſtling, or Geſling, is held in the church. The market-houſe ſtands in the main ſtreet, and is a modern ſtructure. The day on which the market is held is Saturday, weekly; beſides which there is an annual fair on the 22d of Auguſt. The church of St. Nicholas is an ancient ſtructure, and conſiſts of three aiſles and three chancels, with a ſquare tower at its weſtern extremity. The columns ſeparating the aiſles are maſſive, and ſupport circular arches with zigzag and billeted mouldings. The weſt door-way under the tower is likewiſe formed by a circular arch, ſimilarly ornamented. Within this edifice is a great variety of monumental erections, chiefly in memory of perſons who have been mayors and jurats of the town. Anciently the church of New Romney belonged to the abbot and convent of Pontiniac, in France, who had a cell or priory here, which was ſuppreſſed by king Henry V. Here was alſo an hoſpital for lepers, founded and endowed by Adam de Cherryng in the time of king Henry II. There was likewiſe a houſe called St. John's houſe in this town previous to the reign of Edward IV. The only charitable inſtitution now in the pariſh is an hoſpital and ſchool-houſe for the reſidence of a ſchoolmaſter and four poor perſons. According to the population cenſus of 1811, New Romney pariſh contained 159 houſes, and 841 inhabitants.

Old Romney is ſituated two miles to the weſtward of New Romney, of which it is a member. This place is ſaid to have been anciently of much importance, and to have conſtituted one of the original Cinque-ports. Here, in the times of the Romans and of the Saxons, was a commodious haven for ſhipping, but the ſea deſerting it occaſioned the decay of the town. Somner conjectures, that the Portus Lemanis of Antoninus was ſituated either at Old or at New Romney; but this opinion is contradicted by later antiquaries, who fix that ſtation near Stutfal caſtle, at the baſe of Limne hill. Old Romney now conſiſts only of about twenty houſes, with a church, which is an ancient building in the maſſive circular ſtyle. In the north chancel is a very old tomb, with a vault underneath, but there is no inſcription to identify its poſſeſſor. The font is rudely ſculptured, and is ſupported on four ſtone pillars.

Romney Marſh is an extenſive level of the richeſt paſture land in England, ſituated between the upland hills and the ſea-ſhore. This diſtrict meaſures about ten miles in length and five in breadth. It comprehends four diviſions, all under different juriſdictions and conſtitutions, *viz.* Romney Marſh, ſtrictly ſo called; Walland Marſh; Dengemarſh, with Southbrooks; and Guildford Marſh, part of which is within Suſſex. Vaſt flocks of ſheep and herds of black cattle are paſtured here. The bullocks of this Marſh are reckoned the largeſt in England, and the ſheep equal to thoſe of Leiceſterſhire and Lincolnſhire. So careful

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were our ancient monarchs of this fertile diſtrict, that they granted to the inhabitants various important privileges. Edward IV. incorporated the towns of Lydd and Romney, with nineteen pariſhes, by the title of the bailiff, twenty-four jurats, and the commonalty of Romney Marſh; but the inhabitants exerciſed many privileges for ſeveral centuries anterior to that era. Under the above charter the bailiff, jurats, and commonalty, are empowered to hold a court every three weeks, and to decide on all pleas of action real and perſonal, civil and criminal. They are likewiſe empowered to chooſe four juſtices of the peace of their own, yearly, beſides the bailiff, who poſſeſſes ſimilar authority *ex officio*. They have nothing, however, to do with the ſuperintendence or management of the embankments and drainage, which by ancient cuſtom is veſted in the lords of twenty-three neighbouring manors, who appoint a bailiff as chief ſupervifor of the works, who is commonly, though not always, the ſame perſon with the bailiff under king Edward's charter. The courts are held in a new hall, in Dimchurch; and at a general one holden on Whit-Thurſday, all ſcots and levies, which on an average of years amount to two ſhillings annually, are paid. Romney Marſh is protected from encroachments of the ſea by a wall of great ſtrength, called Dimchurch wall, which extends ſomewhat more than three miles in length. This wall forms the only highway for carriages along its whole extent, on the road between Hithe and Romney. It meaſures from twelve to twenty feet in height above the level of the Marſh; and from fifteen to thirty feet in breadth at its ſummit. "The drainage," ſays Marſhall, in his Rural Economy of the Southern Counties, "is effected by arched ſluices paſſing under the bank; each having two pair of flood-gates, one on the outſide, the other on the inſide, to provide againſt accidents to the outer pair. Theſe gates permit the interior waters to paſs off when the tide is low; and prevent thoſe of the ſea from entering at high tide." The Hiſtory and Topographical Survey of the County of Kent, by Edward Haſted, eſq. F.R.S. and S.A. 8vo. edit. Canterbury, vol. viii. A New Topographical, Hiſtorical, and Commercial Survey of the Cities, &c. of Kent, by Charles Seymour, 8vo. Canterbury, 1776. Beauties of England and Wales, vol. viii. by E. W. Brayley, 1807.

Romney, a poſt-town of America, the capital of Hampſhire county, in Virginia, ſituated on the W. bank of the S.W. branch of the river Patowmac; 50 miles W. by N. from Wincheſter. It contains about 30 houſes, a brick court-houſe, and a ſtone gaol.

ROMONT, a town of Switzerland, in the canton of Friburg, and capital of an extenſive bailiwick, which was formerly a county; nine miles N.W. of Friburg.

ROMOPOCK, a town, or rather village, of Bergen county, in New Jerſey, on a river of the ſame name, 15 or 20 miles N. of Patterſon.

ROMORANTIN, a town of France, and principal place of a diſtrict, in the department of the Loire and Cher; ſeven miles S.S.E. of Blois. The town contains 5730, and the canton 10,276 inhabitants, on a territory of 330 kiliometres, in 10 communes. Its manufactures conſiſt of fine cloths and ſerges. N. lat. 47° 22′. E. long. 1° 49′.

ROMORSWALDE, a town of Pruſſia, in the province of Ermeland; five miles N.N.W. of Heilſberg.

ROMPEE, or Rompu, in *Heraldry*, is applied to ordinaries that are repreſented as broken; and to chevrons whoſe upper points are cut off. He beareth a chevron rompee, between three mullets, argent, by the name of Sault.

ROMPION, or Rampion, in *Botany*. See Campanula *Rapunculus*.

ROMPNEY, in *Geography*. See Remney.

ROMPONESCO, a town of Italy, on the Po; 20 miles S. of Mantua.

ROMRA, a town on the W. coaſt of the iſland of Lombock. S. lat. 8° 15′. E. long. 115° 54′.

ROMROD, or Rumroth, a town, with a caſtle, of Weſtphalia, in the principality of Heſſe; 16 miles E. of Marburg.

ROMSDAL, a town of Norway, and capital of a diſtrict or provoſtſhip, in the dioceſe of Drontheim; 100 miles S.S.W. of Drontheim. N. lat. 62° 28′. E. long. 7° 54′.

Romsdal *Bay*, a bay or river of the North ſea, on the coaſt of Norway, 20 miles long, with ſeveral branches. N. lat. 62° 40′. E. long. 7° 45′.

ROMSEY, or Rumsey, a market-town and pariſh in the lower half hundred of King's Sombourne, Andover diviſion of the county of Southampton, England, is ſeated in a flat diſtrict, watered by the river Teſt, or Anton, at the diſtance of 8 miles S.W. from the town of Southampton, and 73 miles S.W. by W. from London. The town is of conſiderable antiquity, and probably derived its origin, as it certainly did its early importance, from an abbey founded here by Edward the Elder, and afterwards filled with Benedictine nuns by his ſucceſſor, king Edgar. The firſt abbeſs of this monaſtery was Elfleda, the daughter of a Saxon nobleman, named Ethelwold, who had greatly contributed to its original eſtabliſhment, and whom ſome authors, therefore, deſignate as its founder. This lady was afterwards canonized, and conſtituted one of the patron ſaints of the abbey. She was ſucceeded in her office by ſeveral females of royal birth, and diſtinguiſhed for the ſanctity of their lives. In the year 992, Romſey and its monaſtery were plundered by the Danes; but the nuns and moſt of their valuables had been previouſly removed to Wincheſter, by order of the abbeſs Elwina. The buildings were ſoon reſtored, and the nuns replaced. In 1085, Chriſtina, couſin to king Edward the Confeſſor, took the veil here, and was ſubſequently entruſted with the education of Matilda, daughter of Malcolm, king of Scotland, afterwards conſort to Henry I. Mary, daughter to king Stephen, likewiſe became a nun in this abbey; but afterwards renounced the veil, and married Matthew, younger ſon of Theodoric, earl of Flanders; an event which called forth all the thunders of the Vatican againſt herſelf and her huſband. The benefactors to this monaſtery were numerous; and previouſly to the diſſolution, its revenues were eſtimated, according to Dugdale, at the annual value of 339*l.* 10*s.* 10$\frac{1}{2}$*d.*; but Speed ſtates their amount at 528*l.* 8*s.* 10$\frac{1}{4}$*d.* Of the buildings which belonged to it ſcarcely a veſtige remains, except the church, which is ſtill uſed for divine ſervice.

Romſey is governed by a corporation, conſiſting of a mayor, recorder, ſix aldermen, and twelve burgeſſes, beſides inferior officers. The petty ſeſſions for Romſey diviſion of the hundred are held here. The market-day is Saturday, weekly; and there are fairs on Eaſter Monday, every Tueſday fortnight after 31ſt July until Chriſtmas, 26th Auguſt, and 8th November. Formerly this town poſſeſſed a conſiderable woollen trade, but that is now greatly diminiſhed, and is in part ſupplied by paper-works, and a ſacking manufactory. The chief public buildings here are the audit-houſe, which is a large ſquare building, ſtanding on piers, near the centre of the town; a town-hall; the pariſh church; and a large meeting-houſe for Preſbyterians, built about ten years ago. The church, which alone de-

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ſerves particular notice, was formerly annexed to the abbey. The whole preſents a ſeries of intereſting ſtudies and details to the architectural antiquary. It conſiſts of a nave, with aiſles, a north and ſouth tranſept, a choir, or chancel, with aiſles, three ſmall chapels or oratorios at the eaſt end, where is alſo an aiſle, two ſmall ſemicircular chapels at the angles of the tranſepts with the choir, and a low tower riſing on four lofty arches, at the interſection of the tranſepts with the nave and choir. The eaſtern part of the church is certainly the moſt ancient, and is ſaid by Dr. Latham to have been erected anterior to the Norman conqueſt. At the weſt end are ſome arches of a later age, probably about the era of king Stephen. In the ſouth tranſept is an ancient ſtatue of a female, probably one of the nuns. Near the ſouth door is a crucifixion in bold baſſo relievo, cloſe to which is a ſquare niche, or cupboard, in the wall. At the eaſt end of the north and ſouth aiſles of this church are two pillars, the ſculptures on the capitals of which form the ſubject of ſome papers in the 14th and 15th volumes of the "Archæologia." That in the north aiſle exhibits four human figures, beſides two birds, a horſe, and ſeveral mutilated bodies, &c.; the whole repreſenting a field of battle. Two of the human figures are crowned, and one of them holds the other by the beard. Both have ſwords in their right hands, and ſeem in the act of ſtriking with them; but each is reſtrained by a winged figure ſeizing his ſword. To the right, at bottom, is a horſe ſaddled; and in each corner, above, a bird of prey, loaded with mangled limbs, many of which are likewiſe diſperſed in various places. The oppoſite pillar to this repreſents a more peaceable ſcene. In the centre ſtands a crowned perſonage in a looſe robe. On the left is another crowned man, ſitting bare-legged, and ſupporting one ſide of an angular label, the other ſide of which is held by a winged figure; and on the right is a ſimilar label, held by two ſitting figures habited in mantles. The legend on the firſt label is "Robert me-fec';" and that on the ſecond, "Robert tute conſule + D.S." Dr. Latham makes the former refer to the battle and conſequent peace between king Alfred and Guthrum, the Daniſh chief, who oppoſed him; and the latter to the foundation of the monaſtery. The figures of the two kings he ſuppoſes to repreſent Edward and Edgar; and the legend to mark the name of the conſularius, or maſter maſon of the buildings. Other capitals in this church are alſo ornamented with ſculptured figures, &c. (See Carter's "Ancient Sculpture and Painting," folio.) Some ancient tomb-ſtones commemorate the names of abbeſſes buried beneath; and there is alſo a flat ſtone in remembrance of the celebrated ſir William Petty, author of "A Treatiſe on Taxes and Contributions," "A Survey of Ireland," and ſeveral other works, who died in 1687. He was the ſon of a clothier at Romſey, and anceſtor to the preſent marquis of Landſdown. Another eminent native of this town was Mr. Giles Jacob, author of Jacob's Law Dictionary, and of a work, entitled "Lives and Characters of Engliſh Dramatic Poets." According to the parliamentary returns of 1811, Romſey pariſh, including Romſey Infra et Extra, contained 933 houſes, and 4297 inhabitants.

About half a mile to the ſouth-weſt of Romſey is Broadlands, the ſeat of lord viſcount Palmerſton, whoſe father, the late lord, purchaſed it from the family of St. Barbe, which had poſſeſſed it for more than two centuries. The houſe is embelliſhed with a fine collection of paintings, by the moſt eminent maſters. Paultons, a ſeat of lord viſcount Mendip, is ſituated about three miles to the ſouth-eaſt. The houſe is not remarkable, but the grounds, which extend five miles in circumference, diſplay the taſte and ſkill of the celebrated Brown. Near this manſion is Tatchbury Mount, which tradition reports to have been the ſcite of a royal hunting ſeat; but it appears more probable that it has been an ancient military ſtation. The vallations are ſtill clearly diſcernible on the declivity of the hill. Beauties of England and Wales, vol. vi. 8vo., by John Britton and E. W. Brayley. Archæologia, vols. xiv. xv.

ROMSOE, a ſmall iſland of Denmark, in the Great Belt, near the coaſt of Funen. N. lat. 55° 30′. E. long. 10° 48′.

ROMULEA, in *Botany*, a name given by Maratti, in honour of the founder of Rome, to the Linnæan *Ixia Bulbocodium;* which Mr. Ker, in ſeparating with other ſpecies, from *Ixia*, has thought proper to call *Trichonema;* nor ſhall we, by any means, contend for the above, though the original appellation of this genus. See Trichonema.

ROMULUS, in *Biography*, founder and firſt king of Rome. See Rome.

Romulus, in *Geography*, a military townſhip in the ſtate of New York, in Cayoga county, between Seneca and Cayoga lakes. Its northern part is croſſed by the road to the ferry at Cayoga lake. The townſhip was incorporated in 1794, and comprehends, within its juriſdiction, the townſhips of Janus and Galen, and that part of the lands reſerved to the Cayoga nation of Indians, W. of Cayoga lake. Its number of inhabitants is 1025.

ROMUNDA, a mountain of Carinthia; 6 miles S. of Mautten.

RON, a ſmall rocky iſland of Denmark, in the Little Belt. N. lat. 55° 7′. E. long. 9° 55′.

Ron, *Lynder*, a cluſter of ſmall iſlands in the Categat; 12 miles S. from the iſland of Leſoe.

RONA, one of the weſtern iſlands of Scotland, is ſituated about ſixteen leagues N.W. from the Butt of Lewis, and is ſuppoſed to lie fartheſt to the N.W. of any land in Europe. It is about a mile in length, and half a mile in breadth; and is included in the pariſh of Barvas, in the iſle of Lewis. In this iſland is an ancient chapel, which is fenced round with a ſtone wall, and is kept clean and in good repair by the inhabitants. On the altar lies a large plank of wood about ten feet long, having as many holes in it, each pegged with a ſtone, to which the natives aſcribe many virtues, particularly the promotion of ſpeedy delivery to a woman in travail. The products of Rona are a few cows and ſheep, and a ſmall quantity of barley and oats. The cuſtom of walking round a perſon ſunways, to whom it is intended to expreſs high eſteem, is yet practiſed by the natives of Rona, all of whom are employed as ſervants by the tackſman of the iſland, which was let on leaſe about fifteen years ago for the annual rent of four pounds. A Deſcription of the Weſtern Iſlands of Scotland, by M. Martin, 1716, 8vo. Carliſle's Topographical Dictionary of Scotland, 4to. 1813. The Statiſtical Account of Scotland, &c. by ſir John Sinclair, bart. vol. xix. Edin. 8vo. 1797.

RONABEA, in *Botany*, an unexplained name, Aubl. Guian. v. 1. 154. t. 59. Juſſ. 205. Lamarck Illuſtr. t. 166. This ſuppoſed genus appears, as Juſſieu points out, ſo very near Pæderia, ſee that article, that we cannot conſider them as diſtinct. Still, without examination of ſpecimens, we durſt not poſitively treat of it under that head. Aublet deſcribes two ſpecies, *R. latifolia* and *erecta;* ſhrubby plants of Guiana, of no remarkable properties, the firſt with a twining *ſtem*, the other erect. The *flowers* are ſmall and axillary.

RONALDSAY, North, in *Geography*, the moſt northerly of the Orkney iſlands, Scotland, is ſo called to diſtinguiſh it from South Ronaldſay, the ſubject of the next article, to which, however, it bears no ſort of reſemblance.

It

It is ſeparated from the iſle of Sanday by a rapid and dangerous frith, two miles in breadth, and contains an area of four ſquare miles in extent, which ſupports about 500 inhabitants. The whole iſland is flat, and little raiſed above the level of the ocean, which rendered it peculiarly dangerous to navigators, previous to the erection of a lighthouſe on its north-eaſtern extremity. It is nevertheleſs dry and healthy, and produces both corn and graſs of excellent quality, and ſufficient to ſupply the home conſumption. The inhabitants are ſober, honeſt, and induſtrious, beyond the generality of the Orkney iſlanders. In winter, their chief occupation is the care of their cattle and crops, and fiſhing, when the weather will permit their venturing to ſea. In ſpring they are employed on the land, as in other places; and when ſummer arrives, almoſt every individual is actively engaged in the manufacture of kelp, of which they make about 120 tons every year. Near the centre of the iſland is a ſingle ſtone monument, ten feet high, and four broad, round which it is cuſtomary for the inhabitants to aſſemble annually, on the firſt day of January, to uſher in the new year with the ſong and the dance. Tumuli are numerous, one of which, on being opened, "was found to contain a building of nine feet in diameter, circular on the outſide, and ſquare and hollow within, in the bottom of which was a well, and in the upper part the ſkeleton of a man in nearly an upright attitude." Hiſtory of the Orkney Iſlands, by the Rev. Dr. Barry; ſecond edition, by the Rev. James Headrick, 4to. Lond. 1808.

Ronaldsay, *South*, one of the Orkney iſlands, Scotland, is ſituated to the ſouthward of the Mainland of Orkney, at the diſtance of ſeven miles from Duncanſby Head, in Caithneſs. In ſuperficial extent it contains about eighteen ſquare miles; and its inhabitants amounted to 1631 in the year 1811. The greater part of this iſland is very well cultivated; and is equally fit for corn and paſture. Of the former, a larger quantity is raiſed than can be conſumed at home, and hence a conſiderable exportation takes place to the Mainland. The bowels of the earth contain lead ore, of which a very promiſing vein has been diſcovered at Grimneſs Head, and another at Widewall. The ſhores abound with kelp, which is a ſource of great wealth to the inhabitants; and the ſea affords fiſh in vaſt numbers, and of the beſt quality. An Engliſh company employs about twenty veſſels in carrying cod-fiſh and lobſters to the London market. This iſland is excellently furniſhed with harbours: for, beſides ſeveral places where ſhips may anchor for a time, it has the ſafe and commodious road of St. Margaret's Hope on the north, and the bay of Widewall on the ſouth. Here are alſo ſome intereſting objects of antiquity. On the ſummit of a hill, near Stow's Head, are the remains of a monument compoſed of three upright ſtones, placed in a triangular form, but only one of them is now ſtanding. Another ſtone monument is ſituated in the beautiful vale of Paplay. It conſiſts of a ſingle block of ſtone, ſixteen feet high, and deſtitute of all marks of human art, by which to diſcriminate its uſe. Similar ſtones of ſmaller dimenſions may be ſeen in other parts of the iſland, which likewiſe affords a number of tumuli, and ſeveral of thoſe buildings uſually called Picts-houſes; alſo the ruins of ſome Catholic chapels and chantries. Hiſtory of the Orkney Iſlands.

RONAY, one of the weſtern iſles of Scotland, is ſituated between the Mainland and the Iſle of Skye. It is about four miles in length, and two in breadth; and has a more level ſurface, and greater fertility of ſoil, than moſt iſlands of the Hebrides; but its cultivation is much neglected. On the weſtern ſide of the iſland is an excellent harbour for ſhipping; and round the coaſt the ſea has hollowed out ſeveral caves, ſome of which afford fine ſpecimens of ſtalactites. Carliſle's Topographical Dictionary of Scotland, 4to. 1813. Sinclair's Statiſtical Account of Scotland, vol. xvi. 8vo.

RONCA *de Scaglia*, a town of Italy, in the department of the Panaro; 20 miles S. of Modena.

RONCADOR, an iſland in the Caribbean ſea. N. lat. 13° 45'. W. long. 79° 30'.

Roncador, or *Rum Key*, one of the ſmaller Bahama iſlands. N. lat. 23° 26'. W. long. 75° 3'.

RONCAGLIA, Francesco, in *Biography*, an Italian opera ſinger, with a ſoprano voice, who arrived in England in 1777 as firſt man in our lyric theatre, when Sacchini was here, and the Danzi, afterwards madame Le Brun, was firſt woman.

Roncaglia had a beautiful face, and elegant figure; a ſweet-toned voice; a chaſte and well-diſciplined ſtyle of ſinging; hazarded nothing, and was always in tune. The beſt part of his voice, which was a ſoprano, was from D to A; he ſometimes went to C, but not eaſily. Both his voice and ſhake were feeble; and of the three great requiſites of a complete ſtage ſinger, pathos, grace, and execution, which the Italians call *cantabile*, *grazioſa*, and *bravura*, he was in perfect poſſeſſion of only the ſecond. As his voice, though of an exquiſite quality, was by no means powerful, and little more than a *voce di camera* (more ſuited to a room than a ſpacious theatre), his ſinging at concerts, when confined to the *grazioſa* ſtyle, left nothing for an audience to wiſh. He was of the Bologna ſchool, formed by Piſtocco and Bernacchi, and reminded his hearers of one of their beſt ſcholars, Guarducci.

Roncaglia remained here two ſeaſons, and was ſucceeded by Pacchierotti.

Roncaglia, in *Geography*, a town of Italy, in the duchy of Piacenza; 8 miles E. of Piacenza.—Alſo, a town of the county of Tyrol; 14 miles N.E. of Trent.

RONCARUOLO, a town in the duchy of Piacenza; 4 miles E.N.E. of Piacenza.

RONCAU, a town of the iſland of Dominica.

RONCEVALLOS, a town of Spain, in Navarre, ſituated in a valley of the ſame name, between Pamplona and St. Jean Pie de Porte. This valley has been celebrated in romance for the defeat of the emperor Charlemagne, and the death of Roland; 14 miles N.N.E. of Pamplona.

RONCHAMPS, a town of France, in the department of the Upper Saone; 5 miles E. of Eure.

RONCHAUX, a town of France, in the department of the Doubs; 3 miles S. of Quingey.

RONCIGLIONE, a town of Italy, and capital of a county, to which it gives name, in the Patrimonio; 10 miles S. of Viterbo. N. lat. 42°. E. long. 12° 8'.

RONCINA, a town of Auſtria, in the county of Goritz; 5 miles N. of Goritz.

RONCO, a town of the Ligurian republic; 15 miles N. of Genoa.

RONCOFERRATO, a town of Italy, in the department of the Mincio; 7 miles E. of Mantua.

RONCOFREDDO, a town of Italy, in the department of the Rubicon; 9 miles W. of Rimini.

RONDA, a town of Spain, in the province of Grenada, ſituated on a fertile ſpot, which ſupplies Cadiz with all kinds of fruit and vegetables. The ſoil, which is of a reddiſh colour, abounds with pebbles, and reſiſts the action of fire; and it is therefore uſed in furnaces for fuſing iron. The adjacent country is famous among other curioſities for that ſpecies of Viverra, called Genette (ſee Viverra); and alſo for wild bulls, wolves, and other ferocious animals: its rocks ſerve alſo as a retreat for eagles, oſpreys, and kites; 35 miles W. of Malaga. N. lat. 36° 45'. W. long. 5° 15'.

RONDE, or Rhonds, a ſmall iſland of the Weſt Indies, near the north coaſt of the iſland of Grenada. It has about 500 acres of excellent land, employed in paſturage, and the cultivation of cotton.

Ronde *Haye, La*, a town of France, in the department of the Channel; 6 miles N. of Coutances.

Ronde, Fr., in *Muſic*, a ſemibreve. See Time-table, and *Muſical* Characters.

Ronde *de Table*, Fr. a kind of *chanſon à boire*, or drinking ſong, with a *refrain*, or burden to it, and generally mixed with ſentiments of gallantry, compoſed of different ſtanzas, which are ſung by turns at table, and in which all the gueſts join chorus in the refrain.

RONDEAU, Fr., an air of two or more ſtrains, always returning to, and finiſhing with the firſt. In order to do this in an artful, pleaſing manner, the modulation ſhould paſs into ſome key relative to that of the firſt ſtrain.

Rouſſeau has very juſtly cenſured the writing and ſetting vocal rondeaus, in which the thought is begun in one ſtrain, and continued or ended in another; or begins with a ſimile, of which the application is made in the ſecond ſtrain.

The term *rondeau*, derived from *rondel*, is of great antiquity in France. In old Engliſh it was called a *roundelay*.

But Rouſſeau, after pointing out poetical and muſical defects in the compoſition of rondeaux, indicates the means of avoiding both. "Whenever a ſentiment, expreſſed in the firſt ſtrain, ſuggeſts a reflexion which confirms and enforces it in the ſecond; whenever a deſcription of the ſinger's ſtate of mind is the ſubject of the firſt ſtrain, and illuſtrates a ſimile in the ſecond; whenever an affirmation in the firſt ſtrain, contains its proof and confirmation in the ſecond; every time, in ſhort, that the firſt ſtrain contains a propoſition to perform ſome action, and a reaſon for it is given in the ſecond; in theſe, and ſimilar caſes, a rondeau will be always well placed."

RONDEL, in *Fortification*, a round tower, ſometimes erected at the foot of a baſtion.

RONDELETIA, in *Botany*, was ſo named by Plumier, in memory of William Rondelet, a phyſician of Montpellier, who died chancellor of that univerſity in 1566, aged fifty-nine. He is moſt celebrated for his work on Fiſhes; but his ſtudies were much directed to Botany, ſo far as concerned the Materia Medica; and he is ſaid to have deeply inveſtigated the writings of Dioſcorides.—Plum. Gen. 15. t. 12. Linn. Gen. 90. Schreb. 120. Willd. Sp. Pl. v. 1. 930. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 366. Swartz Obſ. 66. t. 10. f. 2. Juſſ. 201. Lamarck Illuſtr. t. 162. (Lightfootia; Schreb. 122.)—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Stellatæ*, Linn. *Rubiaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, ſuperior, in five deep, acute, permanent ſegments. *Cor.* of one petal, funnel-ſhaped; tube cylindrical, longer than the calyx, very ſlightly inflated at the ſummit; limb flat, ſomewhat reflexed, in five deep roundiſh ſegments. Nectary a crenate ring in the orifice. *Stam.* Filaments five, awl-ſhaped, inſerted into the middle of the tube; anthers ſimple. *Piſt.* Germen roundiſh, inferior; ſtyle thread-ſhaped, as long as the corolla; ſtigma cloven. *Peric.* Capſule roundiſh, crowned with the calyx, of two cells. *Seeds* two or more in each cell, rarely ſolitary.

Eſſ. Ch. Corolla funnel-ſhaped, nectariferous at the mouth. Capſule of two cells, with ſeveral ſeeds, roundiſh, inferior, crowned with the calyx.

A genus of Weſt Indian, ſimple and entire-leaved, ſhrubs, to which the diſcoveries of Swartz have added ſeveral ſpecies. Three only are mentioned in the Hortus Kewenſis, nor are any of them in general cultivation, though ſome poſſeſs fragrance as well as elegance. Two have four-cleft tetrandrous flowers. Juſſieu terms the fruit a berry, which ſeems incorrect. *Rondeletia aſiatica*, Linn. Sp. Pl. 244, is perhaps an *Ixora*, or *Pavetta*.

1. R. *americana*. Corymboſe Rondeletia. Linn. Sp. Pl. 243. Willd. n. 1. Ait. n. 1. (R. arboreſcens, tini facie; Plum. Ic. 237. t. 242. f. 1.)—Leaves elliptic-lanceolate, acute. Panicles repeatedly forked, on long ſtalks, riſing above the ſtem.—Native of the Weſt Indies. Cultivated by Miller, before the year 1752. Mr. Aiton ſays it flowers in the ſtove in Auguſt. We have ſeen no ſpecimen, neither had Linnæus. His deſcription is taken from Plumier's figure, as follows. "A *ſhrub*, with oppoſite, ſeſſile, lanceolate *leaves*. *Common flower-ſtalks* ſolitary, very long, naked, forming at the top a forked *corymbus*, in each of whoſe ſubdiviſions is a ſeſſile *flower*, with a two-leaved *involucrum*;" more properly a pair of *bracteas*. The *flowers* are very numerous, about an inch long. *Leaves* not quite ſeſſile, ſomewhat deflexed, entire, two or three inches long, and one or one and a half broad.

2. R. *odorata*. Fragrant Rondeletia. Jacq. Amer. 59. t. 42. Linn. Sp. Pl. 1671. Willd. n. 2. Swartz Obſ. 67. (R. obovata, by an error of tranſcription; Linn. Syſt. Nat. ed. 12. v. 2. 163.)—Leaves ovate, bluntiſh, rough; ſomewhat heart-ſhaped at the baſe; on ſhort ſtalks. Flower-ſtalks cymoſe, three-cleft, terminal. Native of the Weſt Indies, but rare. *Swartz.* Jacquin found it in rocky places, near the ſea, at the Havannah, bearing flowers, as well as ripe ſeeds, in January. The habit of this *ſhrub* is inelegant and ſtraggling; its height ſix feet; the young *ſhoots* villous. *Flowers* in terminal tufts, each tuft about two inches broad; their ſmell very ſweet, reſembling violets. The *corolla* has often ſix ſegments, though the *ſtamens* are never more than five; its colour is vermilion, with an orange nectariferous ring.

3. R. *hirta*. Hairy Rondeletia. Ait. Hort. Kew. ed. 1. v. 1. 227. ed. 2. n. 3. Willd. n. 13. Swartz Ind. Occ. v. 1. 373.—Leaves oblong, pointed, hairy, rigid; ribbed beneath. Flower-ſtalks axillary, three-forked, erect.—Native of Jamaica, from whence it was imported about the year 1776, by John Blackburne, eſq. of Orford, Lancaſhire. It blooms in the ſtove in ſummer. This is ſaid in Hort. Kew. to be very nearly akin to *R. odorata*, differing merely in its axillary *infloreſcence*; larger, more acute, *leaves*, not rough on their upper ſurface, nor ſcarcely heart-ſhaped at the baſe; and longer *footſtalks*. The tube of the *corolla* is but twice the length of the *calyx*. *Style* prominent beyond the mouth. *Stigmas* erect, converging. *Corolla* reddiſh-yellow. Swartz ſays there are only two *ſeeds* perfected, of a hemiſpherical figure, and that the *footſtalks* are ſhort and hairy. His deſcription agrees in other reſpects with Mr. Aiton's.

4. R. *lævigata*. Smooth-leaved Rondeletia. Ait. n. 2.—Leaves ſtalked, elliptical, acute, very ſmooth, except the rib underneath. Stipulas elliptical, membranous, ſmooth. Panicles three-forked, axillary, ſomewhat hairy.—Native of the Weſt Indies, flowering in our ſtoves in ſpring or ſummer. It was introduced, in 1790, by Mr. William Anderſon. The *ſtem* is ſhrubby, ſpreading, with forked round *branches*, ſlightly hairy when young. *Leaves* two or three inches long, acute at each end, rather fleſhy; very ſmooth above; paler beneath, with a reddiſh, ſometimes hairy, rib and veins. *Stipulas* very large, elliptical, obtuſe, reddiſh. *Flowers* reddiſh, ſmall, their tube ſcarcely longer than the limb. Baſe of the *calyx* clothed with long hairs.

5. R. *trifoliata*. Three-leaved Rondeletia. Linn. Sp. Pl.

Pl. 1671. Willd. n. 3. (R. trifolia; Jacq. Amer. 60. t. 43. "R. arborefcens, tini facie; Ehret Pict. t. 15.")—Leaves on long hairy ftalks, whorled, lanceolate, acute; fomewhat downy beneath. Stipulas pointed. Panicles axillary, compound, hairy.—Native of Jamaica, flowering in February.—An upright *tree*, twelve feet high. Young *branches* obtufely triangular, hairy. *Leaves* three in a whorl, lanceolate, acute, entire, three inches long; fmooth above; flightly downy beneath; with hairy *footftalks*. *Stipulas* roundifh, pointed, ternate, alternate with the leaves. *Clufters* axillary, one inch and a half or more in length, hairy, unequal, branched. *Flowers* inodorous, fmall, reddifh, feffile or ftalked. *Fruit* not examined. *Jacquin*.—On comparing Browne's fpecimen of his *Petefia*, t. 2. f. 3, with Jacquin's plate and defcription of this *Rondeletia*, we are perfuaded they muft be the fame thing. Confequently the *Ixora americana* of Linnæus, an ambiguous and obfcure plant, ought to be expunged, and referred hither. (See Ixora, n. 11.) Swartz quotes this fynonym of Browne for his *racemofa*, (fee the following); but a comparifon of fpecimens fhews them to be diftinct, though very nearly akin.

6. R. *racemofa*. Smooth Racemofe Rondeletia. Swartz Ind. Occ. v. 1. 360. Willd. n. 7, excluding Browne's fynonym.—Leaves on long fmooth ftalks, ovato-lanceolate, pointed, fmooth on both fides. Stipulas abrupt, pointed. Clufters axillary, three-forked, fpreading, fmooth.—Native of uncultivated hills in Jamaica. Like the laft in habit, but the *leaves* are oppofite, more coriaceous, and quite fmooth, as well as the *footftalks* and *flower-ftalks*. The *ftipulas* are fringed, like the *bracteas* and *calyx*. *Corolla* externally finely downy, as in Browne's fpecimen juft alluded to under *R. trifoliata*.

7. R. *virgata*. Long-branched Rondeletia. Swartz Ind. Occ. 354. Willd. n. 4.—"Leaves heart-fhaped, roundifh. Branches fpreading, thread-fhaped. Flower-ftalks three-cleft. Flowers three together, crowded. Stamens four."—Gathered by Swartz in bufhy places, near the fea, in the northern part of Hifpaniola, flowering and fruiting in December.—A *fhrub* about fix feet high, with very long, fpreading, alternate, rough-barked twigs. *Leaves* half an inch long, on fhort *ftalks*, fomewhat reflexed, very fmooth. *Stipulas* minute, acute. *Flower-ftalks* axillary and terminal, oppofite, elongated and erect, refembling branches, and often bearing a pair or two of leaves, three-cleft; the terminal ones leaflefs, and bearing but three flowers. *Flowers* terminal, brownifh-purple, filky at the outfide; four-cleft, with four very fhort *ftamens*. *Seeds* feveral, minute, compreffed.

8. R. *pilofa*. Hoary Rondeletia. Swartz Ind. Occ. v. 1. 356. Willd. n. 5. (R. triflora; Vahl. Symb. v. 3. 34. t. 54.)—Leaves ovato-lanceolate, hairy on both fides. Flower-ftalks axillary, fhorter than the leaves, three-flowered. ftamens four.—Native of the Weft India iflands, of Santa Cruz, and Montferrat. A *fhrub*, whofe young *branches*, *leaves*, *ftalks*, *calyx*, and outfide of the *corolla*, are clothed with fine, foft, hoary pubefcence. *Leaves* on ftill more hairy *footftalks*, elliptic-lanceolate, with a fmall acute point, two or three inches long, ribbed; paler, or glaucous, beneath. *Flower-ftalks* oppofite, axillary, rather fhorter than the leaves, hairy, each bearing three *flowers*, of which the middlemoft has the fhorteft partial ftalk. *Bracteas*, and fegments of the *calyx*, long, awl-fhaped. *Corolla* four-cleft; fomewhat downy within, but moft without. We have no account of the colour, as Swartz feems not to have gathered this fpecies himfelf. The dried *flowers* are brown, with fome indication of a tawny hue.

9. R. *thyrfoidea*. Tufted Rondeletia. Swartz Ind. Occ. v. 1. 358. Willd. n. 6.—Leaves oblong, acute, membranous; downy beneath. Stipulas ovate, acute, fmooth. Clufters axillary, denfe, many-flowered.—Native of dry barren hills, in the weftern part of Jamaica, flowering in May. A fmooth, branching *fhrub*, fix feet high, with long, fpreading, bluntly quadrangular twigs. *Leaves* three inches long, acute at each end, ribbed, veiny; fmooth above. *Footftalks* an inch long, ftriated. *Stipulas* clofe-preffed, broad, ovate, acute, fmooth, rigid. *Clufters* denfe, oblong, fhorter than the leaves, on fmooth ftalks, their branches oppofite, croffing each other, fubdivided; the laft ufually three-flowered. *Flowers* fmall, yellowifh-white, or rufty-coloured, highly fragrant at night. *Bracteas* minute, awl-fhaped. *Calyx* very minute, five-toothed. *Corolla* five-cleft, with five *ftamens*. *Seeds* two in each cell, rounded, fomewhat angular, ftriated.

10. R. *laurifolia*. Laurel-leaved Rondeletia. Swartz Ind. Occ. v. 1. 363. Willd. n. 8, excluding Browne's fynonym.—"Leaves lanceolate-oblong, acute, fmooth on both fides. Stipulas deltoid. Clufters axillary, compound, erect. Tube of the corolla very fhort."—Grows in bufhy places in Jamaica.—*Branches* round, fmooth. *Leaves* laurel-like, three or four inches long, ribbed, veiny; paler beneath. *Footftalks* an inch long, fmooth, flat on the upper fide. *Stipulas* broad, combined, deltoid, pointed, fpreading, rigid, downy at the edge. *Clufters* often as long as the leaves, compound, their ultimate divifions moftly three-flowered. *Bracteas* very minute. *Flowers* fmall, brownifh-yellow, five-cleft. *Seeds* in an early ftate numerous, membranous, but two only arrive at maturity, which are hemifpherical.—We cannot but diffent from our learned friend profeffor Swartz, in his citation of Browne's t. 2. f. 2, and confequent remarks. That plate certainly reprefents the *Petefia ftipularis* of Linnæus, which was defcribed from Browne's own fpecimen, and the *leaves* are, on both fides, finely downy, though no fuch character is expreffed in the engraving. The *inflorefcence* is thyrfoid, and not half fo long as the leaves. See the next fpecies.

11. R. *tomentofa*. Downy-leaved Rondeletia. Swartz Ind. Occ. v. 1. 365. Willd. n. 9. (Petefia ftipularis; Linn. Sp. Pl. 160. P. fruticofa, foliis ovatis oppofitis, &c.; Browne Jam. 143. t. 2. f. 2.)—Leaves elliptic-lanceolate, pointed, downy. Flower-ftalks three-forked, axillary, much fhorter than the leaves.—Native of ftony hills in Jamaica, near the fhady road called Sixteen-mile walk, not far from Spanifhtown. *Swartz*. A fpecimen from the author fhews this to be precifely the above plant of Linnæus and Browne, as Swartz fufpected. We refer the reader to Petesia for its defcription, and for remarks on the uncertainty of that genus, which perhaps muft hereafter be funk in *Rondeletia*.

12. R. *umbellulata*. Umbellate Rondeletia. Swartz Ind. Occ. v. 1. 367. Willd. n. 10.—Leaves elliptic-lanceolate, acute, fomewhat hairy. Stipulas ovate, pointed, membranous, hairy. Flower-ftalks axillary, three-forked. Flowers fomewhat umbellate.—Native of rocky banks of rivers in Jamaica, flowering in April. *Swartz*. That author fufpects his plant may be the fame with Browne's third *Petefia*, which we have adopted by the name of *villofa*, n. 4. This may poffibly be the cafe; but having no fpecimen of what Browne intended, we cannot determine the point. Swartz's plant, communicated by himfelf, is a branching upright fhrub, two feet or more in height; the *branches* fmooth, fomewhat compreffed; hairy and leafy at the fummit. *Leaves* about three inches long, clothed with fhort fcattered hairs, and fupported by hairy *ftalks*, half

an

an inch in length. *Stipulas* large, concave, moft hairy within, with a taper reflexed point. *Flower-ftalks* not half the length of the leaves. *Flowers* collected into a fort of round head. *Bracteas*, and fegments of the *calyx*, lanceolate, hairy. *Corolla* larger than in fome of the foregoing, brownifh-yellow. Two *feeds* are perfected in each cell.

13. R. *incana.* Silvery-cupped Rondeletia. Swartz Ind. Occ. v. 1. 369. Willd. n. 11.—Leaves ovato-lanceolate; rough and hoary beneath. Stalks axillary, fimple, three-flowered. Segments of the calyx ovate, filky on both fides.—Found by profeffor Swartz, from whom we have a fpecimen, on calcareous rocky mountains of Jamaica, but rarely. A *fhrub*, two or three feet high, with round, rigid, rough *branches*. *Leaves* about the extremities of the branches, three inches long, fomewhat coriaceous; fmooth and fhining above; palifh and hairy or downy beneath, with a prominent hairy rib and veins. *Footftalks* ftout, filky, three-quarters of an inch long. *Stipulas* very fhort, fringed. *Flower-ftalks* axillary, oppofite, twice the length of the footftalks, filky, each bearing three large, nearly feffile, *flowers*, whofe globular *germen*, and large ovate fegments of the *calyx*, are entirely clothed with long, denfe, filky hairs; as are alfo the lanceolate *bracteas*.

14. R. *hirfuta.* Rough Rondeletia. Swartz Ind. Occ. v. 1. 371. Willd. n. 12.—"Leaves oblong, acute, hairy. Stalks axillary, three-forked, lax. Flowers hairy."—Native of bufhy hills, in the fouth part of Jamaica, bloffoming in January. A *fhrub* fix feet high, with a fmooth *ftem*, and rough, lax, flightly compreffed *branches*. *Leaves* on fhort, hairy, reddifh ftalks, oblong, broadifh in the middle, ribbed, veiny, hairy on both fides, pale beneath. *Stipulas* broad, ovato-lanceolate, long and hairy. *Flower-ftalks* oppofite, flender, about the length of the leaves, twice three-cleft, lax, hairy. *Flowers* ftalked, yellowifh, externally hairy. *Bracteas* minute, linear, acute, hairy. Differs from *hirta*, n. 3, in having lefs rigid *leaves*, with lax, not ftiff, *branches* and *flower-ftalks*. *Swartz.* We have feen no authentic fpecimen; for one marked *hirfuta*, by the younger Linnæus in his herbarium, feems rather to be Swartz's *hirta*. The defcriptions of thefe two fpecies are not at all well contrafted.

The divifion of this genus into two fections, by the number of the feeds, is better omitted, as it feparates fpecies moft nearly akin, and is befides very uncertain. All have the rudiments of feveral feeds in each cell of the germen, though a greater or lefs number is perfected in fome than in others, or rather perhaps, according to circumftances, in the fame.

Rondeletia, in *Gardening*, contains plants of the woody, exotic, ftove kind, of which the fpecies cultivated is the American rondeletia (R. americana).

Method of Culture.—This plant may be increafed by fowing the feeds on a moderate hot-bed in the early fpring, and when the plants have attained a little growth they fhould be removed into feparate pots, being plunged in the bark-bed of the ftove, where they are to remain and be managed as other tender exotic plants of a fimilar kind. They afford variety in ftove collections.

RONDENCHE, in *Geography*, a town of Ruffia, in the government of Riga; 28 miles S.W. of Narva.

RONDERO Bay, a bay on the N.E. coaft of Antigua. N. lat. 17° 15′. W. long. 61° 26′.

RONDINE, in *Ichthyology*, a name by which fome authors have called the *milvus*, or flying-fifh.

Rondine *Pefce*, a name by which fome have called the *hirundo pifcis*, or fwallow-fifh, called by others *mugil alatus*.

RONE, in *Geography*, a fmall ifland near the W. coaft of Scotland. N. lat. 58° 26′. W. long. 4° 55′.

RONEBY, a town of Sweden, in the province of Blekingen; 10 miles W. of Carlfcrona.

RONES, a cape on the W. coaft of the ifland of Jerfey; 6 miles N.N.W. of St. Helice.

RONGOS, or Pongos, trumpets, or rather French horns, of the kingdom of Loango, in Africa. Thefe inftruments are made of ivory, and refemble hunting-horns of the ancients: their wideft diameter at the mouth is an inch and a half, or two inches; they are of various kinds, and probably ferve for treble and bafe to each other. It is pretended, that many rongos united produce a very *harmonious* effect. (Supplement to the folio Encyclopédie.) The editor of the article forgot that, out of Europe, treble and bafe performing together, except in octaves, is unknown, and that harmonious effects can be no otherwife produced.

RONNE, in *Geography*, a river of France, which rifes about a league N. of Leuze, and runs into the Scheldt, between Tournay and Oudenarde.

Ronne, or *Ronde*, a fea-port town of Denmark, in the ifland of Bornholm, the refidence of the governor. The harbour is not deep, but well fortified.

RONNEBURG, a town of Saxony, in the principality of Altenburg; 12 miles S.W. of Altenburg. N. lat. 50° 48′. E. long. 12° 5′.

RONNEBY. See Rotneby.

RONNEN, a fmall ifland of Denmark, near the N.W. coaft of the ifland of Laland. N. lat. 56° 5′. E. long. 11° 15′.

RONNSKAR, a fmall ifland on the W. fide of the gulf of Bothnia. N. lat. 65° 3′. E. long. 18° 24′.—Alfo, a fmall ifland on the E. fide of the fame gulf. N. lat. 63° 29′. E. long. 22° 2′.

RONO, a fmall ifland on the W. fide of the gulf of Bothnia. N. lat. 63° 5′. E. long. 18° 24′.

RONOBO, a river of the ifland of Celebes, which runs into Sewa bay, N. lat. 1° 33′. E. long. 120° 46′.

RONOUMENA, a river of Madagafcar, which runs into the fea at Port St. James.

RONSARD, Peter de, in *Biography*, a French poet of confiderable celebrity, was born in the year 1524, of a noble family, in the Vendomois. He was educated at the college of Navarre in Paris; but he quitted his ftudies at an early age, and entered into the fervice of the duke of Orleans. From the fervice of this prince he was transferred to that of James V. of Scotland, who had married Magdalen of France. With this fovereign he paffed two years, partly in Scotland, and partly in England; and then returning to France, was again taken into the employment of the duke of Orleans. He accompanied Lazare du Baif to the diet of Spire, who infpired him with fuch a tafte for the belles lettres, that he applied himfelf with affiduity to the Greek language. He at length entirely devoted himfelf to poetry, by which he obtained the title of the prince of the poets of his time. He obtained the firft prize at the floral games of Touloufe, and the ordinary recompence being thought unequal to his merit, he was prefented by the city with a Minerva of maffy filver. He was patronized by five fucceffive kings of France, efpecially Charles IX., who maintained a poetical correfpondence with him. Mary, queen of Scots, who greatly efteemed him, made him a rich prefent. He had fome benefices conferred upon him, though he was not in prieft's orders; and he difplayed great zeal in oppofing thofe of the reformed religion, againft whom he fought, in 1562, at the head of the Vendomois. Like many religious zealots, he made his faith ftand inftead ſtead of morals, being deeply addicted to licentious pleaſures, by which he brought on a premature old age. In the latter years of his life he was a penitent, and felt deep contrition for the licentiouſneſs of his muſe at an earlier period, and reſolved for the future to confine himſelf to ſacred ſubjects. He died in 1585, at the age of 61, and his memory was honoured by eulogies from many of the literary characters of the time. The compoſitions of Ronſard were odes, eclogues, epigrams, ſonnets, hymns, and a poem, entitled "La Franciade." Ronſard had a very bad taſte, which rendered him pedantic, and often obſcure; but he poſſeſſed many excellent qualities as a poet, having warmth of temper, a vivid imagination, and great quickneſs of invention. Very few of his works remain; but three of the beſt have frequently been reprinted, *viz.* "La Promeſſe," "Hymne à l'Eternité," and "Les Quatre Saiſons de l'Année."

Ronſard was praiſed by all the poets of his time, and ſtill merits a part of their encomiums. Scaliger dedicated to him a work, as the firſt poet in France. He was handſome in perſon, well made, loved muſic paſſionately, ſung agreeably, and was very liberal. He had a public and magnificent funeral; the ſervice was ſet in florid or figurative counterpoint, animated by all kinds of inſtruments: it was ſung by the children of the chapel-royal by order of the king, who regretted extremely the death of ſo eminent a perſonage, the ornament of his kingdom. After his interment, Duperon pronounced his funeral oration. All that were great and illuſtrious at court and in the city attended; and the crowd was ſo great, that cardinal Bourbon, and many other princes and nobles, were obliged to return without being able to gain admiſſion into the chapel of the college of Boncourt at Paris.

RONSBERG, in *Geography*, a town of Bohemia, in the circle of Pilſen; 8 miles W. of Teinitz.

RONSDORF, or Rheinsdorf, a town of the duchy of Berg; 12 miles S.S.E. of Duſſeldorf.

RONSE. See Renay.

RONSEL, a town of Germany, in the county of Mentz; 7 miles S.W. of Lunſchede.

RONSENAC, a town of France, in the department of the Charente; 18 miles E. of Angouleſme.

ROO, in *Agriculture*, a provincial term ſignifying rough or coarſe, in the way of paſtures, or the crops on other ſorts of land.

ROOAC, in *Rural Economy*, a provincial word uſed to ſignify a fog or miſt. See Roak.

ROOAH, in *Geography*. See Rewah.

ROOAHOAGA. See Riou's *Iſland*.

ROOD, a quantity of land, equal to the fourth part of an acre; and containing 40 ſquare perches, or poles.

This is the ſtatute rood by which land is uſually at preſent meaſured; but there are local meaſures in many diſtricts, in which both the rood and acre are conſiderably larger. See Measures.

In Scotland, the rood contains 40 ſquare falls. See Fall.

ROODAUN, in *Geography*, a town of Hindooſtan, in Oude; 22 miles N.W. of Allahabad.

ROODE, or Waveren, an extenſive tranſmontane diviſion of the diſtrict of Stellenboſch and Drakenſtein, in Southern Africa, in the Cape diſtrict, lying behind the mountains of Drakenſtein, and producing abundance of grain, pulſe, fruits, and wine. The paſs of Roode Sand is the only waggon-road in this diviſion, and is diſtant from Cape town about 70 miles. In this diviſion there is a ſmall neat church, and a very comfortable parſonage-houſe, with extenſive vineyards, orchards, garden, and arable land; and contiguous to the church is a row of houſes, the number of which has lately increaſed.

ROODLOFT, the gallery over the entrance into the choir, in our ancient cathedral and abbey churches; in the front of which, looking towards the weſt window, a large rood, or crucifix, was uſually placed.

ROOE, Little, in *Geography*, a ſmall iſland among the Shetlands. N. lat. 60° 43′. W. long. 1° 35′.

ROOF, in *Architecture*, is that part of a building generally conſiſting of two ſloping ſides, which protects its contents or inhabitants from inclement ſeaſons or weather.

The ſlope of the roof muſt be directed by the nature of the climate. The ancient Egyptians, Babylonians, Perſians, as well as other Eaſtern nations, made their roofs quite flat. The Greeks, it would appear, were the firſt people who made roofs with a declination each way from the middle to the edges; and this was very gentle, the height from the ridge to the level of the walls not exceeding one-ninth or one-eighth part of the ſpan, as may be ſeen by many ancient temples now remaining. But in northern climates, ſubject to rain and ſnow, the height of the ridge muſt be very conſiderable. In moſt old buildings in Britain, the equilateral triangle ſeems to have been conſidered as the ſtandard, both in private and public edifices; and this pitch ſeems to have continued for ſeveral centuries, until the extinction of Gothic architecture. At the commencement of this period, the ridge was made ſomewhat lower, and the rafters were three-fourths of the breadth of the building. This was called the true pitch, and ſubſequently the ſquare ſeems to have been conſidered as the true pitch. The heights of roofs were gradually depreſſed from the ſquare to one-third of the width, and from that to a fourth, which now ſeems to be a very general ſtandard. They have even been executed much lower. There are ſome advantages in high pitched roofs: they diſcharge the rain with greater rapidity, the ſnow continues to lie a much ſhorter time on the ſurface, and they are leſs liable to be ſtripped by heavy winds. Low roofs require large ſlates, and the utmoſt care in execution; but they have this advantage, that they are much cheaper, ſince they require ſhorter timbers, and of a much ſmaller ſcantling. The roof is one of the principal ties to a building, when executed with judgment: it binds the exterior walls to the interior, and to the partitions, which act like ſtrong counterforts againſt them.

Roofs are of various forms, which depend on the nature of the plan, the law of the horizontal and vertical ſections. The moſt ſimple form of a roof is that which has only one row of timbers, arranged in an inclined plane, which throws the rain entirely to one ſide. This form is called a ſhed-roof, or lean-too. But the moſt elegant roof for a rectangular building is that which conſiſts of two rectangular planes, of equal breadth, equally inclined to, and terminating in a line parallel to, the horizon; and conſequently the form of the roof is that of a triangular priſm, each ſide being equally inclined to the plane of the wall-head. This form of roof is ſometimes called a pent-roof.

When the form of the plan is that of a trapezium, and the wall-heads properly levelled, the roof cannot be executed on planes, ſo as to terminate in a level ridge. In this caſe, the ſides, inſtead of being planes, are made to wind, in order to have the ſummit parallel to the horizon; but the moſt eligible method is to make the ſides of the roof rectangular planes, incloſing a level ſpace, or flat, in the form of a triangle or trapezium, at the ſummit of the roof.

Roofs, which are flat on the top, are ſaid to be truncated.

Truncated roofs are chiefly employed in order to diminiſh the height, ſo as not to predominate over that of the walls.

When all the four ſides of the roof are formed by inclined planes, the roof is ſaid to be hiped, and is, therefore, called a hiped roof: the inclined ridges, which ſpring from the angles of the walls, are called the hips. Roofs of this deſcription are frequently truncated; and when the plan of the walls is in the form of a trapezium, the truncation of the roof becomes neceſſary.

Roofs which ſtand upon circular baſes, and which have all their horizontal ſections circular, and the centres of the circles in a ſtraight line drawn from the centre of the baſe perpendicular to the horizon, are called revolved roofs.

When the plan of the roof is a regular polygon, or a circle, or an ellipſe, and the horizontal ſections are all ſimilar to the baſe, and a vertical ſection a portion of any curve convex on the outſide, the roof is called a dome.

In order to ſave the expence of lead in rectangular roofs, inſtead of the flat, a valley is ſometimes uſed, which makes the vertical ſection in the form of the letter M, or rather an inverted W; and thus it is that this form of roof has obtained the name of an M roof.

Before we proceed to the conſtruction of roofing, it will be neceſſary to ſhew upon what principles a body or piece of timber may be ſupported in various poſitions.

Theory and Practice of Roofs.

Prop. I.

If a heavy body A B C D (*Plate* XLII. *fig.* 3. *Architecture*,) be ſuſpended by any two inclined ſtrings, D E and C F, in a vertical plane, a right line drawn through the interſection, perpendicular to the horizon, will paſs through the centre of gravity of the body.

It is ſhewn by the writers on mechanics, that if any three forces act upon a point, or a body, their directions will tend to the ſame point, or be parallel to each other. It is well known that every body acts with its full force in one point only, *viz.* in its centre of gravity, and in a direction perpendicular to the horizon: therefore, if a body is ſuſtained at E and F, it will revolve round theſe points, until the line G H, paſſing through the interſection, H, of the two ſtrings, D E and C F, and the centre of gravity G, become perpendicular to the horizon.

Cor. 1.—Hence if any body be ſupported by two ſtrings, it may alſo be ſupported by two planes perpendicular to theſe ſtrings, provided that the two points of the body ſupported are in the direction of the ſtrings; for every body, acting upon a plane, acts in a line perpendicular to that plane.

Cor. 2.—Hence, alſo, a body may be ſupported by two props in any two directions that may be ſupported by ſtrings, provided that the ſurface of the body, at the points of contact, or the ends of the props, be planes at right angles to the ſtrings.

Cor. 3.—Hence all the properties that have been demonſtrated of three forces acting upon a body, ſuppoſed void of weight, will equally flow from a heavy body ſupported by two ſtrings, by ſubſtituting the weight of the body for the middle force; and hence, if the direction of any force ſupporting a heavy body be given, the other may eaſily be found.

Prop. II.

Given the poſition in which a body ſhould be placed, and the poſition of a plane ſupporting the body at one end, to find the poſition of another plane to ſupport it at another given point, and to find the preſſure on the planes, the weight of the body being given.

Through the centre of gravity of the body draw a vertical line, and through any point on which the body reſts on the given plane draw a line perpendicular to that plane, meeting the vertical line; from the interſection draw a line to the other point which is to be ſupported; from that point draw a plane at right angles to this line, which will be the direction of the plane required. And to find the intenſity of the forces, take any diſtance on the vertical line to repreſent the weight of the beam from the interſection; then on that line, as a diagonal, complete a parallelogram, whoſe ſides are in the directions of the lines, perpendicular to the ſupporting planes; and the ſide of the parallelogram, perpendicular to either plane, will repreſent the force on that plane.

Example 1. *Plate* XLII. *fig.* 2.

Let the body A B C D lie upon the top of the wall K C, at C, ſo as to touch the lower edge, B C, of the body, at that point C; it is required to find the direction of a plane that will ſupport the lower end at B, and to find the preſſure of the body on the wall and on the plane.

Through the centre of gravity, G, of the body draw the vertical line G F; draw C F perpendicular to C E, join F B, and draw B I perpendicular to F B, and B I is the direction of the plane required. On the vertical line G F, make F M to repreſent the weight of the body, and complete the parallelogram L M N F; then F N repreſents the force on the wall-head, in the direction F C; and F L the force acting perpendicular to the plane, or in the direction B F. But if the vertical and horizontal thruſts on the wall at C are required, draw N P perpendicular to F G, meeting it in P; then the force F N is reſolved into two forces, F P and P N. P N repreſents the horizontal part of the force, *viz.* that which puſhes the wall in a direction parallel to the horizon; and F P the other part, which tends to preſs it downwards in a direction perpendicular to the horizon.

Example 2. *Fig.* 1.

Let the ſloping body, A B C D, be ſupported by a wall at its lower end, D, which coincides with the ſurface of the body, and let G be the centre of gravity; it is required to cut a notch out of the body, at the upper end C, ſo that it may reſt upon the top of a wall, which is made to fit the notch, and to find the preſſure on the walls.

Draw the vertical line G E, from D draw D E perpendicular to D C, join E C, and make C F at right angles to it; then the notch, H C F, being cut, the body, A B C D, will be at reſt. Then to find the preſſure on the walls, complete the parallelogram E I K L, having a given angle D E C, and its diagonal on the given line E G. Then if K E repreſent the weight of the body, I E will repreſent the preſſure in the direction D E, upon the wall at D, and L D the preſſure in the direction C E. The horizontal and perpendicular preſſures upon each wall may be found, as in the preceding example, by reſolving each of the forces, I E and L E, into two; one of which is perpendicular to the horizon, and the other parallel to it.

Scholium.—It muſt be obſerved in this example, that the notch, which is cut out at C, will remove the centre of gravity nearer to the lower end D, and conſequently alter the ſlope C F; but as this can only be in a very ſmall degree, the equilibrium will hardly be affected by it, when the notch is very ſmall.

Example

Example 3. *Fig.* 6.

Let one of the corners of a floping body, A B C D, reft upon the top of a wall at D, which is quite level; it is required to find the pofition of a notch, cut out of the upper end C, fo that the body may reft upon a wall made to fit the notch.

Let the fmall part, F C H, be fo cut, that C H may be parallel to the horizon, then the body will be fupported by the two walls at C and D. For draw D I, G K, and C L, perpendicular to the horizon, then thefe lines being produced, they may be fuppofed to meet at an infinite diftance. To find the preffure on the walls: join D C, and produce the vertical line K G to meet it in E; then if G be fuppofed to be the weight of the body, the preffure on D will be $\frac{EC \times G}{DC}$, and the preffure on C, $\frac{DE \times G}{DC}$.

Example 4. *Fig.* 5.

Let the body A B C D lie with its upper end againft the vertical face of a wall at C; it is required to find the pofition of a plane fupporting the lower end D, fo that the body may be at reft.

Draw the vertical line G E, and C E, perpendicular to the face of the wall C L; join E D, and draw D F perpendicular to E D, then D F is the pofition of the plane required. Complete the parallelogram E H I K; then the preffure on D, and on C, and the weight of the body, are to one another as E H, E K, E I.

Example 5. *Fig.* 4.

To fupport a body A B C D by two props at two given points, E and I, the direction of one of the props, E F, being given.

Draw the vertical line G K, produce F E to K, and draw K I H; and I H is the prop required. On the vertical line G K, take K M to reprefent the weight of the body; and on K M, as a diagonal, defcribe the parallelogram K L M N; then K L is the compreffion of the prop E F, and K N the compreffion of the prop I H.

In order to be underftood by the reader, it will be neceffary to explain fuch terms as are ufed in the fubfequent part of the article, by way of definitions.

Wall-plates are pieces of timber laid on the wall, in order to diftribute the preffure of the roof equally, and to bind the walls together. Thefe are fometimes called raifing-plates.

Truffes are ftrong frames of carpentry, generally of a triangular form, fupporting the covering. They are difpofed at equal diftances, and are ufed when the expanfion of the walls is too great to admit of common rafters alone, which would be in danger of being bent or broken by the weight of the covering, for the want of fome intermediate fupport. They are varioufly conftructed, according to the width of the building, the contour of the roof, and the circumftances of walling below, &c.

Tie is any piece of timber connected at its extremities to two others, acted upon by oppofite preffures, which have a tendency from each other; or to extend the tie, as rope or chain.

Straining-piece is any piece of timber, connected at its extremities to two others, acted upon by oppofite preffures, which have a tendency towards each other.

Hence a tie acts contrary to a ftraining-piece. A chain, rope, or fmall bar of iron, may be ufed for the former; but the latter muft always be inflexible, being in a ftate of compreffion.

Principal rafters are two pieces of timber in the fides of a trufs, fupporting a grated frame of timber-work over them, on which the flating or covering refts.

Purlins are horizontal pieces of timber, fixed upon the principal rafters.

Tie-beam is a horizontal piece of timber, connected to two oppofite principal rafters; it anfwers a twofold purpofe, *viz.* that of preventing the walls from being pufhed outwards by the weight of the covering, and of fupporting the ceiling of the rooms below.—N.B. The tie-beam, when placed above the bottom of the rafters, is called a collar-beam.

Common rafters are pieces of timber of a fmall fection, placed equidiftantly upon the purlins, and parallel to the principal rafters: they fupport the boarding to which the flating is fixed.

Pole-plates are pieces of timber refting on the ends of the tie-beams, and fupporting the lower ends of the common rafters.

King-poft is an upright piece of timber in the middle of a trufs, framed at the upper end into the principal rafters, and at the lower end into the tie-beam: this prevents the tie-beam from finking in the middle.

Queen-pofts, two upright pieces of timber framed below into the tie-beam, and above into the principal rafters, placed equidiftantly from the middle of the trufs, or its extremities.

Strutts are oblique ftraining-pieces, framed below into the king-pofts or queen-pofts, and above into the principal rafters, which are fupported by them; or fometimes they have their upper ends framed into beams, which are too long to fupport themfelves without bending.—N.B. Strutts are often called braces.

Puncheons are fhort tranfverfe pieces of timber, fixed between two others for fupporting them equally, fo that when any force is on the one, the other refifts that force equally, and if one break, the other will alfo break. Thefe are fometimes called ftuds.

Straining-beam is a piece of timber placed between two queen-pofts at their upper ends, in order to withftand the thruft of the principal rafters.

Straining-fill is a piece of timber placed at the bottom of two queen-pofts, upon the tie-beam, in order to withftand the force of the braces, which are acted upon by the weight of the covering.

Camber-beams are horizontal pieces of timber, made on the upper edge floping from the middle towards each end, in an obtufe angle, for difcharging the water. They are placed above the ftraining-beam in a truncated roof, for fixing the boarding on which the load is laid; their ends run three or four inches above the floping plane of the common rafters, in order to form a roll for fixing the lead.

Auxiliary rafters are pieces of timber framed in the fame vertical plane with the principal rafters, under and parallel to them, for giving additional fupport, when the extent of the building requires their introduction. Thefe are fometimes called principal braces, and fometimes cufhion rafters.

Joggles are the joints at the meeting of ftrutts with king-pofts, queen-pofts, or principal rafters; or, at the meeting of principal rafters with king and queen-pofts: the beft form is that which is at right angles to the ftrutts.

Cocking, or *cogging*, is the particular manner of fixing the tie-beams to the wall-plates: one method is by dovetailing, and the other is by notching the under fide of the tie-beam, and

and cutting the wall-plate in a reverſe form to fit it. This method is far preferable to the other, as it is not liable to be drawn, which the other is very ſubject to, when the timber ſhrinks.

Ridge-tree is a piece of timber fixed in the vertex of a roof, where the common rafters meet on each ſide of it; the upper edge of it is higher than the rafters, for the purpoſe of fixing the lead which goes over it to cover the ends of the ſlates in the upper courſe.

Straps are thin pieces of iron running acroſs the junction of two or more parts of a truſs or frame of carpentry, branching out from the interſection in the direction of the ſeveral pieces, for the purpoſe of ſecuring them to each other. They ought always to be double, *viz.* one ſtrap on each ſide; and their ends ſtrongly bolted to each of the pieces.

The uſes of the various parts are illuſtrated as follows; and here it may be proper to obſerve, that though every one of the parts above defined may be found in the ſame roof, it is not neceſſary that a complete roof ſhould have all theſe parts; the introduction of many of them depends on the diſtance of the walls, the contour of the roof, the partitions below, the quantity of head-room wanted in the garret-rooms, &c.

Of common roofs, the ſimpleſt conſtruction is that which conſiſts of two rafters, A B and B C, *Plate* XLII. *fig.* 8; D and E are wall-plates, on which the feet A and C of the rafters reſt; the bottom of the rafters is cut in the form of a right angle (called by workmen a bird's mouth), reverſed to the wall-plate, and is fixed to it with nails; but this form can only be applied to buildings that have their walls at no great diſtance from each other.

The next form is that of having two rafters, A B, B C, *Plate* XLII. *fig.* 7, a collar-beam D E, with two wall-plates, F and G, below. This form will admit of a greater diſtance between the walls than the other: the beam is placed in the ſituation D E, in order to give head-room within; but when the ſpan, F G, of the walls is conſiderable, the parts A D and C E being conſidered as levers, and acted upon by the re-action of the walls, the rafters are either liable to be broken at the points D and E, or curved with a concavity on the upper edges.

The third form of common roofs conſiſts of two rafters, A B, B C, *Plate* XLII. *fig.* 10, a tie-beam A C, for preventing the rafters from puſhing out the walls, a collar or ſtraining-beam D E, and two puncheons, or ſtuds, F G and H I, for keeping the rafters ſtraight: this conſtruction is uſed for cheapneſs, and may be executed with ſafety in houſes not exceeding forty-five feet wide; but it is neceſſary to have partitions immediately below, or at no great diſtance from the ſtuds. Inſtead of ſupporting every oppoſite pair of rafters, as in this example, in many roofs of this conſtruction, the rafters take the place of principals, and are fixed at 7, 8, 9, or 10 feet from each other, and purlins run over the heads of the puncheons at K and L; and at the ends of the collar-beams at M and N, between every two rafters, ſmall rafters are fixed to the purlins, the wall-plates at bottom, and the ridge-tree at the top.

The moſt ſimple conſtruction of a truſs is that conſiſting of the following parts, *Plate* XLII. *fig.* 9. A B the tie-beam, cocked upon the wall-plates C and D; E K the king-poſt; A G and B H principal rafters, fixed to the king-poſt at the joggles, G and H; L M and N O ſtrutts, mortiſed into the rafters at L and N, and joggled to the king-poſt at M and O. Other names of timbers will be fully illuſtrated by the deſcriptions of other roofs in due order of ſucceſſion. What has been ſaid may ſuffice for the preſent.

Prop. III.

The poſition of ſeveral rafters, A B, B C, C D, D E, &c. *Plate* XLIII. *fig.* 1, being given in a vertical plane, joined together and moveable about the angular points B, C, D, E, &c. while the points A and G remain ſtationary; it is required to find the proportion of the forces at the angles, ſo that the rafters may be kept in equilibrio.

Through the points B, C, D, E, &c. draw the vertical lines Bi, Cm, Dp, Es, &c. being the direction of the forces. Make Bi of any indefinite length, and complete the parallelogram $Bhik$. Make Cl equal to Bk, and complete the parallelogram $Clmn$. Proceed in this manner with all the remaining parallelograms, making the two oppoſite forces in the direction of each rafter equal to each other, and the diagonals, Bi, Cm, Dp, Es, &c. will repreſent the forces required, as is evident from the conſtruction. Then, to find the proportion of the weights upon any two angles, the ſine of any angle is the ſame with the ſine of its ſupplement, therefore the ſine of the angle A B C is the ſame as the ſine of Kbk, or Bki; and the ſine of B C D the ſame as the ſine of Cnm; likewiſe the ſine of the angle Cml is equal to the ſine of the alternate angle mCn, and the ſine of the angle Dpo is equal to the ſine of the angle pDq; moreover, the ſine of the angle iBk is equal to the ſine of the angle mCl, and the ſine of the angle mCn is equal to the ſine of the angle pDo, and ſo on: then, becauſe the ſides of triangles are as the ſines their oppoſite angles, it will be by trigonometry,

$$Bi : Bk, \text{ or } Cl :: S\cdot Bki, \text{ or } ABC : S.Bik, \text{ or } iBh$$
$$Cl : lm, \text{ or } Do :: S.Cml, \text{ or } mCn : S.mCl, \text{ or } iBk$$
$$Do : op, \text{ or } Er :: S.Dpo, \text{ or } pDq : S.pDo, \text{ or } mCn$$
$$Er : sr, \text{ or } Fu :: S.Esr, \text{ or } vFu : S.sEr, \text{ or } pDq$$
$$Fu : Fv :: S\cdot Fvu, \text{ or } vFw : S.vuF, \text{ or } EFG$$

$$\text{Therefore } Bi : Fv :: S.ABC \times S.vFu \times S.vFw : S.iBh \times S.iBk \times S.EFG$$

$$\text{Therefore } Bi : Fv :: \frac{S.ABC}{S.iBh \times S.iBk} : \frac{S.EFG}{S.vFu \times S.vFw}$$

That is, the weights on any two angles are as the ſines of theſe angles directly, and reciprocally as the product of the ſines of the two parts of theſe angles, divided by the vertical lines.

Cor. 1.—Hence the weights on any two angles are as the ſines of the angles directly, and as the product of the coſines of the two parts of theſe angles reciprocally. For draw B H perpendicular to Bi, and produce iB and A B to I and K; then will the angle K B I, equal to the angle hBi, be the coſine of the angle H B K; *viz.* the coſine of the angle of elevation of the rafter A B above the horizon; and becauſe C B I is the ſupplement of iBC, the angles C B I and CBi have the ſame ſine, and the angle C B I is the coſine of the angle H B C; *viz.* the angle of elevation of the rafter B C.

Cor. 2.—Hence alſo, the weights on any two angles are as the ſines of the angles directly, and as the products of the ſecants of elevation jointly, becauſe the ſecants of any two angles are reciprocally as the coſines of theſe angles.

Cor. 3.—The force which any rafter makes in its own direction is as the ſecant of its elevation. For make A P equal to Bh; draw the lines P N, kH, nL, &c. parallel to the vertical lines Bi, Cm, &c. and draw A N, B H, C L, &c. parallel to the horizon; then becauſe the angles N A P, HBk, LCn, &c. are the angles of elevation, and A N, B H, C L, &c. are all equal, if A N, B H, C L, &c. be conſidered as radii, A P, Bk, Cn, &c. are the ſecants of elevation, which alſo repreſent the forces on the rafters.

Cor. 4.—Hence the horizontal preſſures at A and G are equal;

equal; for all the perpendiculars drawn from the oppofite angles of each parallelogram to meet the vertical diagonal, are all equal.

Cor. 5.—Hence, if the pofition of any two rafters, and the proportion of the weights, be given, the pofition of the remaining rafters may be determined.

Cor. 6.—If the vertical line S D V be drawn, the horizontal line A V G, and the lines A S, A R, A Q, A T, &c. be drawn parallel to the rafters A B, B C, C D, D E, &c. meeting the vertical line in S, R, Q, T; then will A S, A R, A Q, A T, reprefent the forces, and S R, R Q, Q T, the forces upon the angles; for A S, A R, A Q, A T, &c. are the fecants of the elevation, and the triangles A S R, A R Q, A Q T, are all fimilar to the triangles *h* B *i*, *l* C *m*, *o* D *p*, &c.

Cor. 7.—In every roof kept in equilibrio by the weights of the rafters, if U, V, W, &c. be the centres of gravity of the rafters, and alfo reprefent their weights; then the weight preffing vertically on B, will be $\frac{AU \times U}{AB} + \frac{VC \times V}{BC}$, and the weight on C $= \frac{VB \times V}{BC} + \frac{WD \times W}{CD}$ and fo on; hence $\frac{AU \times U}{AB} + \frac{VC \times V}{BC} : \frac{VB \times V}{BC} + \frac{WD \times W}{CD} :: \frac{S.ABC}{S.hBi \times S.iBk} : \frac{S.BCD}{S.lCm \times S.mCn}$.

Cor. 8.—Hence, if the rafters be prifmatic figures, the weights on the angles B, C, D, &c. will be refpectively as $\frac{AB+BC}{2}$, $\frac{BC+CD}{2}$, $\frac{CD+DE}{2}$, and fo on.

Prop. IV.

Given the vertical angle of a roof, and the proportion of the rafters on each fide, to defcribe the roof to a given width, fo that it fhall be in equilibrio.

Let the proportion of the rafters from the top downwards be as 2, 3, 4, that is, as 4, 6, 8; then the weight on the vertical angle is $\frac{4+4}{2} = 4$; on the next fucceeding angle $\frac{4+6}{2} = 5$; and on the bottom angle $\frac{6+8}{2} = 7$. (*Plate* XLIII. *fig.* 2.) Now let A B C be the given angle. Make B A equal to B C; join A C, and draw D B E perpendicular to A C; then make D B to reprefent half the weight of the vertical rafter: let B D be divided into two equal parts; make B M five of thefe parts, and M E feven; join M A, M C, E A, E C; then from any fcale of equal parts, make B F and B G each two parts; draw F H and G I parallel to M A and M C, and make F H and G I each equal to three equal parts of the fame fcale. Laftly, draw H K and I L parallel to E A and E C, and make H K, I L, each equal to four equal parts; then K H, H F, F B, B G, G I, I L, are the rafters, in the proportion required.

How to reduce this proportion of figure to a given width is obvious; it is only drawing a figure, having a given fide in the fame proportion as another.

Prop. V.

The angular points at the meeting of every two rafters of a roof in equilibrio, by equal weights hung at the angles in vertical directions, equidiftant from each other, are in the curve of a parabola.

Let A B C D E, &c. (*Plate* XLIII. *fig.* 3.) be kept in equilibrio by equal weights, fufpended at the angular points B, C, D, E, &c. in the equidiftant directions B F, C G, D H, E I, &c. the points A, B, C, D, E, &c. are in the curve of a parabola.

For let B F meet A N at F. Draw A K parallel to D E, A L parallel to C D, and A M parallel to B C, cutting F B at K, L, M. Draw B Q, C P, D O, parallel to A N, cutting the middle line I E at Q, P, O.

Then, becaufe the weights on the angles are equal, F K, K L, L M, M B, are alfo equal, the firft excepted, being half, or as the numbers 1, 2, 2, 2; therefore F K, F L, F M, F B, are as the odd numbers 1, 3, 5, 7: but becaufe of the equidiftant lines B F, C G, D H, E I, &c. and the parallels D O, C P, B Q, A I, the triangles A F K, A F L, A F M, are refpectively equal and fimilar to the triangles D O E, C S D, B R C; therefore K F is equal to E O, L F equal to D S, and D S equal to O P, M F equal to C R, and C R equal to P Q: and laftly, B F is equal to Q I; therefore E O, O P, P Q, Q I, are to one another as the numbers 1, 3, 5, 7; and E O, E P, E Q, E I, are as the fquare numbers 1, 4, 9, 16; but the lines O D, P C, Q B, are to one another as 1, 2, 3, 4; therefore the abfciffes E O, E P, E Q, E I, are as the fquares of the ordinates O D, P C, Q B, I A, and the points A, B, C, D, E, are placed in the curve of a parabola. In the fame manner it may be fhewn, that this is the cafe, whatever be the number of ordinates.

Corol.—Hence a roof of this conftruction may be defcribed to any given height and vertical angle, or to a given width and height, with any number of rafters on each fide.

Example.—To defcribe a roof with any given number of rafters on each fide to a given width and height, fo that all the vertical lines paffing through the angular points of the rafters fhall be equidiftant, and the rafters in equilibrio.

Let there be four rafters on each fide, (*Plate* XLIII. *fig.* 3.) Let I N be half the width, and I E the height. Draw N T and E T parallel to I E and I N; divide N T into four equal parts N *f*, *f e*, *e d*, *d* T, and draw *d g* E, *e h* E, *f i* E; likewife divide I N into four equal parts I *c*, *c b*, *b a*, *a* N, and draw *c g*, *b h*, *a i*, parallel to I E. Join E *g*, *g h*, *h i*, *i* N, and thefe lines will be the rafters of half the roof required.

For let C B (*Plate* XLIII. *fig.* 4.) be the height, and A B half the bafe. Draw C D parallel to A B, and A D parallel to B C. In A B take any point *a*, and divide A D, fo that *b* D may be to A D as B *a* to B A. Join *b* C, draw *a c* parallel to B C, meeting *b* C at *c*; and *c d* and *b e* parallel to A B, cutting B C at *e* and *d*, then the triangles C *d c* and C *e b* are fimilar.

Therefore C *d*: C *e* :: *c d* : *e b*, or A B
And by conftruction, C *e* : C B :: *a* B or *c d* : A B or *b e*
Therefore C *d* : C B :: cd^2 : AB^2
Therefore the point C is in the curve of a parabola.

Another method may be as follows: Let B E (*Plate* XLIII. *fig.* 4.) be half the width, B C the height. Produce B C to F, making C F equal to C B. Divide C F into four equal parts, C *f*, *f g*, *g h*, *h* F, and join *f* E, *g* E, *h* E. Divide B E into four equal parts, B *i*, *i k*, *k l*, *l* E, and draw the lines *i m*, *k n*, *l o*, parallel to B C, cutting the former lines *f* E, *g* E, *h* E, at *m*, *n*, *o*; the points *m*, *n*, *o*, are in the curve of a parabola. For the principles of this conftruction, the reader may confult Theorem VII. p. 123. vol. ii. Hutton's Mathematics.

Prop. VI.

To defcribe a roof with four equal rafters, that fhall be in in equilibrio by the weight of the rafters; of a given width A E, *Plate* XLIII. *fig.* 5, and height F C.

Join E C, and bifect it in H, by a perpendicular D H G, meeting A E in G; on G, as a centre, with the diftance G E or G C, defcribe the circle C E O. Draw K H I parallel to F E, meeting the vertical line O C in K, and the circle in I. Draw I D C, and join D E; then make the fide C B A fimilar to C D E, and A B, B C, C D, D E, will be the rafters of the roof required.

For complete the parallelogram C D Q B, and join B D, I F, and draw C L perpendicular to C F, and equal to F G. On L, with the diftance G E, defcribe the circle N I F, meeting the vertical line at N and F; produce E D to meet it alfo in M, and B C to P.

Then becaufe K F is equal to K C, and R C equal to R Q, the triangles C I F and C D Q are fimilar; therefore I F is parallel to D Q: and becaufe the two fegments N I F and C E O are equal to one another, the angle N I F is equal to the angle C E O, equal to twice the angle C E F, or twice the alternate angle E C L equal to E C D + D C L, but E C D is equal to half the external angle M D C, and D C L is half the angle D C P equal to C D Q. Therefore the angle N I F is equal to the angles M D C + C D Q equal to the angle M D Q, and C F : C N :: C Q : C M; but C F and C N are equal, therefore C Q and C M are equal; but C Q is to C M as the weight on C is to the weight on B; therefore the weights on C and B are equal, and the rafters A B, B C, C D, D E, are in equilibrio.

Prop. VII.

Suppofe it were required to conftruct a curb roof, the bottom rafter being in proportion to the upper rafter, as 2 to 3, and to a given vertical angle at the top, and to be of a given width A B, *Plate* XLIII. *fig.* 6.

Now the weight on the upper angle is to the weight on the lower angle, as $\frac{2\,HI}{2}$ is to $\frac{HI + IA}{2}$, that is, as $\frac{3+3}{2} = 3$ is to $\frac{3+2}{2} = 2\frac{1}{2}$; this is in the proportion of 6 to 5, or the half weight at H is to the bottom weight at I, as 3 is to 5.

Bifect A B by the perpendicular C D, and make the angle A E C equal to half the vertical angle, or the angle E A C equal to its complement. Make E D to E C as 5 to 3. Join D A and D B. Take A G of any length; draw F G parallel to A E, and make A G to G F as 2 to 3. Draw A F H, meeting C D at H; and H I parallel to F G or E A, cutting A D at I; make B K equal to A I, and join K H; then A I H K B is the contour of the roof required. This is fo evident from its conftruction, that it does not require demonftration.

Prop. VIII.

In any roof conftructed with two equal rafters only; as the height of the roof is to half the breadth of the building, fo is half the weight of the roof to the horizontal thruft, or lateral preffure.

Let A B C, *Plate* XLIV. *fig.* 1, be a roof, having the two equal rafters A B, B C; join the bottom of the rafters A C; draw B D perpendicular to it; complete the parallelogram B E F G, and draw E G, cutting B D in H. Then, becaufe the triangles B H E and B D A are fimilar, B D : D A :: B H : H E.

Cor. 1.—Hence, in a roof with two rafters and a tie-beam at the bottom, the tenfion, H E, of the tie-beam is $= \frac{DA \times BH}{BD}$.

Cor. 2.—Hence, alfo, B D : B A :: B H : B E, that is, as the height of the roof is to the length of the rafter, fo is half the weight, reprefented by B H, of the roof to the compreffion of the rafters $= \frac{BA \times BH}{BD}$.

Cor. 3.—Half the weight of the roof, the tenfion of the tie-beam, and the compreffion of the rafters, are to one another as the height of the roof, half the breadth of the fpan, and the length of the rafters; for the triangle B H E is fimilar to the triangle B D A.

Prop. IX.

If a rafter bear any weight, or have a weight uniformly diffufed over it, the force tending to break it is equal to the cofine of elevation, multiplied into the weight, divided by radius.

Let A B, B C, *fig.* 2, be two equal rafters; join A C, draw B G perpendicular to it, meeting it in G; and let the weight W be fufpended by the ftring D E. Draw D F perpendicular to A B, and E F parallel to it; then if D E reprefent the weight, D F will reprefent the force tending to break the rafter; F E its tendency to pufh it from B towards A.

Now, becaufe E F is parallel to A B, the alternate angles A D E and D E F are equal, and the angles D F E and A G B are right angles; the triangles E D F and B A G are fimilar; therefore A B : A G :: D E : D F $= \frac{AG \times DE}{AB}$, that is, as radius is to the cofine of elevation, fo is the force employed to its tendency to break the rafter, that is, as R : cof. :: D E : D F $= \frac{\text{cof. elevation} \times DE}{R}$.

Cor. 1.—Hence the weight employed, the preffure in a direction of the length of the rafter at A, the tendency to break it, are as radius, the fine, and cofine of elevation.

Cor. 2.—Becaufe D F $= \frac{\text{cof. elevation} \times DE}{R}$, and becaufe the ftrefs is as the length when the weight is given, the ftrefs is as the cofine of elevation multiplied into the weight, and this product multiplied into the length of the rafter, the radius being a conftant quantity.

Prop. X.

To prevent the rafters of a roof, with a tie-beam, from bending in the middle, and to remove lateral preffure from the walls, when there is no beam.

A variety of methods may be ufed for this purpofe; but the beft are thofe where the fhorteft and leaft quantity of timber are employed without producing a tranfverfe ftrain upon any part. When a roof confifts of two rafters only, no part of the rafters can be loaded between their extremities, nor indeed will they bear their own weight without producing a concavity on the upper fide, which will be greater as the length of the rafter and weight applied to it are greater. Now becaufe the fhorter the rafters are at the fame elevation, the greater the weight they will bear, and be more able to fupport their own weight; the thing to be done is to fupport them by a fufficient number of fixed points

points either from the roof itself, or other immoveable places. There are three points for this purpose; if the rafters have a tie-beam below, that is, at the vertex, and at the two extremities of the rafters, the triangle being immoveable at the angles, every force applied there tends either to compress or extend the sides of the frame without transverse strain.

Examples.—Let it be required to divide each of the rafters into three equal lengths, in order to support two purlins on each side; this may be done, as in *fig.* 3, by pieces, C E, C D, A G, A F, reaching from the two lower angles C and A, and to the opposite sides of the rafters A B and B C, intersecting each other at H and I, and halved upon each other at these intersections: this mode prevents the rafters from sagging, but does not afford any support to the tie-beam. The meeting of so many braces at the same point, too, gives little opportunity of making the ends entirely secure, even though assisted by iron straps. Another mode may be by introducing a king-post, B K, *fig.* 4, to which the strutts D H, E I, F M, G L, may be firmly joggled at H, I, M, L, and mortised to the rafter at D, E, F, G: this method keeps up the middle of the beam, but when the roof is low, and the span great, the strutts, D H and F M, require themselves to be supported, and are much too oblique to prevent a change of figure.

Another method may be as in *fig.* 5, with the king-post in the middle, as before, two queen-posts under the rafters at E and F, two strutts, H E and I F, joggled to the bottom of the king-post at H and I, and to the top of the queen-posts at E and F; and in order to secure the points N and P, two other braces, N Q, P R, are joggled to the bottom of the queen-posts at Q and R, and mortised into the rafters at the upper end. This construction supports the tie-beam in three different points, and each of the rafters in two. The timbers are much shorter than those of the preceding; but so many joggles are certainly an objection to this method, as the shrinking of the timber must be very considerable in three breadths, which would allow the roof to descend. When the span is great, and the points to be supported many, an excellent method may be as in *fig.* 6, where there are two arches of cast-iron or good English oak introduced, which abutt on the king-post, and at the other extremity at the ends of the beam. The rafters and the beam by this mode may be supported by as many equidistant points as we please.

When the tie-beam is removed from the bottom, as in *fig.* 7, and no fixed points are to be found from below, a longitudinal truss may be constructed, the end of which is shewn at A B, and the manner of framing it in *fig.* 9, the two ends being supposed to be firmly fixed into the gables; but where the length is great, the form of *fig.* 10, with a parabolic arch, would be much better: by this method, the rafters will be kept nearly in the same plane, and all lateral pressure from the walls will be removed; for it is evident that if the ridge-tree is supported, there can be no motion downwards in the direction of the rafters, the whole roof being hung to this longitudinal frame.

Prop. XI.

If a roof be constructed with two equal rafters, A M, C M, (*fig.* 8.) and if a tie extend from the bottom of each rafter to an intermediate point in the opposite rafter, and the ties halved together at their intersection B, forming with the rafters a quadrilateral M D B E at the vertex, and two triangles A D B and C E B; then if M D is equal to M E, and if C P represent the direction and quantity of force on the wall at C, the force tending to break the rafters at D and E is $\dfrac{S.PCK \times S.DME \times LK \times DM}{S.LCK \times R}$.

For complete the parallelogram P C L K; make M N equal to C L, and draw N O parallel, and M O perpendicular to A M. Now the triangles C B E and A B D may be looked upon as solid levers, (at least with regard to forces applied to the angles,) moveable round B. Then the force C P will communicate the force C L to the rafter, and C L is the power acting obliquely at M, upon the rafter A M: then because N O is parallel, and O M perpendicular to A M, O M is the force tending to break the rafter at D; O N that pushing it towards A: let M N be considered radius, then O M will be the sine of the angle D M N, or D M E; for produce A M to Q, and the angle N M Q will be the supplement of the vertical angle D M E, therefore the sine of N M Q, equal to the sine of the angle M N O, is the same with the sine of N M A; then by trigonometry,

$$LK : LC :: S.LCK : S.CKL \text{ or } S.PCK$$
$$NM \text{ or } LC : MO :: R : S.DME = S.MNO$$
$$\text{Therefore } LK : MO :: S.LCK \times R : S.PCK \times S.DME.$$

$$\text{Hence } MO = \frac{S.PCK \times S.DME \times LK}{S.LCK \times R} = \text{the}$$

force acting perpendicular to A M at M, but the force tending to break the rafter at D, is as the lever D M multiplied into this force; that is $= \dfrac{S.PCK \times S.DME \times LK \times DM}{S.LCK \times R}$.

Corol. 1.—Hence, if the angle D M E is a right angle, the force tending to break the rafter at D will be $\dfrac{S.PCK \times LK \times DM}{S.LCK}$.

Corol. 2.—Hence the rafters of every roof of this construction must sag in a greater or less degree, by the action of the rafters against each other at the point M, that is, they will be bent into curves concave on the upper edges; but if a diagonal connect the two vertical points M and B, this change of figure will be prevented.

Prop. XII.

To remove the lateral pressure of a roof without any intermediate beam, brace, or strutt.

Let A B, B C, (*Plate* XLV. *fig.* 1. N° 2.) be two rafters, and let there be constructed a strong wall-plate D E F G, N° 1, firmly bolted together at the angles; then if the roof is to be gable-ended, after having fixed the rafters to a common ridge-tree, let two curves be made of cast-iron, or good English oak, of a parabolic form, and let into the rafters, either on the upper or under surface, and firmly secured to them by bolts or nails, and at their lower extremities to the angles of the wall-plates, the vertex of each curve meeting the ridge-piece on each side of it, or nearly, as may be found convenient. One half of the plan N° 1. exhibits the form for the execution of a gable-ended roof, and the other for a hiped roof. The two sides, laid in plano for each form, are shewn in N° 3 and 4; at H I K L and M N O P, H L and D G represent the same wall-plate; D G, N O, and E F another wall-plate, I K and M P meeting the ridge on each side of it: but it must be observed, when the roof is to be hipt, that the ridge-tree must be very strong, as the compressure will be very great, the hip-rafters acting like powerful braces at the extremities of it. Hence it is evident that the wall-plates act as the tie-beams

beams of a common roof, and the curves as the rafters, or more naturally like an arch of a bridge in equilibrium. It has already been ſhewn that equal weights, acting in equidiſtant lines, require an arch of a parabolic form to keep them in equilibrio. In this it is to be conſidered, that as the arches are placed with their crown upwards, they are in a ſtate of compreſſion, and may be got out very conveniently in ſeveral lengths; but if the arches were inverted they would be in a ſtate of tenſion: each arch muſt then be in one piece; the ridge would be compreſſed by the tenſion of the two curves. This inverted diſpoſition of equilibration is not ſo ſecure as when the crown of the arches either meets the ridge or lies towards it. Though the above conſtruction will prevent lateral preſſure, it will not hinder the rafters from ſagging; but the addition of a collar-beam will effectually anſwer this purpoſe in all moderate ſpans.

Prop. XIII.

Given the conſtruction of a roof, of which not more than three timbers meet at the ſame junction, and a force in the direction of any one of the timbers; to find the forces communicated to the other timbers, ſo that the roof ſhall be in equilibrio.

Begin with the given force, and take a part of the line of its direction from the junction to repreſent it; then with the other two directions complete a parallelogram, and apply them from the next junctions on the ſame ſtraight line from which they were taken, and complete parallelograms as before. Proceed in this manner from one junction to another, until parallelograms have been made at every junction. Then the parts of theſe parallelograms in the directions of the timbers are the forces in theſe directions; then to know the ſtate of tenſion or compreſſion of any timber, obſerve that when two of the angles formed by three directions are leſs than two right angles, the middle force acts always contrary to the two extreme ones, as has already been explained; and that when any two of the angles of direction are greater than two right angles, then the forces will act towards or from the ſame point.

Example 1.—Let A B C D A (*fig.* 2.) be a roof, conſiſting of two rafters, A B, B C, two beams, C D, D A, and a king-poſt, D B, ſupported by the walls A O and C E. Let C E repreſent half the weight of the roof, or the re-action of the wall C E; complete the parallelogram C E F G; make D L equal to F C, and complete the parallelogram L M N D, then C F or D L is the force in the direction of the beam C D or A D, and D M the force in the direction of the poſt D B; then becauſe the angles E C F and F C G are leſs than two right angles, and becauſe the point C is preſſed by the re-action of the wall E C, it will alſo be preſſed by the force G C, and drawn by the force C F; therefore the beam C D is in a ſtate of tenſion, and the rafter B C in a ſtate of compreſſion. Again, becauſe C D B and B D A are greater than the two right angles, and becauſe C D is in a ſtate of tenſion, B D and D A are alſo in a ſtate of tenſion.

If B H be made equal to G C, and the parallelogram B H I K completed, and if B P be made equal to D M, then will P I be equal to twice C E, the preſſure on the walls.

Example 2.—Let A B C D E A (*fig.* 3.) be a roof ſupported by walls in the direction P A and Q C, and let there be two pieces of timber, B D and B E, connecting the angular points D and E to the ridge at B.

Take C F to repreſent half the weight of the roof, or the re-action of the wall Q C: complete the parallelogram C F G H, produce C D to K, make D K equal to G C, and complete the parallelogram D I K L; then G C or D K is the force in the direction of the timber C D or A E, and is in a ſtate of tenſion, becauſe the angles F C G and G C H are leſs than two right angles, and becauſe C F is in a ſtate of compreſſion; C H, the force in a direction of the rafter B C, is alſo in a ſtate of compreſſion; and becauſe any two of the three angles G D B, G D E, E D B, are greater than two right angles, and D C is in a ſtate of tenſion, the two pieces, D B and D E, are alſo in a ſtate of tenſion: that is, E A, E B, E D, D B, D C, are all ties. The force in D B or E B is D L, that in D E is D I.

If B R and B S be made equal to C H, and the parallelogram B R W S completed; and if B T and B U be made equal to L D, and the parallelogram B T V U completed, then will V W be equal to twice C F, that is, by reducing the force in the direction of the pieces B E and B D to an equivalent one.

Prop. XIV.

Given the lengths A B, B C, C D, D E, (*Plate* XLVI. *fig.* 1.) of the rafters of a roof and their angles of poſition, to find thoſe angles that require ties, and thoſe which require ſtrutts.

Let A B be to B C as 3 is to 4, that is, as 6 to 8, the proportion of the weight of the rafters; then if 8 be taken for the weight of each of the upper rafters, $\frac{8+8}{2} = 8$ is the weight on the vertical angle C, and $\frac{6+8}{2} = 7$, will be the weight on each of the vertical angles B and D, ſo that the weight on the vertical angle is to the weight on each of the lower angles, as 8 is to 7. Draw the vertical line B G F, and draw A G, A F, parallel to the rafters B C, C D; then if F G be to G B as 8 to 7, the rafters are in equilibrio, and require no ties. But ſuppoſe it ſhould be found that F G is to G B as 1 to 2; now as that will keep it in equilibrio, it would then require a very conſiderable addition laid on the angle B to keep it from ſpringing outwards, ſo that if two braces, F G and K L, N° 2, were fixed to the rafters A B, B C, C D, D E, theſe braces would be in a ſtate of compreſſion, and if the brace H I were fixed at the top it would be in a ſtate of tenſion: F G and K L only require firm butments, but H I to be well bolted. It may here be obſerved, that if the vertical angle only be braced and ſecured to the two rafters, the whole frame will then be immoveable.

Prop. XV.

To diſcover the effect of bracing the angles of a roof flat on the top, ſupported by puncheons at the bottom of the rafters, to accommodate a ſemicircular ceiling within.

Let A B C D E F (*fig.* 2. N° 1.) be the truſs, diveſted of its braces, the bottoms of the puncheons reſting firmly on the walls at A and F, and the joints at B, C, D, E, to be quite moveable, like rule joints. Now, as this diſpoſition of timbers would fall, and in falling, would aſſume the form of N° 2, the angles at C and D would become more and more obtuſe, while thoſe at B and E would become more and more acute; the latter would therefore require ſtraining-pieces, and the former ties: the ſtraining-pieces muſt have good abutments, and the ties be well bolted at their extremities.

Let N° 3 be the truſs, with braces diſpoſed in the lower angles: this diſpoſition will bend the rafters B C, D E, and the puncheons B A, E F, convex towards the outſide, which is is entirely occaſioned by the braces G H and N O: the camber-beam C D is no otherwiſe affected than by its own weight. Let it now be ſuppoſed, that the angles C and D, N° 4, are braced at I K, L M. In this diſpoſition, the puncheons B A and E F are not affected in reſpect of tranſverſe ſtrains; the rafters C B, D E, and beam C D, would all become concave on the outſide; and the points B and E, at the bottom of the rafters and top of the puncheons, would be puſhed out beyond the perpendicular of A and F, at the bottom: here it is neceſſary to obſerve, that the effect produced in this caſe on the rafters C B and D E is contrary to the effect produced in N° 3, by the braces being diſpoſed in the lower angles. Laſtly, ſuppoſe that all the angles are braced, as in N° 5, it is evident, ſince the braces H G, N O, produce a contrary effect to the braces K I, L M, theſe bending the rafters downwards, and thoſe upwards, that the rafters C B and D E will become nearly ſtraight, or aſſume an undulated line: the puncheons B A and E F, receiving the force of the braces H G and N O at the points G and O, muſt ſtill be bent, ſo long as the under ends G and O of the braces do not coincide with the under ends A and F of the puncheons: in this caſe, there is no other remedy than by giving the puncheons a ſcantling ſufficient to withſtand this tranſverſe ſtrain, or horizontal thruſt, at the points G and O: however, the ſhape of the contour may be pretty well ſecured by introducing two abutments, H I and M N, N° 6; theſe, by being bolted through the two ends, will add greatly to the ſtiffneſs of the rafters B C and D E: the bolts that go through the upper ends may alſo ſerve for the braces I K and L M: the ſhape of the horizontal beam C D will likewiſe be very much preſerved by the piece K L, bolted in three places, one at each end, into the braces I K and L M, and another in the middle: the contour of a roof, thus ſupported, would be quite unchangeable, if the rafters were inflexible; but as this is not the caſe, and as they are acted upon tranſverſely by the braces, the truſs will, therefore, in ſome degree, be expanded at B and E, and conſequently occaſion lateral preſſure on the walls; it will therefore be unfit for an oblong building, without other precautions for this purpoſe. By inſerting parabolic curves in the ſides B C and D E, as in *Plate* XLVI. *fig.* 1, it will be effectually prevented.

In roofs of this deſcription, joggle-pieces of wood ſhould never be uſed, as the ſhrinking of them would tend greatly to alter the outline of the rafters.

Having laid down ſuch principles as will enable the workman to judge of the ſtrength and ſtrain of timbers in the framings of carpentry, it will now be neceſſary to proceed to ſhew the mode of conſtructing roofs to anſwer various purpoſes; to give ſome practical obſervations relative to their ſtrength, and to ſhew the various modes of joining timbers, the forms of ſtraps, &c.

Plate XLVII. *fig.* 1. is the roof of the chapel of the royal hoſpital at Greenwich, conſtructed by Mr. S. Wyatt.

	Inches Scantling.
A A, The tie-beam, 57 feet long, the ſpan of the walls being 51 feet - -	14 × 12
B, Queen-poſts - - - -	9 × 12
C, Braces - - - -	9 × 7
D, Straining-beam - - -	10 × 7
E, Straining-piece - - -	6 × 7
F, Principal rafters - - -	10 × 7
G, Camber-beam for the platform -	9 × 7
H, An iron rod, ſupporting tie-beam -	2 × 2

The truſſes are ſeven feet clear; the platform is covered with lead, which is ſupported by horizontal beams ſix by four inches.

The timbers of this truſs are well diſpoſed, and perhaps contain leſs wood than moſt roofs of the ſame dimenſions. The iron rod ſeems of no other utility than to prevent the middle compartment of the beam from ſagging.

Fig. 2. is the roof of St. Paul's, Covent-Garden, deſigned by Mr. Hardwick, and conſtructed by Mr. Wapſhot, in 1796.

	Inches Scantling.
A A, The tie-beam, ſpanning 50 feet 2 inches	16 × 12
B, Queen-poſts - - - -	9 × 8
C, Straining-beam - - -	10 × 8
D, King-poſt, 14 inches at the joggle -	9 × 8
E, Strutts - - - -	9 × 8
F, F, Auxiliary rafters, at bottom -	10 × 8½
H, H, Principal rafters, at bottom -	10 × 8½
I, Studs ſupporting the principals -	8 × 8

This roof is much better conſtructed than the original one by Inigo Jones. A truſs of the preſent deſign contains only 98 cubic feet of timber, whereas that by Inigo Jones had 273, and was very inſufficient at the joggles, and had ſome of its timbers very ill diſpoſed: the interior truſs is well contrived for ſupporting the exterior, which reaches ſeven feet beyond the walls. The tie-beam has perhaps too much camber, being ſix inches; for ſince it acts as a ſtring, it will lengthen in the ſettling of the roof.

Fig. 3. is the roof of Drury-lane theatre, 80 feet 3 inches ſpan, and the truſſes 15 feet apart: conſtructed by Mr. Edward Gray Saunders.

	Inches Scantling.
A, Beams - - - -	10 × 7
B, B, Rafters - - - -	7 × 7
C, King-poſts - - - -	12 × 7
D, Strutts - - - -	5 × 7
E, Purlins - - - -	9 × 5
G, Pole-plates - - - -	5 × 5
H, Common rafters - - -	5 × 4
I, Tie-beam - - - -	15 × 12
K, Poſts to ditto - - -	15 × 12
L, Principal braces to ditto -	14 and 12 × 12
M, Strutts - - - -	8 × 12
N, Straining-beam - - -	12 × 12

The principal beams are truſſed in the middle ſpace with oak braces, five inches ſquare. This was requiſite on account of its width, which is thirty-two feet, that the floors might carry the work-ſhops neceſſary for the uſe of the theatre. This truſs is moſt admirably conſtructed, it is hardly equalled for ſtrength, ſtiffneſs, and lightneſs by any other, and will ſafely bear a load of nearly 300 tuns, which is four times more than ever it is likely to be loaded with.

Plate LVIII. *fig.* 1. is the deſign of a truſs-roof for a church, with a nave and two ſide aiſles. The beam of the middle compartment is kept from ſagging in the middle by two ſtrutts, reſting at the bottom on poſts over the columns, and connected together at the top by a ſtraining-piece. As the poſts firmly ſupport the middle of the rafters, keeping theſe points always ſtationary, there will be little danger of lateral preſſure from a roof of this conſtruction. All that is wanted further is to give the rafters ſtiffneſs, by fixing other pieces from the two fixed points of the tie-beam, and from the two poſts.

Fig. 2. is a deſign for the truſs of a curb-roof, with a door in the middle. The rafters are ſupported at equal diſtances, from

from fixed points of the trufs; the weight of the covering being always uniform, or nearly fo.

Fig. 3, N° 1, a defign for a roof, with lanterns in feveral ftages, diminifhing in the form of fome Chinefe buildings. Thefe towers may be carried to any height, at pleafure, by always truffing in the plane of the diagonal between every two ftages from the lower, to fupport that immediately above. There are fome excellent fpecimens to be feen in the buildings of Deptford, belonging to the victualling office, called ufually the Red-houfe. N° 2. is a plan for the feat of the upper ftage.

Fig. 4. is the defign of a conic roof for a rotunda or circular building, fupporting a lantern at the top. If the extent of the building is very large, the rafters would require to be fupported in the middle; for this purpofe the bottom piece may be continued, as is expreffed by the dotted lines.

Fig. 5. is a defign for a pent roof, fupporting a lantern of an octagonal form. N° 1. is the form of the trufs; N° 2, the lower plan, with the feat of the pofts; N° 3, the plan of the upper part; N° 4, the trufs of the two tranfverfe parts.

Having defcribed the form of roofs fupporting lanterns, and the truffes in which they may be executed with fafety, it will now be proper to give a few examples of domes, and fhew how they may be conftructed under various circumftances. If the dome to be conftructed be on a circular plan, and have no lantern above, the ribs may be built in the following manner, with planks of convenient lengths in three thickneffes. Having afcertained the length of the ribs, and the number of pieces in that length, and having properly fhaped all the pieces to the curve, the middle piece at the bottom may be one of thefe lengths; to each fide may be joined two other pieces, one reaching to a third of the middle piece, and the other to two-thirds from the bottom; fo that by continuing with planks of the whole length to the other extremity of the rib, the middle thicknefs will always be covered two-thirds from the bottom on one fide, and one-third on the other; the deficiency at the top muft be filled up with pieces, one of a third and the other of two-thirds, as at the bottom; the whole, being well bolted together and ftrapped acrofs the joints, will be nearly as ftrong as a folid rib. *Plate* LIX. *fig*. 1 fhews the manner of conftructing this kind of dome; N° 1 being the femi-plan, N° 2 the elevation, N° 3 the manner of building the rib. In domes of this kind it may fometimes be neceffary to difcontinue the ribs, in order to divide the fpaces more equally for the horizontal ribs. It is evident that a dome built in this manner may be carried almoft to any degree of extent, provided that it have a fufficient number of horizontal ribs. Of this conftruction is the Halle du Bled at Paris, of 200 feet in diameter, the invention of a judicious carpenter, the Sieur Molineau, a man of little education in the point of fcience, but of confiderable mechanical experience, from which he formed his theory. Being convinced that a very thin fhell of timber might not only be fo fhaped as to be nearly in equilibrio, but that, if well connected with horizontal ribs, it would have all the ftiffnefs that was neceffary; he accordingly prefented his fcheme to the magiftracy of Paris: the grandeur of the idea pleafed them, but they doubted of the poffibility of its being put in practice. Being a great public work, they prevailed on the Academy of Sciences to confider it. The members, who were competent judges, were ftruck with the juftnefs of Mr. Molineau's principles, and aftonifhed that a thing fo plain had not become familiar to every houfe-carpenter. It quickly became an univerfal topic of converfation, difpute, and cabal in the polite circles of Paris. But the Academy having given a favourable report of their opinion, the project was immediately carried into execution and foon completed, and now ftands as one of the greateft exhibitions of Paris. The circular ribs which compofe this dome confift of planks 9 feet long, 13 inches broad, and 3 inches thick, made in three thickneffes, as in that already defcribed. At various diftances thefe ribs were connected horizontally by purlins and iron ftraps, which made fo many hoops to the whole. When the work had reached fuch a height, that the diftance of the ribs was two-thirds of the original diftance, every fecond (now confifting of two ribs, very near each other,) was in like manner difcontinued, and the void glazed. A little above this the heads of the ribs are framed into a circular ring of timber, which forms a wide opening in the middle, over which is a glazed canopy or umbrella, with an opening between it and the dome, for allowing the heated air to get out. All who have feen this dome fay, that it is the moft beautiful and magnificent object they ever beheld.

The only difficulty which occurs in the conftruction of wooden domes, is when they are loaded in the upper part by a heavy lantern or cupola. Such a dome as has now been defcribed would be in danger of being crufhed at the top inwardly; the moft effectual method of preventing which is by making the ribs in the form of truffes, as in *Plate* LIX. *fig*. 2, where the ftraight pieces connecting the two extremities of the exterior fide, forming as it were the bafe of a trufs in a common roof, act contrary to the nature of a tie-beam; they refift the vertical preffure of the lantern, without having any tendency to burft out the fides, by acting entirely longitudinally on the wall-plate. In order to fecure the lantern, horizontal braces are fixed from the bottom of the lantern to the middle of the principal braces under the joggles, fo that the whole is refolved into triangles, which are all immoveable at the angles. The wall-plates fhould be framed as the ribs of a dome, conftructed as in the laft example.

When a dome is to fupport a heavy cupola of ftone, fuch a conftruction as that of the cathedral of St. Paul's, London, may be employed. *Fig*. 3. N° 1. exhibits the trufs of this dome, taken from accurate meafurement. A *a a* A, a dome of brick, two bricks thick, which, as it rifes every five feet, has a courfe of ftrong bricks 18 inches long, bonding through the whole thicknefs. B *b b* B is a cone, built with bricks one foot fix inches in thicknefs, for fupporting the heavy cupola above, of Portland ftone, which is 21 feet diameter, and near 61 feet high, and alfo the timber-work of the dome. The horizontal or hammer-beams, C,C, &c. being curioufly tied to the corbels D, D, D, &c. with iron cramps, which are bedded into the corbels with lead, and bolted to the hammer-beams. N° 2. fhews more particularly the manner of tying the hammer-beams to the corbels.

This dome is boarded from the bafe upwards, and the ribs are therefore fixed horizontally, having their fides in planes tending to the centre of the dome. The contour of the dome is formed of two circular fegments, which meet in the axis like a pointed arch. The fcantlings of the curve rib of the trufs are 10 inches by $11\frac{1}{2}$ at the bottom, and 6 inches by 6 at top. It has a very ftrong double iron chain, linked together at the bottom of the cone, and feveral other lefs ones between that and the cupola, which may be feen in that beautiful fection of St. Paul's, engraved by Rooker. This dome was turned upon a centre, which was fupported without any ftandards from below. As every ftory of the fcantling was circular, and the ends of the ledgers meeting like fo many rings, and truly wrought, it fupported itfelf; and as it was both centering and fcaffolding it remained for the

the uſe of the painter, there being a ſpace of twelve feet between it and the dome. This machine, it is ſaid, was original of its kind.

Roof, *Rotative*, or *Rotatory*, in *Aſtronomy*, is one which is made to turn round in a horizontal direction, ſo that its openings or doors may be directed to any azimuthal line in the concave expanſe of the heavenly regions. In a tranſit room, where a meridian line is the only one that is wanted, a fixed roof, with trap-doors opening at different altitudes above one another, ſufficiently anſwers the purpoſe of the aſtronomer; but in an obſervatory, where an inſtrument that meaſures azimuths as well as altitudes is placed; or where a good teleſcope, of either the achromatic refracting, or reflecting conſtruction, is uſed, for viewing the ſtars and planets in various parts of the heavens on the ſame evening, a rotative roof is indiſpenſably requiſite. The conſtruction which has been moſt generally adopted, and which we ſhall firſt deſcribe, was contrived by the ingenious Mr. Smeaton, one of whoſe papers, of the date of 1788, now lying before us, was deſigned for the late Mr. Aubert's obſervatory at Highbury, and will ſupply us with materials ſufficient for the purpoſe of illuſtration. In *Plate* XXII. of *Aſtronomical Inſtruments*, *fig*. 1. repreſents a ſection of the whole roof along that plane, which paſſes through the doors, or opening, that divides it into two equal portions; *fig*. 2. is the plan of the ſame, and ſerves to illuſtrate *fig*. 1; in both theſe, *a*, *a*, are the rafters, or door-cheeks, covered by two oblong doors meeting at the apex, and ſo contrived by cloſe fitting, as to exclude the rain and ſnow when nicely made. An enlarged ſection acroſs one of theſe doors is ſeen in *fig*. 3, and will be explained preſently. The frame of the roof is covered with alternate boards of deal of a triangular ſhape, tongued into one another at the edges, and when perfectly put together with ſtrong glue, and ſeveral times painted over, will be light, and will laſt ſeveral years; but if a coat of copper, particularly of tinned copper of Mr. Wyatt's patent manufactory, be ſuperadded, the weight will not be conſiderable, and the durability will be enſured. A ſquare foot of Mr. Wyatt's copper of the thinneſt kind weighs a pound, and therefore a given number of ſquare feet will be covered by ſo many pounds weight. An edge plate, formed into a circle, terminates the eaves, and conceals a ſtrong annular ſupport, which reſts on ten rollers, five of which are ſeen in *fig*. 1, three as circles, and two at the extremities of the roof in ſection as ſmall parallelograms. All the ten rollers are repreſented in the ring ſeen in *fig*. 4, which is united by five pairs of hinges that connect the five equal portions thereof, as ſeen on the plane of the ring; while each of theſe five portions contain two rollers ſeen in ſection, and one handle projecting inwards. The uſe of the hinges is to allow each of the five portions of the ring to yield to the preſſure of the ſuperincumbent roof, in order that all the rollers may be made to act in every poſition of the roof, in the event of any of the parts becoming diſtorted or partially worn. This ring, which receives the pivots of the rollers, lies intermediate between the roof and fixed circle that bears the whole weight, and is repreſented by the letters *b*, *b*, in *fig*. 1, the fixed circle or bed being denoted by the letters *c*, *c*; both which, in the ſection, appear as ſtraight lines, though they are circles or rings, as above deſcribed, and the fixed one, *c c*, reſts on ſtrong upright pieces, *d*, *d*, properly braced by frame-work, which it is not neceſſary to ſhew. From this ſhort deſcription the reader will now conceive that the roof is ſeparated from the bed *c c*, by exactly the whole diameter of the rollers, which therefore ought to be turned nicely to the ſame dimenſions, in order to preſerve the horizontal poſition of the ring, and to make the rollers act ſmoothly, when the roof is puſhed round by any force internally applied; but unleſs ſome proviſion is made, more than we have yet deſcribed, the roof might be puſhed from its bed, and be upſet; to avoid this accident a groove is made along the upper face of the annular bed *c c*, in which the rollers move, and while all the parts of this contrivance remain unaltered by the weather, the action of the rollers is uniform, and the conſtruction anſwers its purpoſe in a ſatiſfactory manner: but in many inſtances, we learn that the work of turning a large roof, thus conſtructed, becomes laborious, in conſequence of either the ring of rollers, or the groove in the bed, taking an elliptical ſhape, in a ſmall degree, by partial ſhrinking or ſwelling in different ſtates of the atmoſphere; in which caſe the rollers bind in the groove, and require mechanical force to move them, in certain parts of the revolution; which force will of courſe ſtrain the joints, and ultimately deſtroy the union of the different parts of the ſtructure. It is, therefore, of importance that an attention be paid to the grain of the wood, as well as to its being ſeaſoned, before the upper covering be attached; which precaution will prevent the bad effect of external moiſture. At *e*, in *fig*. 3. is one of the hinges of the doors, attached firſt to the ſide of the door, and then to a piece of wood that lies over the roof to receive the ſcrews, without penetrating the roof itſelf; and the crank-ſhape of the ſection of the door will explain how it claſps the door-cheeks, ſo as to exclude the admiſſion of rain or ſnow, ſo long as the materials do not warp or decay. The handle-piece, *f*, puſhes the door back, and brings it cloſe again, by the aid of a ſtaff with a hook at the end, that takes hold of the ring at the lower extremity of the handle *f*, when the roof is too far elevated for the reach of the human hand. During the peruſal of this account of the mechaniſm of Smeaton's rotatory roof, it may have occurred to the reader, that the rollers might have been attached to the annular portion of the roof, which now reſts on the upper extremities of the rollers, and that conſequently the ring, that now carries the ſaid rollers, and that is repreſented by *fig*. 4, might have been omitted. But the inventor had a good practical reaſon for the introduction of this ring, which may not yet have occurred to our reader; and it might perhaps puzzle him to diſcover it, without our aſſiſtance. Smeaton knew very well that the roof with rollers, or ſmall wheels under it, would move in a groove made in the bed to receive them; but he knew, moreover, that, to move in a *circular* groove, the diameters of the rollers could not be *great*, without ſticking faſt againſt the ſides of the ſaid groove; and, alſo, that the pivots of the rollers muſt be *ſtrong*, to ſupport the whole roof. The relative diameters of the rollers, and of their pivots, on which the quantity of friction depends, would not conſequently produce, under theſe circumſtances, the eaſy motion of the roof that conſtitutes a leading object of the aſtronomer: the ring was, therefore, introduced, for the purpoſe of diminiſhing the friction *one-half*, without altering the neceſſary dimenſions of the rollers, and of their pivots; which effect may be thus explained. In the firſt place, ſuppoſing the roof to be moving forwards on rollers attached to it, like a carriage on wheels; in this caſe, the velocity of the roof and of the rollers, or of the carriage and wheels, would be the ſame; and the horizontal diſtance paſſed over in a given number of revolutions of the roller, or wheels, would be meaſured by the circumference of the roller, or wheel, multiplied by its number of revolutions; and the mechanical diminution of friction would be as the diameter of the roller to that of the pivot of the axis, or of the wheel to that of its axle. When a motion is thus produced in a roof, or in a carriage, a carriage, we may ſay that it *rides* on, or *is carried* by its roller, or wheel, and that with the ſame velocity with which the roller or wheel moves forwards, by virtue of its rotations. But, in the next place, let the rollers be conſidered as attached to the ring in *fig.* 4, which has as many holes cut through it as there are rollers for them to paſs through; and let us conceive this ring to be put in motion, as it is placed on its circular bed *c c*, without any reference to the roof. In this ſituation, the ring rides on, or is carried by the rollers with their velocity, as the roof or carriage was on our firſt ſuppoſition. Let now the roof reſt on wedges placed on the ring, but ſo as *not to touch* the rollers, and it will alſo ride as before, with the velocity of the rollers; but remove the wedges, and let the roof fall upon the upper edges of the rollers, and it will now have two motions combined: for, firſt, it will ride in common with the ring on which it reſts, in the way we have deſcribed; and, ſecondly, it will be urged by the rollers acting on its annular face, as ſo many toothleſs pinions, with a ſimilar velocity with which it *rides* on the rollers, along with the ring; or, in other words, the roof will have *double* the *velocity* of the ring on which the rollers are fixed. To underſtand this effect more clearly, let the reader ſuppoſe himſelf in an open carriage. While he ſits ſtill, he is carried with the velocity of his vehicle; but if he ſhould venture to place his foot on the circumference of one of the wheels, in getting out, while the vehicle is in motion, he will run the riſk of being toſſed forward by the ſaid moving wheel with an *increaſed velocity*, that will convince him of the danger of ſuch an experiment. This effect is familiar to all, but the cauſe is not generally conſidered, perhaps but little underſtood.

In order that the adaptation of all the parts that are connected with the rollers may be the more evident, we have given an enlarged ſection of one corner of the roof, near the eaves, within the ring of *fig.* 4, which, therefore, may be conſidered as a ſeparate figure, in which the ſame letters repreſent the ſame parts as in *fig.* 1: namely, *a* is one of the rafters, forming one of the door-cheeks, projecting above the covering of the roof; *b b*, the roller, ſeen both in ſection and plan; *c*, a ſection of the fixed annular bed; *g*, a ſection of the moveable annular part of the roof, on which the eaves lie; and *g h*, an iron cranked bar, ſcrewed to *g* above, and therefore moving with the roof, but in ſuch way, that the crooked part at *h* lies juſt below an annular piece *i*, attached to the bed *c*; ſo that if any blaſt of wind, or other external force, ſhould move the roof, it will be ſecured from overſetting, by the crank-bar at *h* catching the ſaid fixed piece *i*; and if four or more of theſe crank-bars be uſed, the roof will be ſecure in all directions.

The objection which we have ſtated, as applying to the conſtruction of Smeaton's roof, has very lately been obviated by the Rev. W. Pearſon of Eaſt Sheen, Surrey, who has juſt finiſhed a rotative dome, to receive a large and very accurate circular inſtrument for meaſuring azimuths, as well as altitudes, by Troughton; which inſtrument was originally ordered by the Ruſſian Academy, but was countermanded by reaſon of the ravages committed by the French in Ruſſia, at the time that the conſtruction of it was in hand. This dome is repreſented in ſkeleton in *fig.* 5, where the circular rafters are ſeen at ſixteen equal diſtances, excluſive of the opening, *a a*, *a a*, which is nearly nine inches, through which the teleſcope of the inſtrument, placed on the top of the pillar A, is directed to any part of the heavens. This ſemicircular opening, which divides the dome into two equal portions, or quarters of an oblong ſphere, is covered by five doors, two on each ſide, and one at the ſummit; but in ſuch a way, that a ſmall door on one ſide faces a large one on the other, and the top door takes in five or ſix inches more on one ſide than on the other, ſo that there is no altitude to which the teleſcope may not be directed, by reverſing the poſition of the dome, *i. e.* by turning it juſt half round, when neceſſary; and yet the fittings are ſo contrived, that any one of the doors may be opened, while the reſt are ſhut. The two quarters of the oblong ſphere are connected by braſs bars at the points where the doors meet, and grooves are made on the edges of the rafters, that form the door-cheeks; ſo that any rain, that may be driven into the ſides or ends of the doors, runs down theſe grooves to the eaves, and diſappears, without being admitted within. We have not thought it neceſſary to ſhew theſe doors, which turn back on hinges, placed at their edges, upon the roof, which is covered firſt with triangular ſlips of deal about three-eighths thick, and then with tinned copper from Wyatt's manufactory; which metal being eaſily ſeamed, requires not the aid of many nails. The ornament at the top, being light, turns back with the top-door, and lies alſo on the roof, while obſervations are made in or near the zenith. The rotative part of this roof is of the ſimpleſt conſtruction that can well be imagined, and yet is ſafe, and more free from friction than Smeaton's, though made with the utmoſt care. The ring of rollers is here entirely left out, and three large balls of lignum vitæ are ſubſtituted in a detached ſtate, that is, without any fixed axis of motion, or pivots; and a four-ſided circular tunnel is ſo formed of wood, that theſe balls, by their ſimilarity of dimenſions, keep their relative diſtances from one another, and act as friction-rollers both in a vertical and horizontal direction; nay, even in both at once, whenever they happen to come in contact with either of the ſides of the ſaid tunnel. The balls, which are $4\frac{1}{4}$ inches in diameter each, are ſhewn in *fig.* 5. at oppoſite diameters of the dome, near the eaves, as though four were uſed, for the ſake of exhibiting their mode of poſition and action; but three only are much better, becauſe in every ſituation of their revolution they are certain to bear equal ſhares of the whole weight, when the bed is horizontal; and therefore none of them will refuſe to move, when the dome is puſhed round; but ſhould they happen to gain ground of one another in moving forwards, by any difference in their diameters, they will reſume their original ſituations reſpectively during the backward motion of the dome. *Fig.* 6. is an enlarged ſcale of the tunnel and of one of the balls, in which A is a portion of the roof, terminated by the annular piece of deal B, which is lined with the annular piece of wainſcot C, to both which the covering-piece D above the eaves is ſcrewed; E is a piece of wainſcot forming the inner ſide of the tunnel, and G is a continuation of one of the upright planks attached to the annular bed H, and forms the exterior ſide of the ſame. All the four ſides of the ſquare tunnel, which we called circular, becauſe it ſurrounds the circular erection, are either of wainſcot, or lined with wainſcot, to come in contact with the lignum vitæ which compoſes the balls; though the rings of deal, B and I, might have been in contact with the balls, if they had been hard enough; but the weight of a dome, of nearly ten feet diameter, covered with copper, would, in that caſe, have produced hollow places, that might have impeded the uniform motion of the balls. The piece J is one of the ſupporters of the bed I, to which the deal planks G are made faſt, and alſo the external pilaſters that ornament the vertical portion of the ſtructure. In this dome the velocity of the ſuperſtructure, as in Smeaton's, is double to that of the balls; and as theſe are left at liberty to turn in any direction, where an obſtacle to motion is preſented to any of them, they in-

ſtantly

ftantly right themfelves, and fet forwards again with their load without impediment, and without groaning. A cranked bar attached to the piece E, and bending below a ring, faft to the bed I, but not fhewn in the figure, prevents the dome from overturning by either accident or violence, and by the aid of a thumb-fcrew fixes it in any given pofition. This conftruction was, we believe, fuggefted firft by Mr. Troughton, and as it has not been long in ufe, we cannot forefee what objections may hereafter apply to it; but we give the particulars of it from a perfuafion, that it will be found to be a confiderable improvement on Smeaton's, and that it may ultimately be generally adopted.

Roofs, in *Rural Economy*, are formed of many different forts of materials. Thatch was formerly almoft in general ufe for covering the roofs of farm-buildings; but it is obvioufly objectionable on many accounts; it not only ferves as a hiding-place for rats, mice, infects, birds, and other forts of vermin; but it is extremely perifhable in its nature, fubject to be much damaged by high winds, and of courfe liable to frequent repairs, and, above all, highly dangerous from its combuftible nature; it is, therefore, probably the moft improper, the leaft fafe, and, in the end, the moft expenfive material that can be employed for the purpofe. Mr. Middleton, however, thinks that it keeps out the fummer's heat and winter's cold more effectually than any other material now in ufe; but that, as it is not quite fo compact and fightly as flates or tiles, and the ftraw being of fuch value for other purpofes, it will probably be fuperfeded by them. Tiles, though little expofed to danger from fire, do not, by any means, conftitute a good roof, being ill calculated for preferving grain or other farm produce. In fummer they admit a heat very unfriendly to hay, corn, or ftraw, while, in winter, they are equally objectionable, on the ground of tranfmitting moifture in a high degree, while flates, though more expenfive at firft, are liable to none of thefe objections, efpecially when of the more thick kind. A roof covered with them, therefore, anfwers every ufeful purpofe, and is very durable, lafting half a century, with very flight repairs in any way.

In the Middlefex Report on Agriculture, it is remarked on this important fubject, in fpeaking of the roofs of houfes, that pantiles are fo eafily heated through by the fun during the fummer months, that the rooms underneath are as hot as an oven; while, in the winter feafon, in every common froft, thefe tiles are fo completely frozen through, as to become as cold as a covering of ice. Thefe extremes muft confequently have a very bad effect on the health of the inhabitants. The blue flates are fo very thin, as to be equally liable to the fame objection, particularly as they are now laid on moft of our fafhionable houfes, under Wyatt's patent. They are rather better when laid on in the common manner, that is, on double laths, but much better on boards. Plain tiles make a confiderably more temperate covering for houfes than either pantiles or flates, by reafon of their being laid double and in mortar, and thereby forming a much thicker and clofer roof. In this they are nearly equalled by the thick or ftone flating of the midland counties; they might alfo be glazed of a flate colour; in which cafe they would make a roof more handfome, temperate, and durable than any other covering material now known.

Some other fubftances have been had recourfe to in this intention. In different parts of the country, cements of various kinds, and coarfe paper laid over with refin, tar, &c. and other fimilar matters, have been tried, but with no very promifing fuccefs as to their application. In fome parts of Devonfhire, though flate is by no means difficult to be procured, a fubftitute for that fort of covering is, Mr. Vancouver afferts, getting very much into ufe, which is prepared in the following manner:—three parts of whiting, five of fand, one of pounded charcoal, and one of bone-afhes, to a barrel of common tar, to which are added four pounds of black refin; the two laft materials are to be melted together, and, when boiling, the other ingredients are to be added in fmall quantities, keeping them conftantly ftirred and in motion over the fire, until the whole mafs becomes of a confiftence fit for ufe. Then the roof, being previoufly covered over with fheathing-paper fecurely nailed down, is to be carefully and evenly fpread with the liquid hot from the copper, to the thicknefs of about three quarters of an inch; which will coft, at the cauldron, about thirty-five fhillings for each fquare of ten feet. The fame meafure of the common flate roof will coft about thirty-two fhillings. The roofs for this fort of compofition are pitched very flat, and, from the lightnefs of the fcantling which is neceffary in their conftruction, come confiderably cheaper than thofe required for carrying flate or tiles.

Materials of the reed and heath kinds have alfo been tried as coverings for the roofs of farm-houfes and cottages, in places where they are capable of being procured in fufficient quantities for fuch purpofes; and, though they are confiderably more durable than common ftraw thatch, they are fubject to all the inconveniencies and objections of that fort of covering. Indeed, no kind of material that has hitherto been made ufe of for forming the coverings of the roofs of buildings are quite free from imperfections of fome fort or other. It is confequently a matter of great individual, as well as national importance, to be acquainted with a fubftance which is not liable to any fuch defects, as a good, cheap, and durable material of fuch a nature, for this ufe would evidently be a moft valuable difcovery, as fuch a material is ftill clearly wanting for this purpofe.

Roof, *Attic of a*. See Attic.

Roof, *Falfe*. See False.

Roof, *Hip*. See Hip *Roof*, and Roof, fupra.

Roof-*Trees*, or Ruff-*trees*, are the timbers, in a fhip, which go from the half-deck to the forecaftle. See Rough-*Tree*.

The term is alfo ufed for the upper timbers of any building; whence, in the northern counties, it is common to fignify a whole family, by faying all under fuch-a-one's roof-tree.

Roof-*Tyles*. See Tyle.

ROOFING, in *Rural Economy*, fometimes a word applied provincially to the ridge-cap of thatched roofs. It alfo fignifies any fort of material employed in forming the roof of a building, whether in the frame-work, or covering. In the bufinefs of roofing farm or other buildings, the chief circumftance neceffary to be attended to, is that of tying the two fide-parts well together, and in a fafe manner, by means of the wall-plates and binding-beams; efpecially thofe erections which are of the more long kind, without any crofs-walls to ftiffen and fupport them. It has been remarked, that it is generally for want of attention to thefe matters that farm-buildings, as well as thofe of other forts, are fo frequently feen propped up with fhores and buttreffes; or fallen to the ground half a century fooner, perhaps, than they would have done under a better and more judicious management. And it ought, indeed, to be a general principle, or line of conduct, which every careful and intelligent manager fhould follow in erecting fuch buildings;—a principle which is equally applicable to the other parts as well as the timber and the covering: which is, that of fparing no requifite expenditure; as a few fhillings, or pounds, of additional

tional coſt, in the firſt inſtance, may be the ſaving of ten times the ſum in the end.

In the work of repairing buildings of this nature, the roofing claims equally the regard of the manager, with thoſe of the foundations and other external parts. But the inſide works, in all caſes, more commonly and properly demand the notice of the occupiers.

ROOGEN, in *Geography*, a town of the duchy of Courland; 36 miles E.N.E. of Piltyn.

ROOK, in *Ornithology*, a well-known bird of the crow-kind. See CORVUS *Frugilegus*.

Great care ſhould be taken to guard againſt theſe miſchievous birds at the time when the wheat is juſt ſhooting up; for they perceive it ſhooting much ſooner than the farmer can, and are led by the ſhoot to pick it up. They muſt therefore be carefully kept off the ground until about a week or ten days after this ſeaſon; for at the end of that time the blade will be grown up, and the grain ſo exhauſted of its ſubſtance, that they will not give themſelves any trouble to pick it out of the ground. They ſeldom or ever moleſt the wheat, which is ſown about Michaelmas; becauſe ſo much grain of the late harveſt then lies ſcattered about the fields, that they find it much eaſier to pick up there, than to ſearch for corn under ground in new-ſown lands. They often do harm when the ſnow is going off from the green wheat towards the end of winter; for having been pinched for food during that ſeaſon, they then greedily pluck up the young plants, in order to come at the remainder of the ſeeds ſtill adhering to their roots; and are greatly aſſiſted in this by the looſe ſtate of the earth at that time.

And they are alſo highly deſtructive to pea and bean crops in the early ſpring ſeaſon, when they firſt appear above the ground, as they dig up the whole, both root and ſtem, even when conſiderably advanced in growth. They muſt, therefore, be kept off with great care. A great many contrivances have been invented to frighten them away, ſuch as feathers ſtuck up, the limbs of rooks ſcattered about the ground, dead rooks hung on ſticks, the gun, a boy to halloo, and toſs a dead rook up in the air. Mr. Tull found this laſt to be the moſt effectual. It is probable, however, that firing at them frequently with a gun is the moſt certain means of deterring them from doing ſuch injuries, as they have a great diſlike to the ſmell of gunpowder.

It is remarked by Mr. Marſhall, in his Rural Economy of Norfolk, that the method of frightening rooks in practice there, eſpecially when they take to patches of corn, which are lodged before harveſt, is ſimply to ſtick up a tall bough in the part infeſted; and if a gun be fired near the place, before the bough is ſet up, this ſimple expedient ſeldom fails of being effectual. And that if rooks make an attack after ſeed-time, or when they take generally to the crop before harveſt, a boy is ſet to ſcare them; they being ſeldom attempted to be ſhot at in Norfolk; where a notion prevails, and is perhaps well founded, that rooks are eſſentially uſeful to the farmer, in picking up worms and grubs; eſpecially the grub of the cock-chaffer, which, it is believed, is frequently injurious to the meadows and marſhes of that country. This opinion alſo prevails in other diſtricts, and has moſt probably ſome foundation in truth, as they are often ſeen to follow the plough cloſe to pick up ſuch grubs.

It has indeed been ſtated, and ſuppoſed by ſome, that theſe birds do as much good by the deſtruction of grubs, inſects, worms, and other ſimilar ſorts of animals, as they produce miſchief by their attacks and ravages on the crops of the farmer; an inſtance in favour of which is noticed to have occurred on the Yorkſhire ſide of the county of Lancaſter, where it is ſaid they wholly devoured, deſtroyed, and removed ſome ſort of inſects, which, like locuſts, had ſeized upon and taken poſſeſſion of the graſs-plants of a large track of graſs-land in that neighbourhood in the early ſpring ſeaſon, and nearly eat up and conſumed the whole of it, to the very great alarm of the farmers of the vicinity; but which, on the firſt flight of the young rooks, were ſoon obſerved to be completely eaten up and deſtroyed, as was evident from the freſh graſs quickly ſpringing up and the ſurface becoming green again.

Theſe birds are, however, in general conſidered as the greateſt peſts and plagues of the farmers in the above and ſome other northern diſtricts, as they not only deſtroy the ſeed-wheat when newly ſown, but drag out of the earth the ſpires of the grain or pulſe ſeeds with them altogether, in the manner already ſuggeſted.

They are alſo, in theſe diſtricts, equally deſtructive of the potatoe crops, both at the time of ſetting or putting them into the ground, and when they are coming up, as they eat and drag them out with great eagerneſs, thereby cauſing much irregularity and miſchief in them. That they may ſometimes, however, be uſeful in the above manner may readily be ſuppoſed; but they exiſt in ſuch vaſt numbers in theſe, and ſome other parts of the country, that the ravages and injuries which they commit, very greatly preponderate over any good they are capable of performing in the ways that have been already ſtated.

They are, on the whole, an impudent and miſchievous race of birds, with which, all the means the farmer can poſſibly take in the way of ſcaring them, are too often of very little avail. They frequently go to very great diſtances, ſo that the ravages they are productive of are of an extenſive nature, and not confined to particular places or tracts of country only. The only ſafety for the farmer, therefore, ſeems to conſiſt in the prevention of their breeding and rearing their young, and their deſtruction and eradication, as much as poſſible, in other ways. See ROOKERY.

ROOKE, LAWRENCE, in *Biography*, an able mathematician, was deſcended from a reſpectable family, and born at Deptford, in Kent, in the year 1623. He was educated in grammar-learning at Eton ſchool, whence he removed, in 1639, to King's college, in the univerſity of Cambridge, where he took his degrees. In 1650 he went to Oxford, where he had apartments in Wadham college, for the ſake of improving in the ſociety of Dr. Wilkins, and Mr. Seth Ward. He at length became a fellow-commoner of the college, and made it his principal place of reſidence for ſome years, during which he aſſiſted Mr. Boyle in his chemical experiments. In 1652, Mr. Rooke was elected profeſſor of aſtronomy at Greſham college, and in the ſame year he made ſome obſervations, at Oxford, on the comet which appeared in the month of December, and which obſervations were printed by Mr. Ward in 1653. In 1657, Mr. Rooke exchanged the aſtronomical profeſſorſhip at Greſham college for that of geometry. He was one of the gentlemen by whoſe exertions the Royal Society was firſt formed, though he did not live long enough to ſee it eſtabliſhed by the royal charter. Among the men of rank who cultivated his acquaintance was the marquis of Dorcheſter, who was not only a patron of learning, but very learned himſelf; and after the reſtoration, that nobleman frequently entertained Mr. Rooke as a viſitor at his ſeat at Highgate, whence he uſed to bring him in his carriage every Wedneſday to the Royal Society, which then met weekly at Greſham college. Mr. Rooke had always a tender conſtitution, and walking from

from Highgate to London on a hot summer's day, he took cold, which proved fatal to him. He died in June 1662, in the 40th year of his age. He was highly esteemed by his contemporaries, as will appear from the following testimonies. Dr. Pope, in his life of Ward, bishop of Salisbury, speaking of Mr. Rooke, says he was profoundly skilled in all sorts of learning: "I durst," says he, "venture my life upon the truth of any proposition which he asserted, either in mathematics, natural philosophy, or history, for I never knew him affirm any thing positively, that was dubious. And when I have asked his opinion of an hypothesis, his usual answer was, I have no opinion. He was very modest, and sparing of his words, unless among intimate friends, and never talked idly. I may truly say I never was acquainted with any person who knew more and spoke less." Mr. Hooke places him among those who were most eminent for their knowledge and improvement of astronomy. Dr. Sprat, in his History of the Royal Society, speaks of him as "a man of a profound judgment, a vast comprehension, prodigious memory, and solid experience. His skill in mathematics was reverenced by all the lovers of those studies, and his perfection in many sorts of learning deserves no less admiration."

The only pieces which were published from his papers consist of "Observationes in Cometam, qui mense Decembri Anno 1652 apparuit;" "Directions for Seamen going to the East and West Indies," which were drawn up at the appointment of the Royal Society, and inserted in their Transactions for 1665; "A Method for observing the Eclipses of the Moon;" "A Discourse concerning the Observations of the Eclipses of the Satellites of Jupiter;" and "An Account of an Experiment made with Oil in a long Tube." Ward's Life of the Gresham Professors.

Rooke, *Sir* George, a celebrated naval commander, the son of sir William Rooke, knight, of an ancient and honourable family in the county of Kent, was born in 1650. Though destined for another profession, a strong inclination for the sea-service induced him to enter into the navy. His first station was that of a volunteer, in which he distinguished himself by his undaunted courage and indefatigable application to business. He very soon obtained the post of lieutenant, from whence he rose to that of captain before he was thirty years of age, which was considered as a very extraordinary circumstance, at a time when no man, be his quality what it would, was advanced to that station before he had given ample testimonies of his being able to fill it with honour. These preferments he obtained during the reign of Charles II. and under his successor, James II., he was appointed to the command of the Deptford, a fourth rate man of war. His obligations to the Stuart family did not prevent his hearty concurrence in the revolution, and in 1689 he was appointed by admiral Herbert as commodore, with a squadron on the coast of Ireland. In this station he concurred with major-general Kirke in the famous relief of Londonderry. Soon after he was employed in escorting the duke of Schomberg's army, and landing them safe near Carrickfergus, facilitated the siege of that place, and, after it was taken, sailed with his squadron along the coast; where he first looked into the harbour of Dublin, manned all his boats, and insulted the place where king James was in person; and in the night of the 18th of September, he formed the design of burning all the vessels in the harbour, which he would certainly have executed, if the wind had not shifted and driven him out to sea. In 1690 he was, upon the recommendation of the earl of Torrington, appointed rear-admiral of the red, and in that rank he served in the fight off Beachy-Head, in which unfortunate affair it was admitted, on all hands, that he had done his duty. He was employed twice or thrice to convoy king William to Holland, and in 1692 he was promoted to the rank of vice-admiral of the blue, when he served in the famous battle of La Hogue. This was on the 22d of May, and he behaved with such distinguished courage as to obtain the most marked applause of admiral Russel, it being owing to his vigorous behaviour that the last stroke was given to that important day, which threw the French entirely into confusion, and forced them to run such hazards, in order to shelter themselves from their victorious enemies. The next day was, however, still more glorious, for vice-admiral Rooke had orders to go into La Hogue and burn the enemy's ships as they lay. There were thirteen large men of war, which had crowded up as far as possible, and the transports, tenders, and ships with ammunition, were disposed in such a manner that it was thought impossible to burn them. Moreover, the French camp was in sight, with all the troops intended to have been employed in an invasion of this country, and several batteries upon the coast well supplied with heavy artillery. Notwithstanding all these preparations, admiral Rooke performed the business entrusted to him with so much skill and judgment, that he destroyed twelve ships of the line, and one fifty-six gun frigate. This desperate enterprise he effected with the loss of ten men only. The behaviour of the vice-admiral at La Hogue appeared to the king so great, and so worthy of public notice, that, having no opportunity at that time of providing for him, he settled upon him a pension of 1000*l.* *per annum* for his life. In 1693 the honour of knighthood was conferred upon him, and he was, at the same time, made vice-admiral of the red.

The grand fleet of the English and Dutch proceeding to sea in the month of May, sir George Rooke was detached from it with a squadron of twenty-three ships of both nations, to convoy a large fleet of merchantmen up the Mediterranean. The French, in the mean time, had been indefatigable in repairing their losses, and with a very powerful fleet, of which the English ministry had obtained no proper intelligence, were lying in Lagos-bay, off Portugal, to intercept the combined fleet. On descrying the enemy, admiral Rooke ordered the smaller ships to make their escape into the nearest Spanish ports, and stood off under an easy sail for the protection of the rest. Two Dutch men of war, and a great number of merchant-ships, were captured: the conduct of the English admiral was, however, not only exempt from all blame, but he received the thanks of the merchants, and his promotion was not in the least impeded by this misfortune, which was owing to the mismanagement of the ministers. In 1696, having the chief command of the Channel fleet, he was ordered to prevent the Toulon fleet from getting into Brest, which, from the defective manning of his ships, he was unable to accomplish. On this account he underwent a long examination before the house of commons, but nothing appeared upon which a charge against him could be founded. He continued in command till the peace of Ryswick, in 1697. He was chosen member of parliament for Portsmouth, and in this capacity he performed the duties of his station with activity and energy; however, as he mostly voted with the Tories, great pains were taken by the opposite party to ruin him in the king's opinion; but, to the honour of king William, when pressed to remove sir George Rooke from his seat at the admiralty, he answered resolutely, "I will not." "Sir George (continued his majesty) served me faithfully at sea, and I never will displace him for acting as he thinks most for the service of his country in the house of commons:" an answer truly worthy of a British prince, as it tends to preserve the freedom of the constitution, and the liberty

liberty of parliament. In 1700 he was ſent with an Engliſh ſquadron, in conjunction with a Dutch one, into the Baltic, to preſerve the balance of power in the North, where a confederacy had been formed againſt Charles XII., the young king of Sweden. Rooke bombarded Copenhagen, and a peace being effected in the courſe of the year, he returned. In the following year he acted as commander of the Channel fleet; and being a ſecond time choſen repreſentative for Portſmouth, he continued to act with the oppoſition. This line of conduct was conſidered as highly meritorious with the miniſtry of queen Anne, who ſucceeded to the crown in 1702; and when war with France was declared, he was appointed as vice-admiral of England, to an united Engliſh and Dutch fleet, in an expedition againſt Cadiz, the duke of Ormond being commander of the land forces. The plan failed, probably for want of a proper degree of cordiality between the ſea and land-ſervice. Soon after, ſir George obtaining intelligence that twenty-two Spaniſh galleons, guarded by a ſquadron of French men of war, were arrived in the harbour of Vigo, ſailed thither; and ſending a detachment of his fleet, with fire-ſhips, into the harbour, deſtroyed all the enemy's men of war, and a number of galleons, and took the reſt. A vaſt booty was brought home, and a new coinage of ſilver, with the ſtamp Vigo, was iſſued as a national memorial of this brilliant ſucceſs. On his return home, ſir George Rooke was appointed to a ſeat in the privy council, and an inquiry having been moved in the houſe of lords into his conduct at Cadiz, it was voted that he had honourably diſcharged his duty.

In 1704 he was appointed to the command of the fleet deſtined to convey to Liſbon Charles, at that time competitor for the crown of Spain. Having performed that ſervice he proceeded to the Mediterranean, where he cruiſed for ſome time. On his return through the Straits, he was joined by ſir Cloudeſley Shovel with a large reinforcement, and ſeveral ſchemes of further ſervice being propoſed, he determined to make a ſudden attempt on Gibraltar. This he carried into execution in July, and the prince of Heſſe, with the land forces, being diſembarked on the neck, the ſhips proceeded to cannonade the fortifications at the mole. The enemy were driven from their guns, and a party of ſeamen landing, took poſſeſſion of the batteries. The governor, intimidated by this bold and unexpected action, capitulated; and that important fortreſs has ever ſince remained in the hands of the Engliſh. Sir George Rooke then proceeded to Malaga, where he encountered the French fleet under the count de Toulouſe. The numbers on each ſide were nearly equal in ſhips of the line, but the French were ſuperior in men and guns. The engagement, which enſued Auguſt 13th, was undecided, neither party loſing a ſhip, and each returned to their own ports.

Factions now ran high in the nation; and ſir George Rooke, perceiving that as he roſe in credit with his country, he loſt his intereſt with perſons in power, reſolved to retire from public buſineſs, and prevent the affairs of the nation from receiving any injury on his account. Thus, almoſt immediately after he had taken the important fortreſs of Gibraltar, and beaten the whole naval force of France in the battle of Malaga, he was conſtrained to quit his command: and as the Tories had before driven the earl of Orford from his poſt immediately after the battle of La Hogue, ſo the Whigs returned them the compliment, by making uſe of their aſcendancy to the like purpoſe with regard to ſir George Rooke. After this return for the important ſervices he had done his country, ſir George Rooke paſſed the remainder of his days as a private gentleman, and, for the moſt part, at his ſeat in Kent. "His zeal for the church," ſays the diſcerning Campbell, "and his ſtrict adherence to the Tories, made him the darling of one ſet of people, and expoſed him no leſs to the averſion of another, which is the reaſon that an hiſtorian finds it difficult to obtain his true character from the writings of thoſe who flouriſhed in the ſame period of time. For my part, I have ſtudied his actions, and his behaviour, and from thence have collected, that he was certainly an officer of great merit; if either conduct or courage could entitle him to that character."

In party matters he was perhaps too warm and eager; but in action he was perfectly cool and temperate, gave his orders with the utmoſt ſerenity; and as he was careful in marking the conduct of his principal officers, ſo his candour and juſtice were always conſpicuous in the accounts he gave of them to his ſuperiors; he there knew no party, no private conſiderations, but commended merit wherever it appeared.

In private life he was a good huſband and a kind maſter, lived hoſpitably towards his neighbours and left behind him a moderate fortune: ſo moderate, that when he came to make his will, it ſurpriſed thoſe that were preſent; but ſir George exclaimed, "I do not leave much, but what I have was honeſtly gotten; it never coſt a ſailor a tear, or the nation a farthing." He died in January 1708, in the 58th year of his age, and was interred in the cathedral of Canterbury. He had been thrice married, and left one ſon only. Sir George Rooke has merited very highly the reputation of a brave and able ſeaman, who maintained the honour of the Britiſh flag, at a period when its ſuperiority was much leſs decided than it has been during the preſent reign. Stockdale's edition of Campbell's Lives of the Admirals, vol. iv.

ROOKERY, in *Rural Economy*, a term applied to a nurſery of rooks, or place where they build their neſts, and collect in large numbers.

There are every where in many of the northern and other counties of the kingdom, numbers of ſuch deteſtable nurſeries of theſe miſchievous and rapacious vermin, where they are ſuffered to breed and multiply in countleſs multitudes, to the great deſtruction of the hopes of the farmer and the nation at large. If it be neceſſary that ſuch repoſitories of miſchief to the produce of the huſbandman ſhould be preſerved and kept up, for the vernal ſport and amuſement of their proprietors, certainly ſome other more certain and effectual means than thoſe of the croſs-bow kind ſhould be had recourſe to for the deſtruction of their young, in order that they may be kept ſufficiently reduced and thinned in their numbers, to obviate, in as great a meaſure as poſſible, their baneful depredations and effects on the ſeeds and produce of the farmer.

The rooks fly from theſe deſpicable abodes, which are the head-quarters or dwellings where they collect and repoſe themſelves, as well as breed, to very conſiderable diſtances, in order to execute and effect their different miſchievous and rapacious attacks on the newly ſown or riſing crops of the huſbandman, as they but ſeldom commit ſo much depredation on the fields which are near home.

They collect together during the ſeverity of the winter ſeaſon, eſpecially in the more northern diſtricts, from the different neighbouring ſmall rookeries to be protected in large ones, and the woods which may happen to be near them; and thus render themſelves ſecure at this inclement period, ſeparating in the early ſpring to form their neſts and breed in their particular rookeries.

In Lancaſhire, the whole track of the Fildes, as well as ſome others, is beſet with theſe deſtructive and impudent birds,

birds, from the vaſt rookeries and woods of Rawcliff-Hall and other halls in the ſame neighbourhood, without the owners of them ever ſuſpecting that they harbour and ſupport a breed of deſtructive vermin, which greatly injure and leſſen the agricultural produce of the county. The ſame is alſo the caſe in a variety of other diſtricts of the kingdom. Therefore ſome ſteps ſhould be taken, either by ſeverely taxing them, or ſome other means, in order that the miſchievous conſequences of ſuch nurſeries may be leſſened, or wholly prevented, by their affording the convenience of breeding and rearing of ſo many of theſe birds.

ROOKPOUR, in *Geography*, a town of Bengal; ſix miles N. of Kiſhenagur. N. lat. 24° 28′. E. long. 86° 46′.

ROOM, in *Building*. See BUILDING.

ROOM, *Cook*. See COOK-*Room*.

ROOM, *Fruit*, in *Gardening*, a place conſtructed for the purpoſe of ſtoring and laying up different articles of the fruit kind. Rooms of this nature are contrived in many different ways, but the beſt are perhaps thoſe made with drawers and ſhelves for containing and preſerving this ſort of produce in all the different kinds and ſtates of it. An ingenious plan and contrivance of this deſcription has lately been ſuggeſted and delineated in the ſecond volume of the Tranſactions of the Horticultural Society, by Mr. Maher, who has found it, in ſeveral years' experience, extremely uſeful in keeping fruit, eſpecially of the apple and pear kinds.

It is repreſented as conſiſting of a long ſquare form, the inſide of which is fitted up, from the top to near the bottom, with drawers in different diviſions, according to the ſize of the room. The number of each of the drawers is marked upon it, and a ſpace left oppoſite to each ſuch number, for inſerting the name of the particular kind of fruit it may contain.

The lower rows of drawers have cloſe bottoms, and are termed ſweating drawers, as the fruit is put into them immediately after it is gathered, in order to undergo that operation. Then, in the courſe of ten or fifteen days, accordingly as the apples and pears may be found to have come forward, they are ſorted, and the other drawers prepared for receiving them, by covering the bottoms of them with very clean wheat ſtraw, which has been thoroughly ventilated and rendered quite dry in the open air. The bottoms of the drawers for this purpoſe are to be formed in open trellis work.

It is recommended, as ſaving much time and trouble in running up and down ſtairs, to have theſe rooms built upon the ground ſurface; and that the door and window of each ſhould have ſlides, in order to admit a free circulation of air, when the weather is fine; but in damp days, or when it rains, the rooms ſhould conſtantly be kept ſhut up in a cloſe manner.

It is alſo adviſed, that a ſlate and pencil ſhould hang in the rooms, the former of which ſhould be divided into ſeven different columns, in which may be put down what fruit is delivered out each day in the week, for the ſatisfaction of families and ſervants.

Where theſe kinds of rooms are conſtructed with ſhelves, they ſhould be formed of ſuch ſorts of wood as communicate no bad ſmells or taſtes, and have thin ſlips of boards faſtened on their fore parts to prevent the fruits from falling off from them. Some adviſe their being covered all over with a very coarſe canvas, in order to prevent any ſort of injury in the above way. The fruit is then to be laid ſingly in rows all over the ſurfaces of the ſhelves after being well dried, but never heaped over each other. Some cover it by means of the ſame ſort of canvas or by paper, taking care to turn it, and remove all that is damaged, two or three times during the winter ſeaſon.

When the fruit is firſt laid upon the ſhelves, the earlieſt ſhould be put upon the loweſt ſhelves, and ſo on to the higheſt in their proper order. As this requires much time in many inſtances, it ſhould always be done at every leiſure period.

Many, however, think it the beſt way of keeping fruit, to firſt put it in glazed earthen pans, well packed and cloſed with covers, which are then to be placed on the ſhelves in theſe drying rooms.

Theſe ſorts of rooms ſhould conſtantly be placed in the moſt convenient ſituations, and contiguous to the rooms deſigned for other ſorts of garden produce.

ROOMS, *Flight of*. See FUGUE.

Rooms in houſes might be warmed by the ſteam of boiling water conveyed in pipes along their walls. See Phil. Tranſ. N° 476. p. 370. ſeq.

This contrivance is a copper with a ſtill-head, and a lead or copper pipe fixed to this head, which conveys the hot ſteam of the boiling-water through the different rooms intended to be warmed.

ROOMS, in *Ship-Building*, the different vacancies between the timbers, and likewiſe thoſe between the beams, as the maſt-rooms, capſtan-rooms, hatch-rooms, &c. Alſo the different apartments or places of reſerve, of which there are a number in a ſhip, as the bread-room, an apartment in the hold abaft for containing the bread for the ſhip's uſe. The ſpirit-room is adjoining the after-hold, to contain the ſpirituous liquors for the ſhip's uſe. The captain's and lieutenant's ſtore-rooms are two apartments built next each other on the ſtarboard ſide of the after platform abaft, for thoſe officers to ſtow their wine, &c. in. On the oppoſite ſide to the above is the ſteward's room, whence moſt of the proviſions are iſſued, and which is the place appointed for the purſer's ſteward to tranſact his buſineſs in. Sail-rooms are built between decks, upon the orlop or lower deck, to contain the ſpare ſails. Beſides theſe, there are ſeveral other ſtore-rooms, in which the carpenter's, boatſwain's, and gunner's ſtores are kept. Filling-room is a place parted off in the magazine; it is lined with ſheet-lead, and therein the powder is ſtarted, in order to fill the cartridges.

ROOM *and Space*, the diſtance from the moulding edge of one timber to the moulding edge of the next timber, which is always equal to the ſiding of two timbers, and the room or opening between.

ROOMS, in a military ſenſe, are thoſe parts of a building or barrack, which, by ſpecific inſtructions, the different barrack-maſters muſt provide, and furniſh for the accommodation of the king's troops in Great Britain or elſewhere. The ſchedule, as publiſhed by authority, deſcribes the number of rooms allowed in barracks for the commiſſioned, warrant, and non-commiſſioned officers, and private men, to be as follows:

Cavalry Rooms.—Field-officers, each two rooms; captains, each one ditto; ſubalterns, ſtaff, and quarter-maſters, each one ditto; the ſerjeants of each troop of dragoons, and the corporals of each troop of horſe, one ditto; eight rank and file, one ditto; officer's meſs, two ditto.

Infantry Rooms.—Field-officers, each two ditto; captains, each one ditto; two ſubalterns, one ditto; ſtaff, each one ditto; twelve non-commiſſioned officers, and private men, one ditto; officer's meſs, two ditto; ſerjeant-major, and quarter-maſter ſerjeant, one ditto. When there are a ſufficient number of rooms in a barrack, one may be allowed to each ſubaltern of infantry.

ROONAY,

ROONAY, in *Geography*, a town of Bengal; 33 miles S.E. of Ghidore.

ROOP, a term applied to fignify a hoarfenefs, fuch as happens among animals of the cattle kind.

ROOPAPOUR, in *Geography*, a town of Hindooftan, in Oude; 31 miles E.N.E. of Manickpour.

ROOPAT, a town on the E. coaft of Sumatra. N. lat. 1° 3′. E. long. 101° 12′.

ROOPGUNGE, a town of Bengal; 34 miles N.N.W. of Dinagepour.

ROOPGUR, a town of Hindooftan, in Guzerat; five miles S. of Surat.

ROOPNAGUR, a town of Hindooftan, in the country of Agimere; 30 miles E. of Agimere. N. lat. 26° 39′. E. long. 75° 52′.

ROOPOUR, a town of Hindooftan, in the circar of Sirhind; 58 miles N. of Sirhind.

ROOS, Philip, better known by the name of *Rofa da Tivoli*, in *Biography*, was the fecond fon of a painter, whofe name was John Hendrick Roos; and he was born at Frankfort in 1655. His early inclination to the art practifed by his father, and the proficiency he exhibited, gained him the favour of the landgrave of Heffe, at whofe court the father and an uncle of Philip, called Theodore Roos, refided; and for whom they painted, conjointly, compofitions of animals, landfcapes, and figures.

This prince became the patron of Philip alfo, and prefented him with a fum of money to profecute his ftudies at Rome, from whence he never returned to repay the obligation. He married a beautiful woman, daughter of an hiftorical painter, Giacinto Brandi, but was diffipated and extravagant.

He took up his refidence at Tivoli, from whence comes his cognomen of Rofa da Tivoli, and there he imitated and combined the forms he met with. His pictures are generally made up of a group of fheep, goats, or cattle, a herdfman or woman, and a piece of building, illumined with ftrong contrafts of light and fhade, and touched with uncommon fpirit and freedom. That latter quality is their bane, for relying upon its effect upon the obfervers, and working generally from neceffity, or the fpur of the moment, he was tempted to reft fatisfied with incorrectnefs and commonplace. His fhadows are generally too dark and too brown, effected by leaving the dark ground upon which he worked; but the arrangements of his lights are ingenious and capitally executed, and the colour is frequently rich and full. He died in 1705, at the age of 50.

ROOSAND, in *Geography*, a town of Norway; 48 miles N.N.E. of Romfdal.

ROOSEBURG, a fmall ifland in the Meufe; 3 miles N.E. from the Brill.

ROOT, (Radix,) in *Botany* and *Vegetable Phyfiology*, an important part of the vegetable body, being the bafis of the whole, and what is firft produced from the feed, when evolved by the procefs of germination. Its ufes are, to fix the plant to a commodious fituation, and to derive nourifhment for its fupport. This organ is therefore perhaps indifpenfably neceffary, at the firft period of the growth of vegetables; and it ufually continues to be fo, at leaft amongft what are termed the more perfect kinds; the *Cufcuta*, or Dodder, being almoft a folitary inftance, of a phænogamous plant, parting with its root at an early age, and trufting for its future fuftenance to the vegetable bodies on which it parafitically fixes. In fome cryptogamous tribes the roots, though lefs difcernible to us, are not the lefs effective for the performance of one or other of thefe functions. Thus, the cruftaceous Lichens have not only a confiderable inequality of furface underneath, infinuating itfelf into every minute irregularity of the ftone or bark over which they fpread, but feveral of them have very diftinguifhable, fibrous, branched roots; witnefs *Lichen faxifragus*, Sm. Tranf. of Linn. Soc. v. 1. 82. t. 4. f. 4, and *L. tartareus*. The Submerfed *Algæ*, or Sea-weeds, feem, at firft fight, to be merely fixed by their fmall difk-like roots; though many of them have branched and entangled radicles, infinuating themfelves among pebbles at the bottom of the fea, which laft may well be organs of nourifhment, as well as of fupport. But even fuch as are fixed by a mere difk, are found, if cut down to that part, to fprout up again with all the rapidity and vigour of a full-grown fhrub, treated in the fame manner. Hence it appears that the difk in queftion muft act as an organ for imbibing nutriment. That procefs indeed feems not to be accomplifhed, as ufual, by the bafe, or under part, efpecially confidering the nature and fize of the bodies to which this kind of root is commonly attached. But fomething analogous may be obferved in feveral parafitical plants of the *Orchis* family, (fee Orchideæ,) whofe thick fibrous roots lie naked upon the bark or branches of trees; and if they do imbibe a part of their fuftenance from the latter, fhould feem alfo to be indebted confiderably to the atmofphere, (to which a much larger portion of their furface is conftantly expofed,) as feaweeds are to the circumambient water. With the roots of parafitical ferns, indeed, as well as the fupplementary radicles, thrown out from the climbing ftem of the *Cufcuta*, the cafe may be different, as both are infinuated into the bark of the plants on which they grow. Floating fea-weeds, and abundance of frefh-water plants nearly related to them, agree with the *Cufcuta* fo far, that after vegetating on fome fixed fpot, to which the parent feed attaches itfelf, they foon feparate therefrom, and can derive nothing fubfequently from thence. But being entirely difengaged, they can obtain matter of growth and nourifhment, in future, from no other fource, than the water in which they float. Who fhall fay whether fuch nutriment is abforbed by their whole furface; or whether the various and multiplied, fibrous or tubercular, appendages of their curious, and often complex, ftructure, may not, many of them, be analogous to the fibrous radicles, thrown out by the ftems of the Dodder?

The moft ufual economy of the roots of plants is to be immerfed in the earth, they having always a tendency to grow downwards, as ftems in general have to afcend. Dr. Darwin's fimple and luminous explanation of this phenomenon is quite fufficient, and precludes all others. He conceives that each part elongates itfelf in the direction in which it is moft ftimulated; the infant ftem being moft acted upon by air, the radicle by moifture.

A root commonly confifts of two parts; the *caudex*, or body, and *radicula*, the fibre. The latter, generally greatly multiplied, branched, and extended, is the effential organ of nourifhment.

The duration of roots is either annual, biennial, or perennial. Annual Roots, confifting chiefly of numerous fibres, belong to plants whofe exiftence is limited to one fummer, as Barley, and a vaft tribe of field or garden flowers, many of which muft occur to every one's recollection. Biennial Roots produce, the firft feafon of their growth, only herbage, and, living through the enfuing winter, bear flowers and fruit, or feed, in the following fummer, after which they perifh; for they never bloffom or fructify but once, any more than annual herbs. Their exiftence indeed may be prolonged by accidents which hinder their flowering, year after year, in fome cafes; but after perfecting feed, or

even

even bloſſoms, they die. Wheat, as cultivated with us, may be termed biennial; but is more properly an annual, which is ſown and ſprings up the ſeaſon before it flowers, as many annual weeds often do; while the ſeeds of others, perhaps of the ſame ſpecies, remain latent in the earth, awaiting the approach of ſpring. More genuine biennials are ſome ſpecies of *Verbaſcum*, the *Digitalis purpurea* or Fox-glove, &c. Perennial Roots belong to plants which live and bloſſom through many ſucceſſive ſeaſons, to an indefinite period, as is the caſe, not only with all trees and ſhrubs, but with many herbaceous plants, whoſe entire ſtems and foliage are frequently annual. Such are the bulbous roots of Tulips, Hyacinths, Anemonies, &c. and the large fleſhy ones of Rhubarb, and the *Gentiana lutea*, with many others, whoſe herbage dies every year entirely down to the ground; while other perennial roots, principally of a fibrous nature, are never deprived of herbage, as the *Gentiana acaulis*, *Lamium album*, and moſt perennial graſſes. Several plants of hot climates, naturally perennial, and even ſhrubby, become annuals in our gardens, as the Common Naſturtium, *Tropæolum*, which is capable of being increaſed by cuttings, nearly as well as by ſeeds, and thus its double-flowered variety is preſerved. The ſame thing may be ſaid of the *Hemimeris urticifolia*. The Tree Mallow, *Lavatera arborea*, wild in Pembrokeſhire, and occaſionally ſeen in gardens, exemplifies, in a remarkable manner, the durability of the vital principle in ſeeds, as well as in biennial plants hindered from flowering. Nearly twenty years ago the ſeeds of this large and handſome ſhrubby plant were ſown in a garden under our obſervation. From that period many of the young plants have, every year, ſprung up, but the winter uſually deſtroys them. A few have, now and then, ſurvived a mild winter, and attaining a large ſize, have borne flowers, dying entirely at the end of autumn, nor do we believe that any of them has ripened ſeeds, ſo as to repleniſh the ſtock in the earth. At leaſt this has not been the caſe for eight or nine years paſt. We have never taken the pains to ſhelter a young plant of this ſpecies in a ſtove, or green-houſe, through one or more winters; but Linnæus, with whom it was a favoured exotic, aſſerts that it will ſometimes wait, for ſeveral years, for a proſperous flowering ſeaſon, even in the open ground, though periſhing afterwards, with the firſt cold, in ſpite of all the protection it can receive.

The *Caudex*, or Body of the root, in the Turnip, aſſumes the appearance of a ſtem, by riſing conſiderably above the ſurface of the ground. Such is partly the caſe with onions, and many exotic bulbous plants. Linnæus ſpeaks of the ſtem of a tree as a *caudex*, or root above ground. Perhaps the *caudex* may be as properly termed a ſubterraneous ſtem. This analogy neverthleſs is ſcarcely correct, the line of demarcation being much more ſtrictly drawn between an annual ſtem, and its perennial root, than between the branches of any tree and its trunk.

The fibres of the root, at leaſt their growing extremities that imbibe nouriſhment from the earth, into which they are gradually and continually inſinuating themſelves, are, in every common caſe, ſtrictly annual. The powers of roots lie dormant through our winters, or in bulbous plants, inhabitants of arid burning ſands, through the ſummer of ſuch climates. After they have begun to form freſh radicles, they cannot without deſtruction, or great danger, be tranſplanted; nor can even herbs with fibrous roots be ſafely removed, while their fibres are in a progreſſive ſtate, very young annuals alone excepted.

Botaniſts, as well as gardeners and agriculturiſts, diſtinguiſh ſeveral kinds of roots, whoſe nature requires attention from thoſe who wiſh to be maſters of their economy or cultivation. The following are the principal heads under which they may be comprehended.

1. *Radix fibroſa*, a Fibrous Root, the moſt ſimple of all, conſiſts entirely of fibres, undivided or branched, neceſſarily connected indeed by a common head, or by the baſe of the ſtem. Theſe fibres convey nouriſhment directly to the ſtem or leaves. Such conſtitute, in general, the roots of graſſes, and of moſt annual herbs; which latter requiring no reſerved ſtore of proviſion for another ſeaſon, have no need of a *caudex* in which it might remain through the winter. While ſuch roots exiſt, they keep growing, ſucceſſively forming new fibres, as well as elongating their older ones. Their fibres are occaſionally remarkably ſhaggy, or downy; whether to increaſe the ſurface for more ample abſorption, or to fix the plant more firmly in the ground, we cannot always directly determine. Botanical experience has taught us, that very downy or woolly fibres are eſpecially appropriated to graſſes that inhabit looſe blowing ſand.

2. *Radix repens*, a Creeping Root, is rather perhaps a ſubterraneous ſtem, branching off horizontally, extending itſelf at the extremity, and decaying at its origin, throwing out fibres as it goes, which are the efficient or actual roots. Such a root is extremely tenacious of life, as any portion of it will grow. Weeds which have this ſort of root, as Couch-graſs and Mint, are the moſt difficult of all things to eradicate, except perhaps the deeply deſcending roots, partly fleſhy, of *Convolvulus arvenſis*, and *Carduus*, or rather *Cnicus, arvenſis*, whoſe more vertical poſition enables them to run ſo far into the ground as to be hardly acceſſible. The widely creeping roots, well guarded with hard and durable ſheaths, and ſupported by long woolly fibres, which belong to many ſea-ſide, or ſand, graſſes, render ſuch plants of great importance in the economy of nature. They bind down the looſe ſand, and form barriers againſt the encroachments of the ocean itſelf. The whole country of Holland is perhaps indebted for its very exiſtence to ſuch natural mounds, judiciouſly foſtered and imitated by art. The three principal graſſes that ſerve ſo valuable a purpoſe are *Carex arenaria*, *Arundo arenaria*, and *Elymus arenarius*, all plentiful on our ſandy ſhores.

3. *Radix fuſiformis*, a Spindle-ſhaped, or Tap Root, like the Carrot, Parſnep, Radiſh, and many common plants, of biennial, perennial, or more rarely annual duration. Its form is beſt calculated for penetrating deeply into the ground, or rather is owing to the reſiſtance encountered by the young deſcending radicle. The *caudex*, of a fleſhy juicy ſubſtance, abounding with peculiar ſecretions, and pregnant with the materials of the future herb, throws out numerous fibres, which are the real roots.

4. *Radix præmorſa*, an Abrupt Root, is nothing more than an oblong or ſpindle-ſhaped, vertical or horizontal, fleſhy root, whoſe progreſs has been impeded, either by want of vigour, or by ſome mechanical interruption, ſo that it ſeems to have been cut or broken off. The name alludes to an ancient opinion of its having been bitten off, by no leſs a perſonage than "the divel," out of ſpite to mankind. Hence ſeveral plants, with ſuch a root, were relied on for their ſuppoſed medical virtues, which nothing but hereſy and ſchiſm could doubt.

5. *Radix tuberoſa*, a Tuberous or Knobbed Root, is of various kinds. This ſort of root belongs to perennial plants, its knobs, whether of themſelves annual, biennial, or perennial, being reſervoirs of nouriſhment, and of vital energy, in which the reſources of the herb are huſbanded through the winter. Such are the Potatoe, and Jeruſalem Artichoke. Many of the Vetch or Pea tribe

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have likewise small annual tubercles to their roots, by which these plants are enabled better to support the casual privations of a barren, dry soil. The knobs of Pæonies and *Spiræa Filipendula* are perennial, and analogous to bulbs. In the Orchis family they are biennial, whether simply oval, hand-shaped, or fasciculated; for in each case the plant of the season lives on that portion of its root which was formed during the preceding year, and meanwhile makes a new pair of knobs, or bulbs, to blossom in the following summer, or at least to produce herbage, whether circumstances may admit of flowers or not. There is reason to believe that certain species of this family, as the Linnæan *Ophrys spiralis*, often produce a mere tuft of leaves, without flowering at all, for many successive years, in spots which, in favourable seasons, are profusely decorated and perfumed with that charming little flower.

6. *Radix bulbosa*, a Bulbous Root, is often solid, as in the common *Crocus*, and its near relations *Ixia*, *Gladiolus*, the splendid *Tigridia*, &c. In the Onion tribe, the bulbous root consists of concentric layers, enveloping one another, as also in the more solid root of the Tulip. The Lily has a scaly bulb, exactly analogous to the last; but as the leaves of this plant are narrow, and in some measure whorled, not sheathing, like those of the Onion and Tulip, the layers of its roots, having the closest affinity to leaves, assume a similar arrangement. The strict analogy of such coated or scaly bulbs with leaf-buds, indeed one might almost say their identity, appears from the scaly axillary buds of the Orange Lily, and other species, formed on the upper part of the stem, which, falling to the ground, become actual bulbous roots, without any transformation. Similar buds in *Dentaria* become, by a slight alteration, the tuberous scaly root proper to that genus. The constitution of bulbous roots is admirably suited for plants inhabiting hot sandy countries, subject to long drought. After flowering, their withered herbage serves like wings to disperse them far and wide, till the first rains cause them to fix their sprouting radicles in the moistened soil, where they speedily put out fresh leaves and blossoms, during the favourable season; after which their life and energy are locked up again in the bulb, or perhaps multiplied in seeds, for the succeeding year. The seeds of the *Ixia* and *Gladiolus* families are no less admirably adapted to the circumstances of their sandy and windy country; such as are winged being readily wafted, and the large polished round kinds, as extensively rolled, over the open desarts which they are appointed to adorn.

7. *Radix articulata*, or *granulata*, a Jointed or Granulated Root, does not essentially differ from a scaly bulb. The Wood Sorrel, *Oxalis Acetosella*, for instance, has, as it were, a scaly bulb, pulled out into an oblong form, and connected by a thread; while the *Saxifraga granulata* has a series of subterraneous buds, like solid bulbs. *S. cernua* and *bulbifera* have axillary buds, formed on their stems, like *Dentaria*, which become granulated roots.

The object of Nature is nearly the same throughout all these seemingly different productions; to establish a reservoir, in which the vital force of the plant, as well as its material resources, are stored up; till the former is strengthened, in consequence of suspended action, and the latter are matured by rest. Such assistance is occasionally afforded to plants whose roots have naturally hardly any thing of a fleshy substance, whenever they are exposed to danger from vicissitude, or from interrupted supplies. Thus grasses with fibrous roots, accidentally stationed in a soil too dry or fluctuating, have a power of becoming bulbous. For the same reason, bulbous roots, when desired to be had in great size or perfection, should first be supplied with plentiful nourishment, and then be checked in the too luxuriant growth of their herbage. By some treatment of this kind, exotic bulbs, which seldom afford flowers in our gardens or stoves, because of the uniformity of their languid existence, may perhaps be made to blossom more frequently than they do. Sudden and abundant supplies of heat, food, or moisture, and as sudden checks of one or the other, at the discretion of the cultivator, are likely to have this effect. In general, an interruption of the luxuriance of a root, favours its production of flowers and of seeds. The latter are seldom perfected in the more luxuriant sorts of Mint, except by greatly restraining the growth of the roots, in a garden-pot, dry border, or otherwise. The bulbous lilies will often form seeds, if their buds are stripped off, but seldom in their ordinary state of culture.

A just attention to the nature and constitution of each different kind of root, will teach us to understand its best mode of cultivation, transplantation, &c. and will account for those general practices, founded on experience, which are too well known to require illustration here, and properly come under the notice of the agriculturist and gardener.

Root, in *Husbandry*, the lower part of a plant, or that which is in the ground, and by which it adheres to the earth, draws its nourishment, and transmits it to the other parts. For the method of clearing lands from the roots of trees, under-wood, &c. see Reclaiming *Lands*.

It may be noticed, that the roots of plants are of use to them principally in two respects, namely, to give them stability in the ground, that they may not be displaced, or blown down by high winds, or other accidents; and by their spreading in the ground, for collecting, and perhaps in some measure preparing, food for the whole plant. Plants are, however, in part fed or nourished from the air, fine vapours, dews, &c.; which enter by their leaves and branches, but principally by what is absorbed and taken up by their roots: for which reason the farmer takes infinite pains to prepare the land by tillage and manure, whereby it is opened, pulverized, and not only made more easily penetrable for the roots to spread in, and collect their nourishment, but rendered more proper for being impregnated with such matters, as well as for retaining and conveying them to their fibrous roots in order to be drank up.

Roots, in the intention of the farmer, may also be divided into two sorts, namely, perpendicular or tap-roots, which penetrate deep, and run down into the ground, usually singly, such as carrots, parsneps, and the roots of some trees, as the oak, &c. And those that divide near the surface of the ground, and spread out in it in various directions, which are called horizontal and fibrous roots, and if very small, capillary roots. The tap-roots have also fibrous roots issuing from their sides, all round the tap-root; and these lateral roots are longest near the surface of the ground, and gradually shorter as the tap-roots descend deeper into the soil.

And further, the surfaces of roots are soft and spongy, more particularly in the small or fibrous roots, and these are furnished with absorbent vessels, the mouths of which drink up the vegetable food, and distribute it to all parts of the plant. As the large roots are more close and hard on their surfaces, it would appear that they are chiefly intended for the support and stability of the plant, while the fibrous roots collect the nourishment for the support of the plant as well as the large roots. The branches of roots are formed with their extreme ends pointing from the stem of the plant, and hence it appears that roots, when once well formed, do not afterwards increase, or extend further longitudinally; they lengthen at their ends, but not at their intermediate

termediate parts, for if they did, the branches, being left behind, would be drawn back, with their ends pointing towards the ſtem; but they are conſtantly found in a contrary poſition, with their ends pointing in a direction from the ſtem. If a root is cut it extends no farther in length, as already obſerved, but new roots are formed near the cut end of the old root; two or more new or young roots being formed in the room of the former old one. Hence the fibrous roots of plants are multiplied by cutting them with a ſpade or hoe; and this is often a great benefit to the plant. The pores of the fibrous roots are the mouths of the abſorbent veſſels, by which the whole plant is fed, and the more they are multiplied the more nouriſhment they collect for it.

And thus a plant that naturally extends its roots to a conſiderable diſtance, is in danger of being killed by tranſplanting, unleſs it is alſo furniſhed with fibrous roots, which muſt be carried with it to the new ground; or new ones muſt be formed to make the plant thrive. Hence it is that plants which have long ſtraggling roots are removed with difficulty; but plants of the ſame kind and age, and that grow in the ſame ground, are tranſplanted with ſafety and ſucceſs, if they have been previouſly dug round with a ſpade, whereby their fibrous roots have been cut and multiplied, ſo that they riſe with a ball of earth adhering to them.

Beſides, there is a communication between the different roots of a plant, as when ſome of them are well nouriſhed the others are benefited thereby. If ſome of the roots of a plant be laid in dry earth or ſand, and others in water, the latter will furniſh the dry roots with water ſufficient to keep them and the earth about them moiſt, ſo long as they have a ſupply of water; it is for this reaſon that deep rooting plants are little affected by drought; the tap-roots finding moiſture below, ſend ſome of it up to the roots near the ſurface; for which reaſon, alſo, lucern and ſaintfoin flouriſh in dry hot weather, in which common graſs, and other fibrous-rooted plants, that do not deſcend deep, are ſcorched and burnt up. And as roots communicate moiſture to each other, they therewith alſo communicate nouriſhment; for it is found by experience, that drilled plants, well hoed on each ſide of a row only, are better nouriſhed than ſown plants ſtanding at equal diſtances, or upon an equal ſurface of ground with the drilled, and not hoed. Beſides theſe ſorts of roots, ſome kinds of grain, as that of wheat, have them double, or what may be termed two ſets; the firſt coming directly from the grain or ſeed, while the latter ſhoots ſome time afterwards from the top or crown. Hence they are denominated *ſeminal* and *coronal* roots. The ſeminal root is, Dr. Hunter ſays, puſhed out at the ſame time with the germ, which, together with the farina, nouriſhes the plant during the winter, before the crown and coronal roots are formed. But that in the ſpring, when the crown has become ſufficiently large, it detaches a number of ſtrong fibres, which puſh themſelves obliquely downwards. Theſe are the coronal roots ſerving to nouriſh the plant till it arrives at maturity. And he adds, that a ſmall pipe preſerves the communication between them and the ſeminal roots. This makes an eſſential part of the plant, and is obſerved to be longer or ſhorter, according to the depth that the ſeed has been buried. But on the contrary, it is remarkable, that the crown is always formed juſt within the ſurface. Its place is the ſame, whether the grain has been ſown deep or ſuperficial. And that as the increaſe of this ſort of grain depends upon the vigorous abſorption of the coronal roots, it is obvious why they fix themſelves ſo near the ſurface, where the ſoil is the moſt rich, and contains the largeſt proportion of nutritious ſubſtances. It is alſo evident, that as this ſort of grain muſt be expoſed to the ſeverity of the winter ſeaſon, its roots are admirably diſpoſed to withſtand its effects.

It is evident, that theſe facts, and thoſe connected with the nature of the roots of different plants of the graſs kind, lead to many important conſiderations in the practice of the farmer, and fully ſhew the neceſſity as well as utility of his being perfectly acquainted with the nature, form, and mode of growth of the roots of ſuch plants as have been introduced into the field culture.

All thoſe ſorts of fleſhy roots which run to a conſiderable depth in the ground, as is the caſe with the carrot, parſnep, beet, mangel wurzel, liquorice, and ſome others of the ſame nature, conſtantly require a great depth of cultivation and tillage to ſecure good and full crops. And the various leſs fleſhy roots, which run deeply in the earth, ſuch as thoſe of beans, hops, parſley, red clover, lucern, ſaintfoin, and many ſorts of graſſes, as well as the common and Swediſh turnip, &c. alſo ſtand in need of a rather fine and deep preparation of the ſoil in order to afford equal and full crops.

Among the grain kinds of crops, wheat, from the nature of its root, demands the deepeſt and fineſt tillage; but neither this nor any of the others require any great depth of ploughing merely on that account, as the roots always ſpread out very near the ſurface. The ſame is the caſe with moſt of the cabbage ſorts, yet the land ſhould always be well prepared for them.

Much difference of opinion has been entertained by different inquirers reſpecting the cauſe of the conſtant downward direction of roots and the upward growth of ſtems. Some have ſuppoſed it to depend on the quality of the ſap juice which circulates within them; others have, with greater ingenuity and plauſibility, aſſerted it to be owing to the living principle or power in them, and the ſtimulus of the air and moiſture upon different parts of them. And more lately, and with ſtill greater probability, it has been attributed to circumſtances of a mechanical nature, as depending on the principle of gravity. This notion has been beautifully illuſtrated and explained by the experiments of Mr. A. Knight, by placing moiſtened beans in favourable ſituations for vegetating upon the circumferences of wheels moving with different degrees of velocity in vertical and horizontal poſitions.

The roots of large old trees, which have been felled, are often got out of the ground in a cheap convenient manner by blaſting or blowing them with gunpowder, by means of a boring auger contrived for the purpoſe. See BLASTING.

ROOTS, in *Gardening*, are of many different kinds, which vary conſiderably in their nature. They moſtly conſiſt of a ſtock, or thick main part, which ſtrikes into the earth or ſoil, and of fibrous or thread-like parts, which terminate, and are ſent off from different portions of it, ſpreading themſelves to great diſtances in the ground, for the purpoſe of collecting the nouriſhment and ſupport of the particular plant.

The peculiarities of ſtructure, and the direction in the ſtock parts of roots, have led to ſeveral diſtinctions in regard to their kinds.

In this way we have *perpendicular* and *horizontal* roots, or thoſe which deſcend and run down into the earth or ſoil in a ſtraight downward direction; and thoſe which run or paſs along under the ſurface of the ground in a ſuperficial tranſverſe manner: *ſimple* and *compound* or *branched* roots, or ſuch as are perfectly ſingle, and without any ſort of ſubdiviſion in their parts, and ſuch as are divided in a lateral

lateral branched manner, with many ſubdiviſions and ramifications: *ſpindle-ſhaped* and *tapering* roots, or thoſe which have oblong thick upper parts, which taper in a regular gradual manner to the lower extremities: of this nature are the roots of the common radiſh, the parſnep, the carrot, and many others: *bulbous* and *tuberous* roots, or thoſe which have a roundiſh, oval, ſwelling, bulbous form, and which are compoſed, in ſome caſes, of many ſucculent imbricated ſcales, and in others, of numerous involving coats, including three diſtinct ſorts, as ſcaly bulbs, having the parts lying over one another, as in the root of the lily; tunicated bulbs, which are formed of ſeveral different tunics or coats involving each other in a cloſe manner, as in the onion; and ſolid bulbs, as in the tulip; and thoſe which are of a thick, fleſhy, knobby, ſolid, lumpy form, whether of a roundiſh, irregularly knobbed or oblong ſhape, whether conſtituted of only one knob, or of ſeveral collected into bundles: examples of theſe ſorts are met with in the roots of the potatoe, the Jeruſalem artichoke, anemone, pæony, &c. as well as in all thoſe which are made up of a ſolid fleſhy ſubſtance: *fibrous* and *creeping* roots, or ſuch as are wholly compoſed of numerous radical or ſlender fibrous parts, and are the moſt common ſort, eſpecially in various deſcriptions of herbaceous plants, conſiſting of roots of the perpendicular, horizontal, ſimple, and branched kinds; ſome of which are very thin and fine, like threads, others ſomewhat of a fleſhy nature; and ſuch as run along immediately under the ſurface of the ground to a conſiderable length or diſtance, emitting and ſending forth at certain points ſmall fibres below and ſhoots at the upper parts: *globular* and *bundled* roots, or ſuch as have roundiſh, fleſhy, ſolid roots of the tuberous deſcription, as in the earth-nut, &c. and ſuch as are compoſed of many ſmall, oblong, fleſhy kernelly parts or knobs, which are all connected on the upper part, and terminated underneath in radicles or fibres, as in the ranunculus, &c.: theſe are alſo often termed *grumous* roots: *granulous aggregate* and *pendulous cluſtered* roots, or thoſe which conſiſt of many roundiſh knobs, like grains of corn, the whole of which is congregated together, ſo as to form a root; and thoſe which are compoſed of ſeveral roundiſh fleſhy knobs or tubers, which are ſtrung on and ſuſpended, as it were, at the ends of fibres, as in the aſphodel and many others: *handed tuberous* and *teſticulated* roots, or ſuch as have oblong tuberous forms of them which divide and ſpread out like an open hand, and ſuch as are compoſed of two roundiſh, egg-like, tuberous knobs, united in ſomewhat a teſticulated manner: *jointed* and *woody* roots, or thoſe which are long, thickiſh, and jointed at certain diſtances; and thoſe which are conſtantly becoming of a hard, tough, woody nature, as thoſe of moſt trees, ſhrubs, and under-ſhrubs: and *downright* or *tap* roots, or thoſe which have a main fleſhy part, that runs directly downwards in a perpendicular manner, as in the carrot, parſnep, beet, &c. as well as in ſome ſorts of trees and ſhrubs.

Garden roots are likewiſe further divided and diſtinguiſhed according to the time of their duration or laſting in the ſoil or ground. In this reſpect, there are *annual* roots, or thoſe which continue or endure for one year only, at the fartheſt, and then wholly periſh and decay, as in all the annual plant kind: *biennial* roots, or ſuch as continue and laſt out for two years, or thereabouts, only, after which they entirely decay and are deſtroyed; and *perennial* roots, or ſuch as are of many years' duration or continuance. In ſome caſes of this nature both the roots and ſtems are perennial, while in others only the former.

Roots of the garden deſcription, for the moſt part, penetrate and inſert themſelves into the ſoil or ground, in order to draw and derive nouriſhment and ſupport from it; but there are ſome few which form exceptions to this rule, as the root of the miſletoe, which attaches and fixes itſelf to the branches or other parts of trees, being inſerted between their bark and wood, whence it acquires its means of ſupport, the ſtem proceeding in a downward direction from it, &c.

In bulbous roots of different kinds, there are great differences in regard to their habits of growth, in ſo far at leaſt as relates to the depths which they require to be in the earth or ſoil; ſome ſtanding in need of being quite ſuperficial, while others neceſſarily deſcend to conſiderable depths below the ſurface. Theſe circumſtances therefore probably require much greater attention in their cultivation than has hitherto been beſtowed upon them, in order to procure good roots of ſuch kinds.

The roots of different kinds of garden plants require to be taken up at particular ſeaſons, and to be kept and preſerved for uſe in different manners, according to their different natures, and the purpoſes for which they are intended. All the roots of the different flower bulb and tuberous kinds may be taken up when the ſtalks decline towards the end of ſummer, or the beginning of the ſucceeding ſeaſon; they ſhould then be rendered perfectly dry by ſome gentle means, ſuch as expoſing them to a dry current of air and a middling degree of heat, when thinly ſpread out in a ſieve, or ſome other convenient manner; afterwards, when this has been perfectly accompliſhed, they may be put into drawers in dry ſituations, or hung up in bags in ſimilar places.

Bulbous culinary roots of the onion kind have been attempted to be kept in many different ways, as by laying them thinly in dry rooms, roping them and hanging them up in dry airy places, and burning or charring the root parts of the bulbs; but they ſeem not to be capable of being long preſerved without ſhooting while in the open air, in any way that has hitherto been made trial of in ſuch intention. The beſt methods of proceeding with them are probably thoſe of taking them from the ground after ſome dry weather, expoſing them thinly to the ſun and air until they are become, in every reſpect, perfectly in a ſtate free from any ſort of mould or moiſture, and then either to have them roped and hung up, or ſpread out in a thin manner upon a dry boarded floor. The warmth or heat of the ſun or fire ſhould never be ſuffered to penetrate into the places where they are kept, but they ſhould be naturally dry.

Tuberous roots, ſuch as thoſe of the potatoe, in the general keeping crop, ſhould always be taken up during a dry ſeaſon, and be afterwards, as quickly as poſſible, by mild means, made thoroughly dry and free from any mouldy matter that may hang about them, when they may be laid up in any place which is free from damp, taking care to cover them ſufficiently thickly with dry ſtraw when the weather is froſty. Roots of the Jeruſalem artichoke, and other ſimilar kinds, may be preſerved in the ſame way, but without the uſe of the ſtraw, as they do not ſtand in need of it.

Perpendicular and tap-roots, ſuch as thoſe of the carrot, parſnep, beet, and others of the ſame fleſhy kind, ſometimes require to be laid up in order to preſerve them in a juicy moiſt ſtate. This is beſt accompliſhed by the uſe of dry light ſand, or other ſimilar materials of a light dry nature, packing them up in layers one over the other, each ſort together, in a ſeparate manner. In this way they may be well preſerved in a ſtate fit for conſtant uſe. The roots of celery and cardoons may alſo be preſerved in the ſame way with much ſucceſs and advantage when neceſſary.

It is occasionally neceſſary that the tap-roots of ſeedling plants, while they are in the nurſery, ſhould be ſhortened, with the view of preventing their ſtriking down too deep into a bad ſubſoil, as well as to force out lateral horizontal roots in greater abundance nearer to the ſurface of the ground, where the ſoil is good, that they may derive more full nouriſhment and ſupport, and thereby thrive in a better and more expeditious manner.

The roots of annual and biennial plants ſtand in need of being renewed every year, or at the end of every two years, by the ſowing of their ſeeds, or the ſetting of ſome other part of them: and the perennial roots are continued by the parting, dividing, ſlipping, cutting, and reſetting of them or their different parts, as well as by various other methods, as may be ſeen fully deſcribed under their different proper heads.

Roots, in *Medicine.* The principal roots uſed in the practice of phyſic, are rhubarb, rhaponticum, ſarſaparilla, ipecacuanha, jalap, zedoary, galangal, caſſumenar, gentian, turmeric, liquorice, madder, &c. See Rhubarb, Sarsaparilla, Ipecacuanha, &c.

There are ſeveral ways of preparing roots for medicinal uſe in the eaſtern nations, which ſtrongly alter them from their original form and appearance. An inſtance we have of this in the drug called ſalep, which is no other than the root of an orchis thus prepared.

Other roots they alſo prepare in the ſame manner, or ſomething like it; an inſtance of which we have in ſome of the oriental ginſeng, which is clear and pellucid, as a reſin, and friable like one, retaining very little of the ſtructure or appearance of the root. Kæmpfer gives the method by which the people in the Eaſt do this, and it may be well worth trying on ſome of our own roots.

The Chineſe, this author informs us, give their ginſeng its colour and tranſparence in this manner. They macerate the freſh root for three days in cold rice-water, then expoſe it in cloſe veſſels to the vapour of the ſame water; after which they carefully and leiſurely dry it, and it becomes hard and brittle, of a browniſh-red colour, and as tranſparent as a reſin.

All the ginſeng of China is not of this ſort; and it has been ſuppoſed by ſome, that ſuch as was ſo had aſſumed that appearance by age, as many of the more ſucculent roots, which have very ſmall fibres, will become much leſs opaque when perfectly dry than they were at firſt; but experience ſhews that this is not the caſe; for many perſons have kept the oriental ginſeng a great many years, but it has never been known to aſſume that appearance. There is no doubt, however, but that if the Weſt Indian ginſeng were treated in this manner, it would equal the prepared ginſeng of the Eaſt; for the roots of ſome of our umbelliferous plants, particularly the ſkirret, may be made clear and tranſparent in this manner, by only boiling it in common water, and afterwards drying it in the open air. Mem. Acad. Scienc. Par. 1740.

Roots, *Flower.* See Flower.

Root *of Oſteocolla*, a word uſed to expreſs a ſort of ſoft and rotten matter, on which the oſteocolla of Germany is found in ſandy grounds.

The workmen ſeek after the oſteocolla by the direction of certain lumps of a white marley matter, which they find lying on the ſands; under this they always find a parcel of rotten vegetable matter, branching out from a main ſtem or trunk, at ten or twelve feet deep up to the ſurface; this rotten ſubſtance they call the root of the oſteocolla; and they obſerve, that where the matter they ſeek after is not found round it at the time of their digging, they need only mark the place, and dig again a year afterwards, and they will find it formed in a perfect manner. The oſteocolla found near Frankfort is all of this kind; and we find the holes in the centre of all the pieces through which this root had paſſed. It is ſo tender, that it uſually moulders away on the oſteocolla being expoſed to the air; but ſometimes they waſh it out. Phil. Tranſ. N° 39.

It is not eaſy to conceive what this is, unleſs the remains of foſſile branches of trees; but even then it is as difficult to account for the formation of the oſteocolla about them, as there is none of it found concreted where they are not. We have a ſort of oſteocolla found with us in what we call *petrifying ſprings;* but as this is done in the water, it is eaſier to conceive how it becomes ſo pure, than how a ſoft and pappy ſubſtance, found in the midſt of a bed of ſand, comes not to have ſome ſand embodied in it.

Root, *Indian Arrow.* See Arrow-*root.*

Root, *China.* See Smilax.

Root, *Falſe China*, a ſpecies of *Senecio;* which ſee.

Root, *Fever*, a ſpecies of *Trioſteum;* which ſee.

Root, *Hollow*, a ſpecies of *Adoxa;* which ſee.

Root, *Roſe.* See Rose-*root.*

Root, *Seminal.* See Seminal.

Root, *Snake.* See Snake-*root.*

Root, *Black*, or *Wild Snake*, of America, a ſpecies of *Actæa;* which ſee.

Root, *Dr. Witt's Rattle-ſnake*, a ſpecies of *Prenanthes;* which ſee.

Root, *Senegaw Rattle-ſnake*, a ſpecies of *Polygala;* which ſee.

Root, *Sweet*, a ſpecies of *Glycirrhiza;* which ſee.

Root *of Scarcity*, in *Agriculture*, the common name of a plant of the tap-rooted fleſhy kind, that has much reſemblance to the beet, and which is now cultivated to a very large ſize both in the root and top, as cattle food, where a proper ſort of ſeed is provided. It is a very hardy vegetable, is eaſily grown, and much reliſhed by horſes as well as neat cattle. See Mangel *Wurzel.*

Root-*Crops*, ſuch ſorts of field crops as afford their produce in roots, ſuch as potatoes, turnips, carrots, parſneps, &c. Theſe ſorts of crops conſtantly require to have the ground peculiarly prepared for them. See theſe ſeveral heads.

Some of the crops require that the land be well pulverized and prepared before they are put into it, and afterwards to have the mould well ſtirred and laid up about them while they are growing. They ſhould alſo, in many inſtances, be at firſt, or in a gradual manner, thinned, ſet out, and left at ſuitable diſtances for gaining their full and perfect ſtates of growth. Some of them ſtand in need of being regularly taken up out of the ground at the proper ſeaſon and ſtored up, as the potatoe, carrot, parſnep, beet, &c. while others may often remain in the ſoil until they are conſumed, as the various ſorts of turnips, and ſome others, not only without ſuſtaining any great injury, but ſometimes with much benefit. The Swediſh turnip is, however, frequently ſtored up with utility and convenience. When laid up they require to be in a dry condition on the outſide, and to be depoſited in dry ſituations. Potatoes ſhould always be kept dry and ſecured from froſt, by means of ſtraw or other ſimilar matters being laid round them.

Root-*Grafting.* See Engrafting.

Root-*Houſe*, in *Rural Economy*, the place where roots are depoſited for the more readily ſupplying live-ſtock of different kinds with them. It is of much conſequence to the farmer to have this place as near as poſſible to the ſtables, feeding-houſes, and cattle-ſheds. Theſe houſes are eſſentially neceſſary

necessary wherever there is a number of cows or other sorts of cattle to be supported on roots of the carrot, parsnep, turnip, and potatoe kinds, as well as for cabbages, as without them it would not be only inconvenient, but in many cases, in severe weather, impossible to provide them for the daily supply of such stock. The cabbages should not, however, ever be kept long in these houses, as they are very apt to take on the putrid fermentation, and become useless. The farmer should be careful that the yard-man constantly keeps such places perfectly clean and sweet, in order that the roots may contract no bad smell, as cattle are in many cases extremely nice in their feeding, and when once disgusted with any sort of food of this kind, seldom take to it again in a proper manner.

Root-houses are always the best and sweetest when laid over on the insides with a coarse plaster, or boarded with some rough common boarding material. They may in many cases be divided for different sorts of roots, with great advantage and convenience. The doors of them should for the most part be large, so that the carts may be backed and readily emptied in at them without any difficulty.

Root, in *Arithmetic* and *Algebra*, denotes a quantity which, being multiplied by itself, produces some higher power, and it is called the 2d, 3d, 4th, &c. root, according to the number of times that the multiplication by itself is performed, that number being always one less than the denomination of the root: thus, if a number is multiplied once by itself, it is called the square root, or 2d root of the product; if twice, it is called the cube, or 3d root; if three times, the biquadrate, or 4th root; and so on to other roots, which, beyond the 4th, are commonly denoted by the 5th, 6th, &c. root; though ancient authors, and even some modern ones, use particular denominations for all higher roots, as we do for the square root and cube root. Thus, the

2d root, is called the		*square* root.
3d root	—	*cube* root.
4th root	—	*quadrato-quadratum*, or *biquadratic* root.
5th root	—	*sursolid* root.
6th root	—	*quadrato-cubo*.
&c.		&c.

But such distinctions are useless, and are, therefore, now commonly omitted.

For the method of extracting the roots of numbers, see the articles Approximaton and Extraction; and for a table of the square roots and cube roots of numbers, see the conclusion of this article.

Roots *of Equations*, in *Algebra*, denote such a number or quantity as, when substituted for the unknown quantity, will produce an equality between both sides of the equation: thus, in the equation

$$x^3 - 6x^2 + 11x = 6, \text{ or } x^3 - 6x^2 + 11x - 6 = 0;$$

if we substitute 1 instead of x, we have $1 - 6 + 11 = 6$; therefore 1 is a root of that equation: if we substitute 2 instead of x, we have $2^3 - 6 \cdot 2^2 + 11 \cdot 2 = 6$; therefore 2 is also a root of the same equation: and if we substitute 3 for x, then $3^3 - 6 \cdot 3^2 + 11 \cdot 3 = 6$; and, therefore, 3 is likewise a root of the same equation: hence the roots are 1, 2, and 3; that is, there are three distinct numbers, which, when substituted for x, will produce the equality required. And it is the same in all equations, *viz.* it has always as many roots, real or imaginary, as there are units in the index of the highest power of the unknown quantity. This property has place in equations of the most simple forms, as $x^2 = 1$, $x^3 = 1$, $x^4 = 1$, $x^5 = 1$, &c. each of these having as many roots as there are units in the exponent of the power: thus, the

two square roots of 1, are $+1$ and -1;
three cube roots of 1, are 1, $-\frac{1}{2} + \frac{1}{2}\sqrt{-3}$, and $-\frac{1}{2} - \frac{1}{2}\sqrt{-3}$;
four 4th roots of 1, are 1, -1, $+\sqrt{-1}$, and $-\sqrt{-1}$;

$$\text{five 5th roots of 1,} \begin{cases} \text{are } 1, \dfrac{-1+\sqrt{5}}{4} \pm \sqrt{\left\{\left(\dfrac{-1+\sqrt{5}}{4}\right)^2 - 1\right\}} \\ \text{and } \dfrac{1-\sqrt{5}}{4} \pm \sqrt{\left\{\left(\dfrac{-1-\sqrt{5}}{4}\right)^2 - 1\right\}} \end{cases}$$

the two latter forms containing each two roots, in consequence of the ambiguous sign, $\pm$, which enters into their composition.

The doctrine of the roots of equations is one of the most intricate, but at the same time most interesting, of any branch of algebra. The method of finding the roots of quadratic equations is found in the earliest algebraic authors; it is even given, though somewhat different in form, in the *Bija Ganita*, a Sanscrit algebra, written about the latter end of the 12th, or the beginning of the 13th century, translated into Persian in 1634, and lately into English by Mr. Strachey, of the East India Company's Bengal civil establishment. The solution of cubic equations was first published by Cardan about 1540, though it is clear that he was not the inventor of the method, having received it from Tartaglia, who is commonly considered as the real author; however, Lagrange attributes the general investigation to Hudde, a celebrated Dutch mathematician, a contemporary of Descartes and Fermat. Equations of the 4th degree were first solved by Ferrari, a pupil of Cardan's, and published by the latter in 1540; since which time no further extent has been given to the subject, the 5th, and all higher equations having resisted the whole accumulated power of the modern analysis. Still, however, many important properties of the roots of equations have been discovered; the whole theory has been reduced to one uniform principle of operation; and approximations have been made in all those cases where direct methods of solution were unattainable. We cannot, of course, enter upon this subject at any great length; but a summary of the most interesting particulars, though not accompanied, in all cases, with their demonstration, will not, we presume, be unacceptable to the general reader; in the enumeration of which we shall avail ourselves of the Introduction to Barlow's Mathematical Tables.

General Properties of the Roots of Equations.

1. Every equation of the general form

$$x^m + Ax^{m-1} + Bx^{m-2} + Cx^{m-3} + \&c. + K = 0$$

has m roots real or imaginary (see Imaginary *Roots*); and may be supposed to be formed by the continued product of m factors,

$$(x - \alpha)\ (x - \beta)\ (x - \gamma)\ (x - \delta)\ \&c. = 0,$$

where α, β, γ, δ, &c. are the roots of the equation.

2. The imaginary roots of an equation always enter in pairs, and if $a + b\sqrt{-1}$ be one of those roots, $a - b\sqrt{-1}$ is another of them; so that the sum of every pair of them is a real quantity, and the square of their difference a real negative quantity; and an equation can have no imaginary root but is reducible to the above form. These properties of the imaginary roots of equation are generally attributed to d'Alembert.

3. Since

3. Since every equation

$$x^m + Ax^{m-1} + Bx^{m-2} + Cx^{m-3} + \&c. + K = 0$$

is compofed of the factors

$$(x-\alpha)\ (x-\beta)\ (x-\gamma)\ (x-\delta)\ \&c. = 0,$$

it is obvious, that if, by any means, one of thofe roots, as α, can be found, the original equation may be divided by $(x-\alpha)$, and thence be reduced to another of lower dimenfions.

4. If we fuppofe the figns of each of the roots of an equation to be changed, then the co-efficient of the fecond term of that equation will be equal to the fum of all thofe roots fo changed; the co-efficient of the third term equal to the fum of all the products that can be formed with them, taken two and two at a time; the co-efficient of the fourth term equal to all the products that can be formed with them, taken three and three at a time; and fo on to the abfolute term, which is equal to the product of all the roots; thus, if a, b, c, d, be the roots of an equation, then the co-efficient of the firft term being 1, that of the

$$\begin{aligned} 2\text{d} &= -(a+b+c+d) \\ 3\text{d} &= \quad (ab+ac+ad+bc+bd+cd) \\ 4\text{th} &= -(abc+abd+acd+bcd) \\ 5\text{th} &= \quad abcd \end{aligned}$$

5. If the fubftitution of any two numbers, m and n, inftead of the unknown quantity of an equation, give refults with contrary figns, one, or fome odd number, of the real roots of the equation, are contained between thofe two limits.

6. And converfely, if two numbers be fubftituted for the unknown quantity of an equation, which comprife between them any odd number of the roots of that equation, the refults thus obtained muft neceffarily have contrary figns. But if two, or any even number of roots, be comprifed between thofe limits, then no change of figns will take place in the refults. See a demonftration of thefe properties in Barlow's Tables.

7. Therefore, when we fubftitute for the unknown quantity of an equation the feveral terms of the progreffion, 0, 1, 2, 3, &c. it will furnifh us with the integral limits of all the real pofitive roots of that equation, provided it has not any that differ from each other by a quantity lefs than unity, or if it have any odd number of fuch roots; but if two, or any even number of its roots, be comprifed between two confecutive integers, then thefe fubftitutions will not enable us (at leaft not by the change of fign) to difcover the integral limits between which they are comprifed.

8. But if we fubftitute for the unknown quantity the feveral terms of the progreffion, 0, Δ, 2Δ, 3Δ, &c. Δ being fuppofed lefs than the difference of any two of the real roots of the equation, then the limits of every real pofitive root will be indicated by the feveral changes of figns in the refpective refults.

The above two properties have chiefly reference to Lagrange's method of approximation.

9. If, in an equation, whatever real value be fubftituted for the unknown quantity, the refult is always pofitive, it is certain that all the roots of that equation are imaginary.

10. The figns of all the roots of an equation may be changed from pofitive to negative, or from negative to pofitive, by changing the figns of the alternate co-efficients, *viz.* the 2d, 4th, 6th, &c.; and hence the finding the real roots of an equation is reduced to that of finding pofitive roots only.

11. Every equation of an odd degree has at leaft one real root, which will be pofitive if the laft term be negative, or negative if that term be pofitive.

12. Every equation of even dimenfions, having its laft term negative, has at leaft two real roots, one pofitive and the other negative; but if its laft term be pofitive, it furnifhes us with no means of judging of the nature of the roots.

13. The firft term of an equation having (as we have fuppofed throughout) unity for its co-efficient, its greateft pofitive root will be lefs than the greateft negative co-efficient plus 1.

14. And the abfolute term of an equation being divided by the fum of that term, and the greateft co-efficient having a contrary fign, will give a limit lefs than the leaft root of that equation.

15. An equation, having unity for the co-efficient of its firft term, and integral co-efficients for all its others, cannot have a fractional root, *viz.* its roots muft be either integral, irrational, or imaginary.

16. An equation cannot have more real pofitive roots, than there are variations in the fucceffion of the figns of its co-efficients, nor more real negative roots than there are permanencies of figns.

Therefore, when all the roots of an equation are real, there are precifely as many pofitive roots as there are variations, and as many negative roots as there are permanencies.

17. When any term of an equation is wanting, or has its co-efficient equal to zero, and the preceding and following terms have the fame figns, the equation has neceffarily fome imaginary roots.

18. An equation cannot have all its roots comprifed between two confecutive integers, nor between any two integers, of which the difference is not greater than 2.

Thefe properties, the demonftrations of which are given by different algebraical authors, may frequently be advantageoufly confulted in determining the nature and limits of the roots of equations.

On the Forms of the Roots of Equations.—We have before obferved, that the roots of equations, beyond thofe of the fourth degree, cannot be generally exhibited in an analytical form; yet from the analogy difcoverable in thofe of inferior dimenfions, there feems little doubt but that thofe of the fifth and higher dimenfions partake of the fame form.

When an equation of the fecond, third, or fourth degree has its fecond term taken away, to reduce it to its moft convenient form for folution, the roots will have the following form.

Second Degree.

$x = a\sqrt{p}$, $x = a'\sqrt{p}$, where a, a', are the roots of 1.

Third Degree.

$x = \sqrt[3]{p} + \sqrt[3]{q}$, $x = a\sqrt[3]{p} + a^2\sqrt[3]{q}$, $x = a^2\sqrt[3]{p} + a\sqrt{q}$, where a and a^2 are the two imaginary roots of $\sqrt[3]{1}$.

Fourth Degree.

$$\left.\begin{aligned} x &= \sqrt[4]{p} + \sqrt[4]{q} + \sqrt[4]{r} \\ x &= a\sqrt[4]{p} + a^2\sqrt[4]{q} + a^3\sqrt[4]{r} \\ x &= a^2\sqrt[4]{p} + a^3\sqrt[4]{q} + a\sqrt[4]{r} \\ x &= a^3\sqrt[4]{p} + a\sqrt[4]{q} + a^2\sqrt[4]{r} \end{aligned}\right\}$$

where a, a^2, a^3, are the three imaginary roots of $\sqrt[4]{1}$.

Whence

Whence it is very natural to infer, that in an equation of the fifth degree, the roots will have the form,

$$x = \sqrt[5]{p} + \sqrt[5]{q} + \sqrt[5]{r} + \sqrt[5]{s}$$
$$x = a\sqrt[5]{p} + a^2\sqrt[5]{q} + a^3\sqrt[5]{r} + a^4\sqrt[5]{s}$$
$$x = a^2\sqrt[5]{p} + a^3\sqrt[5]{q} + a^4\sqrt[5]{r} + a\sqrt[5]{s}$$
$$x = a^3\sqrt[5]{p} + a^4\sqrt[5]{q} + a\sqrt[5]{r} + a^2\sqrt[5]{s}$$
$$x = a^4\sqrt[5]{p} + a\sqrt[5]{q} + a^2\sqrt[5]{r} + a^3\sqrt[5]{s}$$

where a, a^2, a^3, a^4, are the four imaginary roots of $\sqrt[5]{1}$.

This generalization of the forms of the roots of equations, though generally attributed to Euler, is, we believe, due to Waring; but neither of thefe able analyfts were able to derive from it the folution of any general equation above the fourth degree. On the fubject of equations, *viz.* of finding their roots, we would refer the reader to Waring's "Meditationes Algebraicæ," Lea's "Refolution of the higher Equations in Algebra," La Grange's treatife on the refolution "Des Equations Numeriques," and the Introduction to Barlow's "Mathematical Tables," from which we have extracted the following general fynopfis of refolution. See alfo Bonnycaftle's Algebra.

General Synopfis of the direct and approximate Methods of afcertaining the Roots of Numbers and Equations.

Extraction of the Roots of Numbers.

I. Let n reprefent the index of the root,
x the number of which the root is required,
r an approximate value of $\sqrt[n]{x}$;

which may be found by trial, or otherwife, as near as convenient, and either in excefs or defect: then will,

$$1.\ \sqrt[n]{x} = r + \frac{2r(x - r^n)}{(n+1)r^n + (n-1)x} \text{ very nearly.}$$

And ufing this new approximate value in the fame way, another value may be found ftill nearer; and fo on, to any degree of accuracy required.

This general formula refolves itfelf into the following particular ones; *viz.*

$$2.\ \sqrt{x} = r + \frac{2r(x - r^2)}{3r^2 + x}.$$

$$3.\ \sqrt[3]{x} = r + \frac{r(x - r^3)}{2r^3 + x}.$$

$$4.\ \sqrt[4]{x} = r + \frac{2r(x - r^4)}{5r^4 + 3x}.$$

$$5.\ \sqrt[5]{x} = r + \frac{r(x - r^5)}{3r^5 + 2x}.$$

$$6.\ \sqrt[6]{x} = r + \frac{2r(x - r^6)}{7r^6 + 5x}.$$

$$7.\ \sqrt[7]{x} = r + \frac{r(x - r^7)}{4r^7 + 3x}.$$

&c. &c.

By the Binomial Theorem.

II. Let $(a + b)$ reprefent any binomial, and n the index of the root or power, which may be either pofitive or negative, integral or fractional; then will

$$(a + b)^n =$$

$$(1)\ a^n + \frac{n}{1}a^{n-1}b + \frac{n(n-1)}{1 \cdot 2}a^{n-2}b^2 + \frac{n(n-1)(n-2)}{1 \cdot 2 \cdot 3}a^{n-3}b^3 + \text{\&c.}$$

If b be negative, the odd powers of b will alfo be negative; that is,

$$(a - b)^n =$$

$$(2)\ a^n - \frac{n}{1}a^{n-1}b + \frac{n(n-n)}{1 \cdot 2}a^{n-2}b^2 - \frac{n(n-1)(n-2)}{1 \cdot 2 \cdot 3}a^{n-3}b^3 + \text{\&c.}$$

Otherwife: let $\frac{m}{n}$ reprefent the index, and put $\frac{b}{a} =$ Q; alfo, let A, B, C, D, &c. reprefent the firft, fecond, third, &c. terms of the feries, with their proper figns; then will

$$(a + b)^{\frac{m}{n}} = (a + aQ)^{\frac{m}{n}} =$$

$$(3)\ \overset{A}{a^{\frac{m}{n}}} + \overset{B}{\frac{m}{n}AQ} + \overset{C}{\frac{m-n}{2n}BQ} + \overset{D}{\frac{m-2n}{3n}CQ} + \frac{m-3n}{4n}DQ + \text{\&c.};$$

which is by far the moft convenient form in the cafe of fractional or negative indices.

ROOTS OF EQUATIONS.

QUADRATIC EQUATIONS.

III. Let $x^2 + ax - b = 0$, or $x^2 + ax = b$, reprefent any quadratic equation, a and b being either pofitive or negative; then will

$$x = \frac{-a}{2} \pm \sqrt{\left(\frac{a^2}{4} + b\right)}.$$

But if a and b, independent of the fign by which they are preceded, be always fuppofed pofitive; then this general formula refolves itfelf into the four following particular ones, *viz.*

1. $x^2 + ax - b = 0$, where $x = \frac{-a}{2} \pm \sqrt{\left(\frac{a^2}{4} + b\right)}$.

2. $x^2 - ax - b = 0$, where $x = \frac{a}{2} \pm \sqrt{\left(\frac{a^2}{4} + b\right)}$.

3. $x^2 - ax + b = 0$, where $x = \frac{a}{2} \pm \sqrt{\left(\frac{a^2}{4} - b\right)}$.

4. $x^2 + ax + b = 0$, where $x = \frac{-a}{2} \pm \sqrt{\left(\frac{a^2}{4} - b\right)}$.

By Sines and Tangents.

IV.

1. $x^2 + px = q$.

Put $\frac{2}{p}\sqrt{q} = \text{tan. } z$; then

$$x = \begin{cases} +\sqrt{q} \times \text{tan. } \tfrac{1}{2}z, \text{ or} \\ -\sqrt{q} \times \text{cof. } \tfrac{1}{2}z. \end{cases}$$

2. $x^2 + px = q$.

Put $\frac{2}{p}\sqrt{q} = \text{tan. } z$; then

$$x = \begin{cases} + \sqrt{q} \times \text{cof. } z, \text{ or} \\ - \sqrt{q} \times \text{tan. } z. \end{cases}$$

3. $x^2 + px = -q$.

Put $\frac{2}{p}\sqrt{q} = \text{fin. } z$; then

$$x = \begin{cases} - \sqrt{q} \times \text{tan. } \tfrac{1}{2} z, \text{ or} \\ - \sqrt{q} \times \text{cof. } \tfrac{1}{2} z. \end{cases}$$

4. $x^2 - px = -q$.

Put $\frac{2}{p}\sqrt{q} = \text{fin. } z$; then

$$x = \begin{cases} + \sqrt{q} \times \text{tan. } \tfrac{1}{2} z, \text{ or} \\ + \sqrt{q} \times \text{cof. } \tfrac{1}{2} z. \end{cases}$$

Cubic Equations.

By Cardan's Rule.

V. Let $x^3 + ax - b = 0$, or $x^3 + ax = b$, reprefent any cubic equation wanting its fecond term, and in which a and b may be either pofitive or negative; then will

$$1.\ x = \sqrt[3]{\left\{\frac{b}{2} + \sqrt{\left(\frac{b^2}{4} + \frac{a^3}{27}\right)}\right\}} + \sqrt[3]{\left\{\frac{b}{2} - \sqrt{\left(\frac{b^2}{4} + \frac{a^3}{27}\right)}\right\}}.$$

$$2.\ x = \sqrt[3]{\left\{\frac{b}{2} + \sqrt{\left(\frac{b^2}{4} + \frac{a^3}{27}\right)}\right\}} - \frac{\frac{1}{3}a}{\sqrt[3]{\left\{\frac{b}{2} + \sqrt{\left(\frac{b^2}{4} + \frac{a^3}{27}\right)}\right.}}.$$

Which latter form is frequently the moft convenient, as it requires only one extraction of the cube root, whereas the former requires two.

The fecond term of a cubic equation may be taken away by the following formulæ:

Let $y^3 + py^2 + qy + r = 0$.

Affume $y = \frac{x - p}{3}$; $a = 9q - 3p^2$; and $b = 9pq - 2p^3 - 27r$;

fo fhall $x^3 + ax - b = 0$ be the transformed equation required, which will, under this form, have integral coefficients.

When a is negative, that is, when the equation is $x^3 - ax = b$, the preceding formula becomes

$$3.\ x = \sqrt[3]{\left\{\frac{b}{2} + \sqrt{\left(\frac{b^2}{4} - \frac{a^3}{27}\right)}\right\}} + \sqrt[3]{\left\{\frac{b}{2} - \sqrt{\left(\frac{b^2}{4} - \frac{a^3}{27}\right)}\right\}}.$$

And here, when $\frac{a^3}{27} > \frac{b^2}{4}$, both branches of the root become imaginary, and the equation is faid to be of the irreducible cafe; no folution being then obtainable by this rule, except in thofe cafes in which the cube root of each of thefe branches can be found in other binomial furds, which, when poffible, is done by the following formulæ:

(1) $\sqrt[3]{(a \pm \sqrt{b})} = x + \sqrt{y}$.
(2) $x^3 - \frac{3}{4}x\sqrt[3]{(a^2 - b)} - \frac{1}{4}a = 0$.
(3) $y = x^2 - \sqrt[3]{(a^2 - b)}$.

By Sines and Tangents.

VI. In this cafe, it is neceffary to feparate the above general formula into the following particular ones, according as a and b are pofitive or negative, as follows; *viz.*

Form 1. $x^3 + ax - b = 0$.
2. $x^3 + ax + b = 0$.
3. $x^3 - ax - b = 0$.
4. $x^3 - ax + b = 0$.

1. *Solution of Form* 1: $x^3 + ax - b = 0$.

Put $\frac{b}{2}\left(\frac{3}{a}\right)^{\frac{3}{2}} = \text{tan. } z$; and $\sqrt[3]{\text{tan. }(45^\circ - \tfrac{1}{2}z)} = \text{tan. } u$.

Then $x = 2\sqrt{\frac{a}{3}} \times \text{cot. } 2u$.

2. *Solution of Form* 2: $x^3 + ax + b = 0$.

Put $\frac{b}{2}\left(\frac{3}{a}\right)^{\frac{3}{2}} = \text{tan. } z$; and $\sqrt[3]{\text{tan. }(45^\circ - \tfrac{1}{2}z)} = \text{tan. } u$.

Then will $x = -2\sqrt{\frac{a}{3}} \times \text{cot. } 2u$.

3. *Solution of Form* 3: $x^3 - ax - b = 0$.

This form refolves itfelf into two cafes, according as $\frac{2}{b}\left(\frac{a}{3}\right)^{\frac{3}{2}}$ is lefs or greater than 1.

In the firft cafe, put $\frac{2}{b}\left(\frac{a}{3}\right)^{\frac{3}{2}} = \text{cof. } z$, and $\sqrt[3]{\text{tan. }(45^\circ - \tfrac{1}{2}z)} = \text{tan. } u$.

Then will $x = 2\sqrt{\frac{a}{3}} \times \text{cofec. } 2u$.

In the fecond cafe, put $\frac{b}{2}\left(\frac{3}{a}\right)^{\frac{3}{2}} = \text{cof. } z$, then has x the three following values, *viz.*

1. $x = 2\sqrt{\frac{a}{3}} \times \text{cof. } \frac{z}{3}$.
2. $x = -2\sqrt{\frac{a}{3}} \times \text{cof. } \left(60^\circ + \frac{z}{3}\right)$.
3. $x = -2\sqrt{\frac{a}{3}} \times \text{cof. } \left(60^\circ - \frac{z}{3}\right)$.

4. *Solution of Form* 4: $x^3 - ax + b = 0$.

This has alfo two cafes, according as $\frac{2}{b}\left(\frac{a}{3}\right)^{\frac{3}{2}}$ is lefs or greater than 1.

In the firft cafe, put $\frac{2}{b}\left(\frac{a}{3}\right)^{\frac{3}{2}} = \text{cof. } z$, and $\sqrt[3]{\text{tan. }(45^\circ - \tfrac{1}{2}z)} = \text{tan } u$.

Then will $x = -2\sqrt{\frac{a}{3}} \times \text{cof. } 2u$.

In

In the second case, put $\frac{b}{2}\left(\frac{3}{a}\right)^{\frac{3}{2}} = \text{cos. } z$, then has x the three following values:

$$1.\quad x = -2\sqrt{\frac{a}{3}} \times \text{cos. } \frac{z}{3}.$$

$$2.\quad x = \quad 2\sqrt{\frac{a}{3}} \times \text{cos. } \left(60^\circ + \frac{z}{3}\right).$$

$$3.\quad x = \quad 2\sqrt{\frac{a}{3}} \times \text{cos. } \left(60^\circ - \frac{z}{3}\right).$$

The two latter cases of forms 3 and 4 belong to the irreducible case, each of which gives three real roots or values of x; whereas the other forms have each only one real root. See IRREDUCIBLE *Case*.

By infinite Series.

Let $x^3 + ax = b$ represent any cubic equation, in which a and b may be each either positive or negative.

Assume $\frac{2b}{\sqrt[3]{[2(27b^2 + 4a^3)]}} = \varphi$, and $\frac{27b^2}{27b^2 + 4a^3} = \pi$; then,

$$1.\ \begin{cases} x = \varphi \times [1 + \frac{2.5}{6.9}\pi + \frac{2.5.8.11}{6.9.12.15}\pi^2 + \frac{2.5\ldots17}{6.9\ldots21} \\ \quad \pi^3 + \&c.], \text{ or} \\ x = \varphi \times [1 + \frac{2.5}{6.9}\pi A + \frac{8.11}{12.15}\pi B + \frac{14.17}{18.21} \\ \quad \pi C + \&c.] \end{cases}$$

In which last form, A, B, C, &c. represent the preceding terms.

Again, assume $2\sqrt[3]{\frac{b}{2}} = \varphi$, and $\frac{27b^2 + 4a^3}{27b^2} = \pi$; then,

$$2.\ \begin{cases} x = \varphi \times [1 - \frac{2}{3.6}\pi - \frac{2.5.8}{3.6.9.12}\pi^2 - \frac{2.5\ldots14}{3.6\ldots18} \\ \quad \pi^3 - \&c.], \text{ or} \\ x = \varphi \times [1 - \frac{2}{3.6}\pi A - \frac{5.8}{9.12}\pi B - \frac{11.14}{15.18} \\ \quad \pi C - \&c.] \end{cases}$$

In which, also, A, B, C, &c. are the preceding terms.

Both these series are correct analytical expressions for the value of x, in the general cubic equation $x^3 + ax = b$; but they are not equally commodious for the purposes of solution.

The former must be used in all cases when a is positive, as also when a is negative, and $4a^3$ *greater* than $54b^2$; and the latter when a is negative, and $4a$ *less* than $54b^2$; because then π, in both cases, will be less than unity, and the series will, therefore, be converging ones.

BIQUADRATIC EQUATIONS.

By Simpson's Rule.

VIII. Let $x^4 + ax^3 + bx^2 + cx + d = 0$, be any equation of the fourth degree, in which a, b, c, d, may be any numbers at pleasure, positive, negative, or zero.

Find the values of p, q, and r, by means of the three equations

$$8p^3 - 4bp^2 + (2ac - 8d)p - a^2d + 4bd - c^2 = 0$$

$$q = \sqrt{(\tfrac{1}{4}a^2 + 2p - b)}$$

$$r = \frac{ap - c}{2q};$$

then will the four roots of the proposed equation be contained in the following formulæ;

$$x = -\frac{\frac{1}{2}a - q}{2} \pm \sqrt{\left\{\left(\frac{\frac{1}{2}a - q}{2}\right)^2 + r - p\right\}}$$

$$x = -\frac{\frac{1}{2}a + q}{2} \pm \sqrt{\left\{\left(\frac{\frac{1}{2}a + q}{2}\right)^2 - r - p\right\}}$$

The above rule was only generalized by Simpson, it is originally due to Ferrari, though commonly ascribed to Bombelli.

By Descartes' Rule.

IX. Let $x^4 + ax^2 + bx + c = 0$, be any biquadratic equation, wanting its second term.

Find the value of y in the double cubic equation

$$y^6 + 2ay^4 + (a^2 - 4c)y^2 - b^2 = 0;$$

then will the four values of x be comprised in the formulæ

$$x = \tfrac{1}{2}y \pm \sqrt{\left(-\tfrac{1}{4}y^2 - \tfrac{1}{2}a - \frac{b}{2y}\right)}$$

$$x = \tfrac{1}{2}y \pm \sqrt{\left(-\tfrac{1}{4}y^2 - \tfrac{1}{2}a + \frac{b}{2y}\right)}$$

By Euler's Rule.

X. Let $x^4 - ax^2 - bx - c = 0$, be any biquadratic equation, wanting its second term, a, b, and c, being any numbers, positive, negative, or zero.

Assume $\quad f = \frac{1}{2}a$; $h = \frac{b^2}{64}$; $g = \frac{1}{16}a^2 + \frac{1}{4}c$.

Then find the three roots of the cubic equation

$$y^3 + fy^2 + gy - h = 0,$$

which let be p, q, and r.

Then will the four values of x in the original equation be expressed as follows.

When b is positive,

1st root	$x =$	$\sqrt{p} + \sqrt{q} + \sqrt{r}$
2d	$x =$	$\sqrt{p} - \sqrt{q} + \sqrt{r}$
3d	$x =$	$-\sqrt{p} + \sqrt{q} - \sqrt{r}$
4th	$x =$	$-\sqrt{p} - \sqrt{q} + \sqrt{r}$

When b is negative,

1st root	$x =$	$\sqrt{p} + \sqrt{q} - \sqrt{r}$
2d	$x =$	$\sqrt{p} - \sqrt{q} + \sqrt{r}$
3d	$x =$	$-\sqrt{p} + \sqrt{q} + \sqrt{r}$
4th	$x =$	$-\sqrt{p} - \sqrt{q} - \sqrt{r}$

EQUATIONS IN GENERAL.

By Approximation.—First Method.

XI. Let $x^n + ax^{n-1} + bx^{n-2} + cx^{n-3} + dx^{n-4} + \&c. = 0$, be any general equation, in which a, b, c, d, &c. are any numbers, positive, negative, or zero; then r being an approximate value of x, we have

1. $x =$

$$1.\ x = \frac{(n-1)r^n + (n-2)ar^{n-1} + (n-3)br^{n-2} + (n-4)cr^{n-3} + \&c}{nr^{n-1} + (n-1)ar^{n-2} + (n-2)br^{n-3} + (n-3)cr^{n-4} + \&c.}$$

nearly, which general form resolves itself into the following particular ones; *viz.*

Equations of the third Degree.

2. $x^3 + ax^2 + bx + c = 0$;

$$x = \frac{2r^3 + ar^2 - c}{3r^2 + 2ar + b}.$$

Equations of the fourth Degree.

3. $x^4 + ax^3 + bx^2 + cx + d = 0$;

$$x = \frac{3r^4 + 2ar^3 + br^2 - d}{4r^3 + 3ar + 2br + c}.$$

Equations of the fifth Degree.

4. $x^5 + ax^4 + bx^3 + cx^2 + dx + e = 0$;

$$5.\ x = \frac{4r^5 + 3ar^4 + 2br^3 + cr^2 - e}{5r^4 + 4ar^3 + 3br^2 + 2cr + d}.$$

&c. &c.

By the second Method.

XII. Let $x^n + ax^{n-1} + bx^{n-2} + cx^{n-3} + dx^{n-4} + \&c. = w$, be any general equation, as before, and r an approximate value of x; then making

$$r^n + ar^{n-1} + br^{n-2} + cr^{n-3} + dr^{n-4} + \&c. = v$$

we shall have

$$1.\ x = r + \frac{(w-v)2r}{(n-1)w + (n+1)r^n + (n-1)ar^{n-1} + (n-3)br^{n-2} + \&c.}$$

Or,

$$2.\ x = r + \frac{(w-v)2r}{(n-1)v + (n+1)r^n + (n-1)ar^{n-1} + (n-3)br^{n-2} + \&c.}$$

The first formula being applicable to the case in which r is greater than unity, and the second to those in which it is less.

These general formulæ resolve themselves into the following particular ones; *viz.*

Equations of the third Degree.

3. $x^3 + ax^2 + bx = w$;

$$x = r + \frac{(w-v)r}{w \text{ or } v + 2r^3 + ar^2}.$$

Equations of the fourth Degree.

4. $x^4 + ax^3 + bx^2 + cx = w$;

$$x = r + \frac{(w-v)2r}{3w \text{ or } 3v + 5r^4 + 3ar^3 + br^2 - cr}.$$

Equations of the fifth Degree.

5. $x^5 + ax^4 + bx^3 + cx^2 + dx = w$;

$$x = r + \frac{(w-v)r}{2w \text{ or } 2v + 3r^5 + 2ar^4 + br^3 - dr}.$$

The latter formulæ, which are by far the most converging, were first published by Mr. Barlow, in No. 12. of Leybourn's Mathematical Repository; with reference to which we propose giving one example by way of illustration.

Example.—Given $x^3 - 2x = 5$.

Assume $r = 2$, then (by formula 1),

$$\begin{array}{rlrl}
r^3 = & 8 & 2r^3 = & 16 \\
-2r = & -4 & w = & 5 \\
\hline
v = & 4 & & 21 \text{ divisor.} \\
w = & 5 & & \\
\hline
w - v = & 1 & & \\
r = & 2 & &
\end{array}$$

whence $\dfrac{1 \times 2}{21} = .094$.

Therefore $x = 2.094$ nearly.

Assume, therefore, $r = 2.094$, then,

$$\begin{array}{rlrl}
r^3 = & 9.181846584 & 2r^3 = & 18.363693168 \\
-2r = & 4.188 & w = & 5 \\
\hline
v = & 4.993846584 & & 23.363693168 \\
w = & 5. & & \\
\hline
w - v = & .006153416 & & \\
r = & 2.094 & & \\
r(w-v) = & .012885253 & &
\end{array}$$

whence $\dfrac{.012885253}{23.3636931} = .0005515$.

Therefore $x = .0945515$ nearly; which is true to the nearest figure in the eighth place, by only two substitutions.

Table of Square Roots and Cube Roots, from 1 to 1200.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
1	1.0000000	1.0000000	51	7.1414284	3.7084298	101	10.0498756	4.6570095
2	1.4142136	1.2599210	52	7.2111026	3.7325111	102	10.0995049	4.6723287
3	1.7320508	1.4422496	53	7.2801099	3.7562858	103	10.1488916	4.6875482
4	2.0000000	1.5874011	54	7.3484692	3.7797631	104	10.1980390	4.7026694
5	2.2360680	1.7099759	55	7.4161985	3.8029525	105	10.2469508	4.7176940
6	2.4494897	1.8171206	56	7.4833148	3.8258624	106	10.2956301	4.7326235
7	2.6457513	1.9129312	57	7.5498344	3.8485011	107	10.3440804	4.7474594
8	2.8284271	2.0000000	58	7.6157731	3.8708766	108	10.3923048	4.7622032
9	3.0000000	2.0800837	59	7.6811457	3.8929965	109	10.4403065	4.7768562
10	3.1622777	2.1544347	60	7.7459667	3.9148676	110	10.4880885	4.7914199
11	3.3166248	2.2239801	61	7.8102497	3.9364972	111	10.5356538	4.8058955
12	3.4641016	2.2894286	62	7.8740079	3.9578915	112	10.5830052	4.8202845
13	3.6055513	2.3513347	63	7.9372539	3.9790571	113	10.6301458	4.8345881
14	3.7416574	2.4101422	64	8.0000000	4.0000000	114	10.6770783	4.8488076
15	3.8729833	2.4662121	65	8.0622577	4.0207256	115	10.7238053	4.8629442
16	4.0000000	2.5198421	66	8.1240384	4.0412401	116	10.7703296	4.8769990
17	4.1231056	2.5712816	67	8.1853528	4.0615480	117	10.8166538	4.8909732
18	4.2426407	2.6207414	68	8.2462113	4.0816551	118	10.8627805	4.9048681
19	4.3588989	2.6684016	69	8.3066239	4.1015661	119	10.9087121	4.9196847
20	4.4721360	2.7144177	70	8.3666003	4.1212853	120	10.9544512	4.9324242
21	4.5825757	2.7589243	71	8.4261498	4.1408178	121	11.0000000	4.9460874
22	4.6904158	2.8020393	72	8.4852814	4.1601676	122	11.0453610	4.9596757
23	4.7958315	2.8438670	73	8.5440037	4.1793390	123	11.0905365	4.9731898
24	4.8989795	2.8844991	74	8.6023253	4.1983364	124	11.1355287	4.9866310
25	5.0000000	2.9240177	75	8.6602540	4.2171633	125	11.1803399	5.0000000
26	5.0990195	2.9624960	76	8.7177979	4.2358236	126	11.2249722	5.0132979
27	5.1961524	3.0000000	77	8.7749644	4.2543210	127	11.2694277	5.0265257
28	5.2915026	3.0365889	78	8.8317609	4.2726586	128	11.3137085	5.0396842
29	5.3851648	3.0723168	79	8.8881944	4.2908404	129	11.3578167	5.0527743
30	5.4772256	3.1072325	80	8.9442719	4.3088695	130	11.4017543	5.0657970
31	5.5677644	3.1413806	81	9.0000000	4.3267487	131	11.4455231	5.0787531
32	5.6568542	3.1748021	82	9.0553851	4.3444815	132	11.4891253	5.0916434
33	5.7445626	3.2075343	83	9.1104336	4.3620707	133	11.5325626	5.1044687
34	5.8309519	3.2396118	84	9.1651514	4.3795191	134	11.5758369	5.1172299
35	5.9160798	3.2710663	85	9.2195445	4.3968296	135	11.6189500	5.1299278
36	6.0000000	3.3019272	86	9.2736185	4.4140049	136	11.6619038	5.1425632
37	6.0827625	3.3322218	87	9.3273791	4.4310476	137	11.7046999	5.1551367
38	6.1644140	3.3619754	88	9.3808315	4.4479602	138	11.7473444	5.1676493
39	6.2449980	3.3912114	89	9.4339811	4.4647451	139	11.7898261	5.1801015
40	6.3245553	3.4199519	90	9.4868330	4.4814047	140	11.8321596	5.1924941
41	6.4031242	3.4482172	91	9.5393920	4.4979414	141	11.8743421	5.2048279
42	6.4807407	3.4760266	92	9.5916630	4.5143574	142	11.9163753	5.2171034
43	6.5574385	3.5033981	93	9.6436508	4.5306549	143	11.9582607	5.2293215
44	6.6332496	3.5303483	94	9.6953597	4.5468359	144	12.0000000	5.2414828
45	6.7082039	3.5568933	95	9.7467943	4.5629026	145	12.0415946	5.2535879
46	6.7823300	3.5830479	96	9.7979590	4.5788570	146	12.0830460	5.2656374
47	6.8556546	3.6088261	97	9.8488578	4.5947009	147	12.1243557	5.2776321
48	6.9282032	3.6342411	98	9.8994949	4.6104363	148	12.1655251	5.2895725
49	7.0000000	3.6593057	99	9.9498744	4.6260650	149	12.2065556	5.3014592
50	7.0710678	3.6840314	100	10.0000000	4.6415888	150	12.2474487	5.3132928

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
151	12.2882057	5.3250740	201	14.1774469	5.8577660	251	15.8429795	6.3079935
152	12.3288280	5.3368033	202	14.2126704	5.8674643	252	15.8745079	6.3163596
153	12.3693169	5.3484812	203	14.2478068	5.8771307	253	15.9059737	6.3247035
154	12.4096736	5.3601084	204	14.2828569	5.8867653	254	15.9373775	6.3330256
155	12.4498996	5.3716854	205	14.3178211	5.8963685	255	15.9687194	6.3413257
156	12.4899960	5.3832126	206	14.3527001	5.9059406	256	16.0000000	6.3496042
157	12.5299641	5.3946907	207	14.3874946	5.9154817	257	16.0312195	6.3578611
158	12.5698051	5.4061202	208	14.4222051	5.9249921	258	16.0623784	6.3660968
159	12.6095202	5.4175015	209	14.4568323	5.9344721	259	16.0934769	6.3743111
160	12.6491106	5.4288352	210	14.4913767	5.9439220	260	16.1245155	6.3825043
161	12.6885775	5.4401218	211	14.5258390	5.9533418	261	16.1554944	6.3906765
162	12.7279221	5.4513618	212	14.5602198	5.9627320	262	16.1864141	6.3988279
163	12.7671453	5.4625556	213	14.5945195	5.9720926	263	16.2172747	6.4069584
164	12.8062485	5.4737037	214	14.6287388	5.9814240	264	16.2480768	6.4150687
165	12.8452326	5.4848066	215	14.6628783	5.9907264	265	16.2788206	6.4231583
169	12.8840987	5.4958647	216	14.6969385	6.0000000	266	16.3095064	6.4312276
167	12.9228480	5.5068784	217	14.7309199	6.0092450	267	16.3401346	6.4392767
168	12.9614814	5.5178484	218	14.7648231	6.0184617	268	16.3707055	6.4473057
160	13.0000000	5.5287748	219	14.7986486	6.0276502	269	16.4012195	6.4553148
170	13.0384048	5.5396583	220	14.8323970	6.0368107	270	16.4316767	6.4633041
171	13.0766968	5.5504991	221	14.8660687	6.0459435	271	16.4620776	6.4712736
172	13.1148770	5.5612978	222	14.8996644	6.0550489	272	16.4924225	6.4792236
173	13.1529464	5.5720546	223	14.9331845	6.0641270	273	16.5227116	6.4871541
174	13.1909060	5.5827702	224	14.9666295	6.0731779	274	16.5529454	6.4950653
175	13.2287566	5.5934447	225	15.0000000	6.0822020	275	16.5831240	6.5029572
176	13.2664992	5.6040787	226	15.0332964	6.0911994	276	16.6132477	6.5108300
177	13.3041347	5.6146724	227	15.0665192	6.1001702	277	16.6433170	6.5186839
178	13.3416641	5.6252263	228	15.0996689	6.1091147	278	16.6733320	6.5265189
179	13.3790882	5.6357408	229	15.1327460	6.1180332	279	16.7032931	6.5343851
180	13.4164079	5.6462162	230	15.1657509	6.1269257	280	16.7332005	6.5421326
181	13.4536240	5.6566528	231	15.1936842	6.1357924	281	16.7630546	6.5499116
182	13.4907376	5.6670511	232	15.2315462	6.1446337	282	16.7928556	6.5576722
183	13.5277493	5.6774114	233	15.2643375	6.1534495	283	16.8226038	6.5654144
184	13.5646600	5.6877340	234	15.2970585	6.1622401	284	16.8522995	6.5731385
185	13.6014705	5.6980192	235	15.3297097	6.1710058	285	16.8819430	6.5808443
186	13.6381817	5.7082675	236	15.3622915	6.1797466	286	16.9115345	6.5885323
187	13.6747943	5.7184791	237	15.3948043	6.1884628	287	16.9410743	6.5962023
188	13.7113092	5.7286543	238	15.4272486	6.1971544	288	16.9705627	6.6038545
189	13.7477271	5.7387936	239	15.4596248	6.2058218	289	17.0000000	6.6114890
190	13.7840488	5.7488971	240	15.4919334	6.2144650	290	17.0293864	6.6191060
191	13.8202750	5.7589652	241	15.5241747	6.2230843	291	17.0587221	6.6267054
192	13.8564065	5.7689982	242	15.5563492	6.2316797	292	17.0880075	6.6342874
193	13.8924440	5.7789966	243	15.5884573	6.2402515	293	17.1172428	6.6418522
194	13.9283883	5.7889604	244	15.6204994	6.2487998	294	17.1464282	6.6493998
195	13.9642400	5.7988900	245	15.6524758	6.2573248	295	17.1755640	6.6569302
196	14.0000000	5.8087857	246	15.6843871	6.2658266	296	17.2046505	6.6644437
197	14.0356688	5.8186479	247	15.7162336	6.2743054	297	17.2336879	6.6719403
198	14.0712473	5.8284767	248	15.7480157	6.2827613	298	17.2626765	6.6794200
199	14.1067360	5.8382725	249	15.7797338	6.2911946	299	17.2916165	6.6868831
200	14.1421356	5.8480355	250	15.8113883	6.2996053	300	17.3205081	6.6943295

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
301	17.3493516	6.7017593	351	18.7349940	7.0540041	401	20.0249844	7.3741979
302	17.3781472	6.7091729	352	18.7616630	7.0606967	402	20.0499377	7.3803227
303	17.4068952	6.7165700	353	18.7882942	7.0673767	403	20.0748599	7.3864373
304	17.4355958	6.7239508	354	18.8148877	7.0740440	404	20.0997512	7.3925418
305	17.4642492	6.7313155	355	18.8414437	7.0806988	405	20.1246118	7.3986363
306	17.4928557	6.7386641	356	18.8679623	7.0873411	406	20.1494417	7.4047206
307	17.5214155	6.7459967	357	18.8944436	7.0939709	407	20.1742410	7.4107950
308	17.5499288	6.7533134	358	18.9208879	7.1005885	408	20.1990099	7.4168595
309	17.5783958	6.7606143	359	18.9472953	7.1071937	409	20.2237484	7.4229142
310	17.6068169	6.7678995	360	18.9736660	7.1137866	410	20.2484567	7.4289589
311	17.6351921	6.7751690	361	19.0000000	7.1203674	411	20.2731349	7.4349938
312	17.6635217	6.7824229	362	19.0262976	7.1269360	412	20.2977831	7.4410189
313	17.6918060	6.7896613	363	19.0525589	7.1334925	413	20.3224014	7.4470342
314	17.7200451	6.7968844	364	19.0787840	7.1400370	414	20.3469899	7.4530399
315	17.7482393	6.8040921	365	19.1049732	7.1465695	415	20.3715488	7.4590359
316	17.7763888	6.8112847	366	19.1311265	7.1530901	416	20.3960781	7.4650223
317	17.8044938	6.8184620	367	19.1572441	7.1595988	417	20.4205779	7.4709991
318	17.8325545	6.8256242	368	19.1833261	7.1660957	418	20.4450483	7.4769664
319	17.8605711	6.8327714	369	19.2093727	7.1725809	419	20.4694895	7.4829242
320	17.8885438	6.8399037	370	19.2353841	7.1790544	420	20.4939015	7.4888724
321	17.9164729	6.8470213	371	19.2613603	7.1855162	421	20.5182845	7.4948113
322	17.9443584	6.8541240	372	19.2873015	7.1919663	422	20.5426386	7.5007406
323	17.9722008	6.8612120	373	19.3132079	7.1984050	423	20.5669638	7.5066607
324	18.0000000	6.8682855	374	19.3390796	7.2048322	424	20.5912603	7.5125715
325	18.0277564	6.8753443	375	19.3649167	7.2112479	425	20.6155281	7.5184730
326	18.0554701	6.8823888	376	19.3907194	7.2176522	426	20.6397674	7.5243652
327	18.0831413	6.8894188	377	19.4164878	7.2240450	427	20.6639783	7.5302482
328	18.1107703	6.8964345	378	19.4422221	7.2304268	428	20.6881609	7.5361221
329	18.1383571	6.9034359	379	19.4679223	7.2367972	429	20.7123152	7.5419867
330	18.1659021	6.9104232	380	19.4935887	7.2431565	430	20.7364414	7.5478423
331	18.1934054	6.9173964	381	19.5192213	7.2495045	431	20.7605395	7.5536888
332	18.2208672	6.9243556	382	19.5448203	7.2558415	432	20.7846097	7.5595263
333	18.2482876	6.9313008	383	19.5703858	7.2621675	433	20.8086520	7.5653548
334	18.2756669	6.9382321	384	19.5959179	7.2684824	434	20.8326667	7.5711743
335	18.3030052	6.9451496	385	19.6214169	7.2747864	435	20.8566536	7.5769849
336	18.3303028	6.9520533	386	19.6468827	7.2810794	436	20.8806130	7.5827865
337	18.3575598	6.9589434	387	19.6723156	7.2873617	437	20.9045450	7.5885793
338	18.3847763	6.9658198	388	19.6977156	7.2936330	438	20.9284495	7.5943633
339	18.4119526	6.9726826	389	19.7230829	7.2998936	439	20.9523268	7.6001385
340	18.4390889	6.9795321	390	19.7484177	7.3061436	440	20.9761770	7.6059049
341	18.4661853	6.9863681	391	19.7737199	7.3123828	441	21.0000000	7.6116626
342	18.4932420	6.9931906	392	19.7989899	7.3186114	442	21.0237960	7.6174116
343	18.5202592	7.0000000	393	19.8242276	7.3248295	443	21.0475652	7.6231519
344	18.5472370	7.0067962	394	19.8494332	7.3310369	444	21.0713075	7.6288837
345	18.5741756	7.0135791	395	19.8746069	7.3372339	445	21.0950231	7.6346067
346	18.6010752	7.0203490	396	19.8997487	7.3434205	446	21.1187121	7.6403213
347	18.6279360	7.0271058	397	19.9248588	7.3495966	447	21.1423745	7.6460272
348	18.6547581	7.0338497	398	19.9499373	7.3557624	448	21.1660105	7.6517247
349	18.6815417	7.0405806	399	19.9749844	7.3619178	449	21.1896201	7.6574138
350	18.7082869	7.0472987	400	20.0000000	7.3680630	450	21.2132034	7.6630943

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
451	21.2367606	7.6687665	501	22.3830293	7.9422931	551	23.4733892	8.1981753
452	21.2602916	7.6744303	502	22.4053565	7.9475739	552	23.4946802	8.2031319
453	21.2837967	7.6800857	503	22.4276615	7.9528477	553	23.5159520	8.2080825
454	21.3072758	7.6857328	504	22.4499443	7.9581144	554	23.5372046	8.2130271
455	21.3307290	7.6913717	505	22.4722051	7.9633743	555	23.5584380	8.2179657
456	21.3541565	7.6970023	506	22.4944438	7.9686271	556	23.5796522	8.2228985
457	21.3775583	7.7026246	507	22.5166605	7.9738731	557	23.6008474	8.2278254
458	21.4009346	7.7082388	508	22.5388553	7.9791122	558	23.6220236	8.2327463
459	21.4242853	7.7138448	509	22.5610283	7.9843444	559	23.6431808	8.2376614
460	21.4476106	7.7194426	510	22.5831796	7.9895697	560	23.6643191	8.2425706
461	21.4709106	7.7250325	511	22.6053091	7.9947883	561	23.6854386	8.2474740
462	21.4941853	7.7306141	512	22.6274170	8.0000000	562	23.7065392	8.2523715
463	21.5174348	7.7361877	513	22.6495033	8.0052049	563	23.7276210	8.2572633
464	21.5406592	7.7417532	514	22.6715681	8.0104032	564	23.7486842	8.2621492
465	21.5638587	7.7473109	515	22.6936114	8.0155946	565	23.7697286	8.2670294
466	21.5870331	7.7528606	516	22.7156334	8.0207794	566	23.7907545	8.2719039
467	21.6101828	7.7584023	517	22.7376340	8.0259574	567	23.8117618	8.2767726
468	21.6333077	7.7639361	518	22.7596134	8.0311287	568	23.8327506	8.2816355
469	21.6564078	7.7694620	519	22.7815715	8.0362935	569	23.8537209	8.2864928
470	21.6794834	7.7749801	520	22.8035085	8.0414515	570	23.8746728	8.2913444
471	21.7025344	7.7804904	521	22.8254244	8.0466030	571	23.8956063	8.2961903
472	21.7255610	7.7859928	522	22.8473193	8.0517479	572	23.9165215	8.3010304
473	21.7485632	7.7914875	523	22.8691933	8.0568862	573	23.9374184	8.3058651
474	21.7715411	7.7969745	524	22.8910463	8.0620180	574	23.9582971	8.3106941
475	21.7944947	7.8024538	525	22.9128785	8.0671432	575	23.9791576	8.3155175
476	21.8174242	7.8079254	526	22.9346899	8.0722620	576	24.0000000	8.3203353
477	21.8403297	7.8133892	527	22.9564806	8.0773743	577	24.0208243	8.3251475
478	21.8632111	7.8188456	528	22.9782506	8.0824800	578	24.0416306	8.3299542
479	21.8860686	7.8242942	529	23.0000000	8.0875794	579	24.0624188	8.3347553
480	21.9089023	7.8297353	530	23.0217289	8.0926723	580	24.0831891	8.3395509
481	21.9317122	7.8351688	531	23.0434372	8.0977589	581	24.1039416	8.3443410
482	21.9544984	7.8405949	532	23.0651252	8.1028390	582	24.1246762	8.3491256
483	21.9772610	7.8460134	533	23.0867928	8.1079128	583	24.1453929	8.3539047
484	22.0000000	7.8514244	534	23.1084400	8.1129803	584	24.1660919	8.3586784
485	22.0227155	7.8568281	535	23.1300670	8.1180414	585	24.1867732	8.3634466
486	22.0454077	7.8622242	536	23.1516738	8.1230962	586	24.2074369	8.3682095
487	22.0680765	7.8676130	537	23.1732605	8.1281447	587	24.2280829	8.3729668
488	22.0907220	7.8729944	538	23.1948270	8.1331870	588	24.2487113	8.3777188
489	22.1133444	7.8783684	539	23.2163735	8.1382230	589	24.2693222	8.3824653
490	22.1359436	7.8837352	540	23.2379001	8.1432529	590	24.2899156	8.3872065
491	22.1585198	7.8890946	541	23.2594067	8.1482765	591	24.3104916	8.3919423
492	22.1810730	7.8944468	542	23.2808935	8.1532939	592	24.3310501	8.3966729
493	22.2036033	7.8997917	543	23.3023604	8.1583051	593	24.3515913	8.4030981
494	22.2261108	7.9051294	544	23.3238076	8.1633102	594	24.3721152	8.4061180
495	22.2485955	7.9104599	545	23.3452351	8.1683092	595	24.3926218	8.4108326
496	22.2710575	7.9157832	546	23.3666429	8.1733020	596	24.4131112	8.4155419
497	22.2934968	7.9210994	547	23.3880311	8.1782888	597	24.4335834	8.4202460
498	22.3159136	7.9264085	548	23.4093998	8.1832695	598	24.4540385	8.4249448
499	22.3383079	7.9317104	549	23.4307490	8.1882441	599	24.4744765	8.4296383
500	22.3606798	7.9370053	550	23.4520788	8.1932127	600	24.4948974	8.4343267

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
601	24.5153013	8.4390098	651	25.5147016	8.6668310	701	26.4764046	8.8832661
602	24.5356883	8.4436877	652	25.5342907	8.6712665	702	26.4952826	8.8874882
603	24.5560583	8.4483605	653	25.5538647	8.6756974	703	26.5141472	8.8917063
604	24.5764115	8.4530281	654	25.5734237	8.6801237	704	26.5329983	8.8959204
605	24.5967478	8.4576906	655	25.5929678	8.6845456	705	26.5518361	8.9001304
606	24.6170673	8.4623479	656	25.6124969	8.6889630	706	26.5706605	8.9043366
607	24.6373700	8.4670001	657	25.6320112	8.6933759	707	26.5894716	8.9085387
608	24.6576560	8.4716471	658	25.6515107	8.6977843	708	26.6082694	8.9127369
609	24.6779254	8.4762892	659	25.6709953	8.7021882	709	26.6270539	8.9169311
610	24.6981781	8.4809261	660	25.6904652	8.7065877	710	26.6458252	8.9211214
611	24.7184142	8.4855579	661	25.7099203	8.7109827	711	26.6645833	8.9253078
612	24.7386338	8.4901848	662	25.7293607	8.7153734	712	26.6833281	8.9294902
613	24.7588368	8.4948065	663	25.7487864	8.7197596	713	26.7020598	8.9336687
614	24.7790234	8.4994233	664	25.7681975	8.7241414	714	26.7207784	8.9378433
615	24.7991935	8.5040350	665	25.7875939	8.7285187	715	26.7394839	8.9420140
616	24.8193473	8.5086417	666	25.8069758	8.7328918	716	26.7581763	8.9461809
617	24.8394847	8.5132435	667	25.8263431	8.7372604	717	26.7768557	8.9503438
618	24.8596058	8.5178403	668	25.8456960	8.7416246	718	26.7955220	8.9545029
619	24.8797106	8.5224321	669	25.8650343	8.7459846	719	26.8141754	8.9586581
620	24.8997992	8.5270189	670	25.8843582	8.7503401	720	26.8328157	8.9628095
621	24.9198716	8.5316009	671	25.9036677	8.7546913	721	26.8514432	8.9669570
622	24.9399278	8.5361780	671	25.9229628	8.7590383	722	26.8700577	8.9711007
623	24.9599679	8.5407501	673	25.9422435	8.7633809	723	26.8886593	8.9752406
624	24.9799920	8.5453173	674	25.9615100	8.7677192	724	26.9072481	8.9793766
625	25.0000000	8.5498797	675	25.9807621	8.7720532	725	26.9258240	8.9835089
626	25.0199920	8.5544372	676	26.0000000	8.7763830	726	26.9443872	8.9876373
627	25.0399681	8.5589899	677	26.0192237	8.7807084	727	26.9629375	8.9917620
628	25.0599282	8.5635377	678	26.0384331	8.7850296	728	26.9814751	8.9958829
629	25.0798724	8.5680807	679	26.0576284	8.7893466	729	27.0000000	9.0000000
630	25.0998008	8.5726189	680	26.0768096	8.7936593	730	27.0185122	9.0041134
631	25.1197134	8.5771523	681	26.0959767	8.7979679	731	27.0370117	9.0082229
632	25.1396102	8.5816809	682	26.1151297	8.8022721	732	27.0554985	9.0123288
633	25.1594913	8.5862047	683	26.1342687	8.8065722	733	27.0739727	9.0164309
634	25.1793566	8.5907238	684	26.1533937	8.8108681	734	27.0924344	9.0205293
635	25.1992063	8.5952380	685	26.1725047	8.8151598	735	27.1108834	9.0246239
636	25.2190404	8.5997476	686	26.1916017	8.8194474	736	27.1293199	9.0287149
637	25.2388589	8.6042525	687	26.2106848	8.8237307	737	27.1477439	9.0328021
638	25.2586619	8.6087526	688	26.2297541	8.8280099	738	27.1661554	9.0368857
639	25.2784493	8.6132480	689	26.2488095	8.8322850	739	27.1845544	9.0409655
640	25.2982213	8.6177388	690	26.2678511	8.8365559	740	27.2029410	9.0450419
641	25.3179778	8.6222248	691	26.2868789	8.8408227	741	27.2213152	9.0491142
642	25.3377189	8.6267063	692	26.3058929	8.8450854	742	27.2396769	9.0531831
643	25.3574447	8.6311830	693	26.3248932	8.8493440	743	27.2580263	9.0572482
644	25.3771551	8.6356551	694	26.3438797	8.8535985	744	27.2763634	9.0613098
645	25.3968502	8.6401226	695	26.3628527	8.8578489	745	27.2946881	9.0653677
646	25.4165301	8.6445855	696	26.3818119	8.8620952	746	27.3130006	9.0694220
647	25.4361947	8.6490437	697	26.4007576	8.8663375	747	27.3313007	9.0734726
648	25.4558441	8.6534974	698	26.4196896	8.8705757	748	27.3495887	9.0775197
659	25.4754784	8.6579465	699	26.4386081	8.8748099	749	27.3678644	9.0815631
650	25.4950976	8.6623911	700	26.4575131	8.8790400	750	27.3861279	9.0856030

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
751	27.4043792	9.0896392	801	28.3019434	9.2870440	851	29.1719043	9.4763957
752	27.4226184	9.0936719	802	28.3196045	9.2909072	852	29.1890390	9.4801061
753	27.4408455	9.0977010	803	28.3372546	9.2947671	853	29.2061637	9.4838136
754	27.4590604	9.1017265	804	28.3548938	9.2986239	854	29.2232784	9.4875182
755	27.4772633	9.1057485	805	28.3725219	9.3024775	855	29.2403830	9.4912200
756	27.4954542	9.1097669	806	28.3901391	9.3063278	856	29.2574777	9.4949188
757	27.5136330	9.1137818	807	28.4077454	9.3101750	857	29.2745623	9.4986147
758	27.5317998	9.1177931	808	28.4253408	9.3140190	858	29.2916370	9.5023078
759	27.5499546	9.1218010	809	28.4429253	9.3178599	859	29.3087018	9.5059980
760	27.5680975	9.1258053	810	28.4604989	9.3216975	860	29.3257566	9.5096854
761	27.5862284	9.1298061	811	28.4780617	9.3255320	861	29.3428015	9.5133699
762	27.6043475	9.1338034	812	28.4956137	9.3293634	862	29.3598365	9.5170515
763	27.6224546	9.1377974	813	28.5131549	9.3331916	863	29.3768616	9.5207303
764	27.6405499	9.1417874	814	28.5306852	9.3370167	864	29.3938769	9.5244063
765	27.6586334	9.1457742	815	28.5482048	9.3408386	865	29.4108823	9.5280794
766	27.6767050	9.1497576	816	28.5657137	9.3446575	866	29.4278779	9.5317497
767	27.6947648	9.1537375	817	28.5832119	9.3484731	867	29.4448637	9.5354172
768	27.7128129	9.1577139	818	28.6006993	9.3522857	868	29.4618397	9.5390818
769	27.7308492	9.1616869	819	28.6181760	9.3560952	869	29.4788059	9.5427437
770	27.7488739	9.1656565	820	28.6356421	9.3599016	870	29.4957624	9.5464027
771	27.7668868	9.1696225	821	28.6530976	9.3637049	871	29.5127091	9.5500589
772	27.7848880	9.1735852	822	28.6705424	9.3675051	872	29.5296461	9.5537123
773	27.8028775	9.1775445	823	28.6879766	9.3713022	873	29.5465734	9.5573630
774	27.8208555	9.1815003	824	28.7054002	9.3750963	874	29.5634910	9.5610108
775	27.8388218	9.1854527	825	28.7228132	9.3788873	875	29.5803989	9.5646559
776	27.8567766	9.1894018	826	28.7402157	9.3826752	876	29.5972972	9.5682932
777	27.8747197	9.1933474	827	28.7576077	9.3864600	877	29.6141858	9.5719377
778	27.8926514	9.1972897	828	28.7749891	9.3902419	878	29.6310648	9.5755745
779	27.9105715	9.2012286	829	28.7923601	9.3940206	879	29.6479342	9.5792085
780	27.9284801	9.2051641	830	28.8097206	9.3977964	880	29.6647939	9.5828397
781	27.9463772	9.2090962	831	28.8270706	9.4015691	881	29.6816442	9.5864682
782	27.9642629	9.2130250	832	28.8444102	9.4053387	882	29.6984848	9.5900939
783	27.9821372	9.2169505	833	28.8617394	9.4091054	883	29.7153159	9.5937169
784	28.0000000	9.2208726	834	28.8790582	9.4128690	884	29.7321375	9.5973373
785	28.0178515	9.2247914	835	28.8963666	9.4166297	885	29.7489496	9.6009548
786	28.0356915	9.2287068	836	28.9136646	9.4203873	886	29.7657521	9.6045696
787	28.0535203	9.2326189	837	28.9309523	9.4241420	887	29.7825452	9.6081817
788	28.0713377	9.2365277	838	28.9482297	9.4278936	888	29.7993289	9.6117911
789	28.0891438	9.2404333	839	28.9654967	9.4316423	889	29.8161030	9.6153977
790	28.1069386	9.2443355	840	28.9827535	9.4353880	890	29.8328678	9.6190017
791	28.1247222	9.2482344	841	29.0000000	9.4391307	891	29.8496231	9.6226030
792	28.1424946	9.2521300	842	29.0172363	9.4428704	892	29.8663690	9.6262016
793	28.1602557	9.2560224	843	29.0344623	9.4466072	893	29.8831056	9.6297975
794	28.1780056	9 2599114	844	29.0516781	9.4503410	894	29.8998328	9.6333907
795	28.1957444	9.2637973	845	29.0688837	9.4540719	895	29.9165506	9.6369812
796	28.2134720	9.2676798	846	29.0860791	9.4577999	896	29.9332591	9.6405690
797	28.2311884	9.2715592	847	29.1032644	9.4615249	897	29.9499583	9.6441542
798	28.2488938	9.2754352	848	29.1204396	9.4652470	898	29.9666481	9.6477367
799	28.2665881	9.2793081	849	29.1376046	9.4689661	899	29.9833287	9.6513166
800	28.2842712	9.2831777	850	29.1547595	9.4726824	900	30.0000000	9.6548938

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
901	30.0166620	9.6584684	951	30.8382879	9.8339238	1001	31.6385840	10.0033322
902	30.0333148	9.6620403	952	30.8544972	9.8373695	1002	31.6543836	10.0066622
903	30.0499584	9.6656096	953	30.8706984	9.8408127	1003	31.6701752	10.0099899
904	30.0675928	9.6691762	954	30.8868904	9.8442536	1004	31.6859590	10.0133155
905	30.0832179	9.6727403	955	30.9030743	9.8476920	1005	31.7017349	10.0166389
906	30.0998339	9.6763017	956	30.9192497	9.8511280	1006	31.7175030	10.0199601
907	30.1164407	9.6798604	957	30.9354166	9.8545617	1007	31.7332633	10.0232791
908	30.1330383	9.6834166	958	30.9515751	9.8579929	1008	31.7490157	10.0265958
909	30.1496269	9.6869701	959	30.9677251	9.8614218	1009	31.7647603	10.0299104
910	30.1662063	9.6905211	960	30.9838668	9.8648483	1010	31.7804972	10.0332228
911	30.1827765	9.6940694	961	31.0000000	9.8682724	1011	31.7962262	10.0365330
912	30.1993377	9.6976151	962	31.0161248	9.8716941	1012	31.8119474	10.0398410
913	30.2158899	9.7011583	963	31.0322413	9.8751135	1013	31.8276609	10.0431469
914	30.2324329	9.7046989	964	31.0483494	9.8785305	1014	31.8433666	10.0464506
915	30.2489669	9.7082369	965	31.0644491	9.8819451	1015	31.8590646	10.0497521
916	30.2654919	9.7117723	966	31.0805405	9.8853574	1016	31.8747549	10.0530514
917	30.2820079	9.7153051	967	31.0966236	9.8887673	1017	31.8904374	10.0563485
918	30.2985148	9.7188354	968	31.1126984	9.8921749	1018	31.9061123	10.0596435
919	30.3150128	9.7223631	969	31.1287648	9.8955801	1019	31.9217794	10.0629364
920	30.3315018	9.7258883	970	31.1448230	9.8989830	1020	31.9374388	10.0662271
921	30.3479818	9.7294109	971	31.1608729	9.9023835	1021	31.9530906	10.0695156
922	30.3644529	9.7329309	972	31.1769145	9.9057817	1022	31.9687347	18.0728020
923	30.3809151	9.7364484	973	31.1929479	9.9091776	1023	31.9843712	10.0760863
924	30.3973683	9.7399634	974	31.2089731	9.9125712	1024	32.0000000	10.0793684
925	30.4138127	9.7434758	975	31.2249900	9.9159624	1025	32.0156212	10.0826484
926	30.4302481	9.7469857	976	31.2409987	9.9193513	1026	32.0312348	10.0859262
927	30.4466747	9.7504930	977	31.2569992	9.9227379	1027	32.0468407	10.0892019
928	30.4630924	9.7539979	978	31.2729915	9.9261222	1028	32.0624391	10.0924755
929	30.4795013	9.7575002	979	31.2889757	9.9295042	1029	32.0780298	10.0957469
930	30.4959014	9.7610001	980	31.3049517	9.9328839	1030	32.0936131	10.0990163
931	30.5122926	9.7644974	981	31.3209195	9.9362613	1031	32.1091887	10.1022835
932	30.5286750	9.7679922	982	31.3368792	9.9396363	1032	32.1247568	10.1055487
933	30.5450487	9.7714845	983	31.3528308	9.9430092	1033	32.1403173	10.1088117
934	30.5614136	9.7749743	984	31.3687743	9.9463797	1034	32.1558704	10.1120726
935	30.5777697	9.7784616	985	31.3847097	9.9497479	1035	32.1714159	10.1153314
936	30.5941171	9.7829466	986	31.4006369	9.9531138	1036	32.1869539	10.1185882
937	30.6104557	9.7854288	987	31.4165561	9.9564775	1037	32.2024844	10.1218428
938	30.6267857	9.7889087	988	31.4324673	9.9598389	1038	32.2180074	10.1250953
939	30.6431069	9.7923861	989	31.4483704	9.9631981	1039	32.2335229	10.1283457
940	30.6594194	9.7958611	990	31.4642654	9.9665549	1040	32.2490310	10.1315941
941	30.6757233	9.7993336	991	31.4801525	9.9699095	1041	32.2645316	10.1348403
942	30.6920185	9.8028036	992	31.4960315	9.9732619	1042	32.2800248	10.1380845
943	30.7083051	9.8062711	993	31.5119025	9.9766120	1043	32.2955105	10.1413266
944	30.7245830	9.8097362	994	31.5277655	9.9799599	1044	32.3109888	10.1445667
945	30.7408523	9.8131989	995	31.5436206	9.9833055	1045	32.3264598	10.1478047
946	30.7571130	9.8166591	996	31.5594677	9.9866488	1046	32.3419233	10.1510406
947	30.7733651	9.8201169	997	31.5753068	9.9899900	1047	32.3573794	10.1542744
948	30.7896086	9.8235723	998	31.5911380	9.9933289	1048	32.3728281	10.1575062
949	30.8058436	9.8270252	999	31.6069613	9.9966656	1049	32.3882695	10.1607359
950	30.8220700	9.8304757	1000	31.6227766	10.0000000	1050	32.4037035	10.1639636

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751	27.4043792	9.0896392	801	28.3019434	9.2870440	851	29.1719043	9.4763957
752	27.4226184	9.0936719	802	28.3196045	9.2909072	852	29.1890390	9.4801061
753	27.4408455	9.0977010	803	28.3372546	9.2947671	853	29.2061637	9.4838136
754	27.4590604	9.1017265	804	28.3548938	9.2986239	854	29.2232784	9.4875182
755	27.4772633	9.1057485	805	28.3725219	9.3024775	855	29.2403830	9.4912200
756	27.4954542	9.1097669	806	28.3901391	9.3063278	856	29.2574777	9.4949188
757	27.5136330	9.1137818	807	28.4077454	9.3101750	857	29.2745623	9.4986147
758	27.5317998	9.1177931	808	28.4253408	9.3140190	858	29.2916370	9.5023078
759	27.5499546	9.1218010	809	28.4429253	9.3178599	859	29.3087018	9.5059980
760	27.5680975	9.1258053	810	28.4604989	9.3216975	860	29.3257566	9.5096854
761	27.5862284	9.1298061	811	28.4780617	9.3255320	861	29.3428015	9.5133699
762	27.6043475	9.1338034	812	28.4956137	9.3293634	862	29.3598365	9.5170515
763	27.6224546	9.1377974	813	28.5131549	9.3331916	863	29.3768616	9.5207303
764	27.6405499	9.1417874	814	28.5306852	9.3370167	864	29.3938769	9.5244063
765	27.6586334	9.1457742	815	28.5482048	9.3408386	865	29.4108823	9.5280794
766	27.6767050	9.1497576	816	28.5657137	9.3446575	866	29.4278779	9.5317497
767	27.6947648	9.1537375	817	28.5832119	9.3484731	867	29.4448637	9.5354172
768	27.7128129	9.1577139	818	28.6006993	9.3522857	868	29.4618397	9.5390818
769	27.7308492	9.1616869	819	28.6181760	9.3560952	869	29.4788059	9.5427437
770	27.7488739	9.1656565	820	28.6356421	9.3599016	870	29.4957624	9.5464027
771	27.7668868	9.1696225	821	28.6530976	9.3637049	871	29.5127091	9.5500589
772	27.7848880	9.1735852	822	28.6705424	9.3675051	872	29.5296461	9.5537123
773	27.8028775	9.1775445	823	28.6879766	9.3713022	873	29.5465734	9.5573630
774	27.8208555	9.1815003	824	28.7054002	9.3750963	874	29.5634910	9.5610108
775	27.8388218	9.1854527	825	28.7228132	9.3788873	875	29.5803989	9.5646559
776	27.8567766	9.1894018	826	28.7402157	9.3826752	876	29.5972972	9.5682932
777	27.8747197	9.1933474	827	28.7576077	9.3864600	877	29.6141858	9.5719377
778	27.8926514	9.1972897	828	28.7749891	9.3902419	878	29.6310648	9.5755745
779	27.9105715	9.2012286	829	28.7923601	9.3940206	879	29.6479342	9.5792085
780	27.9284801	9.2051641	830	28.8097206	9.3977964	880	29.6647939	9.5828397
781	27.9463772	9.2090962	831	28.8270706	9.4015691	881	29.6816442	9.5864682
782	27.9642629	9.2130250	832	28.8444102	9.4053387	882	29.6984848	9.5900939
783	27.9821372	9.2169505	833	28.8617394	9.4091054	883	29.7153159	9.5937169
784	28.0000000	9.2208726	834	28.8790582	9.4128690	884	29.7321375	9.5973373
785	28.0178515	9.2247914	835	28.8963666	9.4166297	885	29.7489496	9.6009548
786	28.0356915	9.2287068	836	28.9136646	9.4203873	886	29.7657521	9.6045696
787	28.0535203	9.2326189	837	28.9309523	9.4241420	887	29.7825452	9.6081817
788	28.0713377	9.2365277	838	28.9482297	9.4278936	888	29.7993289	9.6117911
789	28.0891438	9.2404333	839	28.9654967	9.4316423	889	29.8161030	9.6153977
790	28.1069386	9.2443355	840	28.9827535	9.4353880	890	29.8328678	9.6190017
791	28.1247222	9.2482344	841	29.0000000	9.4391307	891	29.8496231	9.6226030
792	28.1424946	9.2521300	842	29.0172363	9.4428704	892	29.8663690	9.6262016
793	28.1602557	9.2560224	843	29.0344623	9.4466072	893	29.8831056	9.6297975
794	28.1780056	9 2599114	844	29.0516781	9.4503410	894	29.8998328	9.6333907
795	28.1957444	9.2637973	845	29.0688837	9.4540719	895	29.9165506	9.6369812
796	28.2134720	9.2676798	846	29.0860791	9.4577999	896	29.9332591	9.6405690
797	28.2311884	9.2715592	847	29.1032644	9.4615249	897	29.9499583	9.6441542
798	28.2488938	9.2754352	848	29.1204396	9.4652470	898	29.9666481	9.6477367
799	28.2665881	9.2793081	849	29.1376046	9.4689661	899	29.9833287	9.6513166
800	28.2842712	9.2831777	850	29.1547595	9.4726824	900	30.0000000	9.6548938

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
901	30.0166620	9.6584684	951	30.8382879	9.8339238	1001	31.6385840	10.0033322
902	30.0333148	9.6620403	952	30.8544972	9.8373695	1002	31.6543836	10.0066622
903	30.0499584	9.6656096	953	30.8706984	9.8408127	1003	31.6701752	10.0099899
904	30.0675928	9.6691762	954	30.8868904	9.8442536	1004	31.6859590	10.0133155
905	30.0832179	9.6727403	955	30.9030743	9.8476920	1005	31.7017349	10.0166389
906	30.0998339	9.6763017	956	30.9192497	9.8511280	1006	31.7175030	10.0199601
907	30.1164407	9.6798604	957	30.9354166	9.8545617	1007	31.7332633	10.0232791
908	30.1330383	9.6834166	958	30.9515751	9.8579929	1008	31.7490157	10.0265958
909	30.1496269	9.6869701	959	30.9677251	9.8614218	1009	31.7647603	10.0299104
910	30.1662063	9.6905211	960	30.9838668	9.8648483	1010	31.7804972	10.0332228
911	30.1827765	9.6940694	961	31.0000000	9.8682724	1011	31.7962262	10.0365330
912	30.1993377	9.6976151	962	31.0161248	9.8716941	1012	31.8119474	10.0398410
913	30.2158899	9.7011583	963	31.0322413	9.8751135	1013	31.8276609	10.0431469
914	30.2324329	9.7046989	964	31.0483494	9.8785305	1014	31.8433666	10.0464506
915	30.2489669	9.7082369	965	31.0644491	9.8819451	1015	31.8590646	10.0497521
916	30.2654919	9.7117723	966	31.0805405	9.8853574	1016	31.8747549	10.0530514
917	30.2820079	9.7153051	967	31.0966236	9.8887673	1017	31.8904374	10.0563485
918	30.2985148	9.7188354	968	31.1126984	9.8921749	1018	31.9061123	10.0596435
919	30.3150128	9.7223631	969	31.1287648	9.8955801	1019	31.9217794	10.0629364
920	30.3315018	9.7258883	970	31.1448230	9.8989830	1020	31.9374388	10.0662271
921	30.3479818	9.7294109	971	31.1608729	9.9023835	1021	31.9530906	10.0695156
922	30.3644529	9.7329309	972	31.1769145	9.9057817	1022	31.9687347	18.0728020
923	30.3809151	9.7364484	973	31.1929479	9.9091776	1023	31.9843712	10.0760863
924	30.3973683	9.7399634	974	31.2089731	9.9125712	1024	32.0000000	10.0793684
925	30.4138127	9.7434758	975	31.2249900	9.9159624	1025	32.0156212	10.0826484
926	30.4302481	9.7469857	976	31.2409987	9.9193513	1026	32.0312348	10.0859262
927	30.4466747	9.7504930	977	31.2569992	9.9227379	1027	32.0468407	10.0892019
928	30.4630924	9.7539979	978	31.2729915	9.9261222	1028	32.0624391	10.0924755
929	30.4795013	9.7575002	979	31.2889757	9.9295042	1029	32.0780298	10.0957469
930	30.4959014	9.7610001	980	31.3049517	9.9328839	1030	32.0936131	10.0990163
931	30.5122926	9.7644974	981	31.3209195	9.9362613	1031	32.1091887	10.1022835
932	30.5286750	9.7679922	982	31.3368792	9.9396363	1032	32.1247568	10.1055487
933	30.5450487	9.7714845	983	31.3528308	9.9430092	1033	32.1403173	10.1088117
934	30.5614136	9.7749743	984	31.3687743	9.9463797	1034	32.1558704	10.1120726
935	30.5777697	9.7784616	985	31.3847097	9.9497479	1035	32.1714159	10.1153314
936	30.5941171	9.7829466	986	31.4006369	9.9531138	1036	32.1869539	10.1185882
937	30.6104557	9.7854288	987	31.4165561	9.9564775	1037	32.2024844	10.1218428
938	30.6267857	9.7889087	988	31.4324673	9.9598389	1038	32.2180074	10.1250953
939	30.6431069	9.7923861	989	31.4483704	9.9631981	1039	32.2335229	10.1283457
940	30.6594194	9.7958611	990	31.4642654	9.9665549	1040	32.2490310	10.1315941
941	30.6757233	9.7993336	991	31.4801525	9.9699095	1041	32.2645316	10.1348403
942	30.6920185	9.8028036	992	31.4960315	9.9732619	1042	32.2800248	10.1380845
943	30.7083051	9.8062711	993	31.5119025	9.9766120	1043	32.2955105	10.1413266
944	30.7245830	9.8097362	994	31.5277655	9.9799599	1044	32.3109888	10.1445667
945	30.7408523	9.8131989	995	31.5436206	9.9833055	1045	32.3264598	10.1478047
946	30.7571130	9.8166591	996	31.5594677	9.9866488	1046	32.3419233	10.1510406
947	30.7733651	9.8201169	997	31.5753068	9.9899900	1047	32.3573794	10.1542744
948	30.7896086	9.8235723	998	31.5911380	9.9933289	1048	32.3728281	10.1575062
949	30.8058436	9.8270252	999	31.6069613	9.9966656	1049	32.3882695	10.1607359
950	30.8220700	9.8304757	1000	31.6227766	10.0000000	1050	32.4037035	10.1639636

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
1051	32.4191301	10.1671893	1101	33.1813200	10.3259284	1151	33.9263909	10.4799314
1052	32.4345495	10.1704129	1102	33.1963853	10.3290537	1152	33.9411255	10.4829656
1053	32.4499615	10.1736344	1103	33.2114438	10.3321770	1153	33.9558537	10.4859980
1054	32.4653662	10.1768539	1104	33.2264955	10.3352985	1154	33.9705755	10.4890286
1055	32.4807635	10.1800714	1105	33.2415403	10.3384181	1155	33.9852910	10.4920575
1056	32.4961536	10.1832868	1106	33.2565783	10.3415358	1156	34.0000000	10.4950847
1057	32.5115364	10.1865002	1107	33.2716095	10.3446517	1157	34.0147027	10.4981101
1058	32.5269119	10.1897116	1108	33.2866339	10.3477657	1158	34.0293990	10.5011337
1059	32.5422802	10.1929209	1109	33.3016516	10.3508778	1159	34.0440890	10.5041556
1060	32.5576412	16.1961283	1110	33.3166625	10.3539880	1160	34.0587727	10.5071757
1061	32.5729949	10.1993336	1111	33.3316666	10.3570964	1161	34.0734501	10.5101942
1062	32.5883415	10.2025369	1112	33.3466640	10.3602029	1162	34.0881211	10.5132109
1063	32.6036807	10.2057382	1113	33.3616546	10.3633076	1163	34.1027858	10.5162259
1064	32.6190129	10.2089375	1114	33.3766385	10.3664103	1164	34.1174442	10.5192391
1065	32.6343377	10.2121347	1115	33.3916157	10.3695113	1165	34.1320963	10.5222506
1066	32.6496554	10.2153300	1116	33.4065862	10.3726103	1166	34.1467422	10.5252604
1067	32.6649659	10.2185233	1117	33.4215499	10.3757076	1167	34.1613817	10.5282685
1068	32.6802693	10.2217146	1118	33.4365070	10.3788030	1168	34.1760150	10.5312749
1069	32.6955654	10.2249039	1119	33.4514573	10.3818965	1169	34.1906420	10.5342795
1070	32.7108544	10.2280912	1120	33.4664011	10.3849882	1170	34.2052627	10.5372825
1071	32.7261363	10.2312766	1121	33.4813381	10.3880781	1171	34.2198773	10.5402837
1072	32.7414111	10.2344599	1122	33.4962684	10.3911661	1172	34.2344855	10.5432832
1073	32.7566787	10.2376413	1123	33.5111921	10.3942523	1173	34.2490875	10.5462810
1074	32.7719392	10.2408207	1124	33.5261092	10.3973366	1174	34.2636834	10.5492771
1075	32.7871926	10.2439981	1125	33.5410196	10.4004192	1175	34.2782730	10.5522715
1076	32.8024389	10.2471735	1126	33.5559234	10.4934999	1176	34.2928564	10.5552642
1077	32.8176782	10.2503470	1127	33.5708206	10.4065787	1177	34.3074336	10.5582552
1078	32.8329103	10.2535186	1128	33.5857112	10.4096557	1178	34.3220046	10.5612445
1079	32.8481354	10.2566881	1129	33.6005952	10.4127310	1179	34.3365694	10.5642322
1080	32.8633535	10.2598557	1130	33.6154726	10.4158044	1180	34.3511281	16.5672181
1081	32.8785644	10.2630213	1131	33.6303434	10.4188760	1181	34.3656805	10.5702024
1082	32.8937684	10.2661850	1132	33.6452077	10.4219458	1182	34.3802268	10.5731849
1083	32.9089653	10.2693467	1133	33.6600653	10.4250138	1183	34.3947670	10.5761658
1084	32.9241553	10.2725065	1134	33.6749165	10.4280800	1184	34.4093011	10.5791449
1085	32.9393382	10.2756644	1135	33.6897610	10.4311443	1185	34.4238289	10.5821225
1086	32.9545141	10.2788203	1136	33.7045991	10.4342069	1186	34.4383507	10.5850983
1087	32.9696830	10.2819743	1137	33.7194306	10.4372677	1187	34.4528663	10.5880725
1088	32.9848450	10.2851264	1138	33.7342556	10.4403267	1188	34.4673759	10.5910450
1089	33.0000000	10.2882765	1139	33.7490741	10.4433839	1189	34.4818793	10.5940158
1090	33.0151480	10.2914247	1140	33.7638860	10.4464393	1190	34.4963766	10.5969850
1091	33.0302891	10.2945709	1141	33.7786915	10.4494929	1191	34.5108678	10.5999525
1092	33.0454233	10.2977153	1142	33.7934905	10.4525448	1192	34.5253530	10.6029184
1093	33.0605505	10.3008577	1143	33.8082830	10.4555948	1193	34.5398321	10.6058826
1094	33.0756708	10.3039982	1144	33.8230691	10.4586431	1194	34.5543051	10.6088451
1095	33.0907842	10.3071368	1145	33.8378486	10.4616896	1195	34.5687720	10.6118060
1096	33.1058907	10.3102735	1146	33.8526218	10.4647343	1196	34.5832329	10.6147652
1097	33.1209903	10.3134083	1147	33.8673884	10.4677773	1197	34.5976879	10.6177228
1098	33.1360830	10.3165411	1148	33.8821487	10.4708185	1198	34.6121366	10.6206788
1099	33.1511689	10.3196721	1149	33.8969025	10.4738579	1199	34.6265794	10.6236331
1100	33.1662479	10.3228012	1150	33.9116499	10.4768955	1200	34.6410162	10.6265857

Root, *False*. See False.

Root, *Impossible*, is not only the square root of a negative quantity, but any other root denominated by any even number. Thus $\sqrt[4]{-1}$, $\sqrt[6]{-1}$, $\sqrt[8]{-1}$, or in general $\sqrt[2m]{-1}$, $\sqrt[2m]{-x}$, are all *impossible* roots, or quantities. Some call them imaginary roots or quantities. See False *Root*.

Root, *Real*. See False *Root*.

Root, *Residual*. See Residual.

Roots *of Equations*, *Extraction of the*. See Extraction, Reduction *of Equations*, and Root *of an Equation*, supra.

Roots, *Radices*, in *Grammar*, are the primitive words of a language, whence others are compounded or derived.

Thus the Latin *fluo* is the root of *fluctus*, *fluxio*, *flumen*, *fluvialis*, *influxus*, *refluens*, *fluctifer*, *fluctisonus*, *fluctivagus*, &c. Thus also the Greek [illegible] is the root of [illegible], [illegible], [illegible], &c.

And thus also, though in a less proper sense, the Danish *rood* is the root of the English word *root*; the Latin *radix* the root of the French *racine*, as *rado* is the root of *radix*; and perhaps ῥάδιος the root of *rado*.

Roots, in the Hebrew language, consist of those letters that are denominated *radical* (which see), and are generally verbs, consisting commonly of three, sometimes of two, and rarely of four letters. Of whatever letters, whether radical or servile, any word consists, it must, at least, contain one of a radical character. The investigation of the radical and a primitive is an object of importance in grammar. In order to facilitate their investigation in the Hebrew, and other Eastern languages, it is necessary to be well acquainted with the division of the letters into *radical* and *servile* (see each term), because these last must be rejected before the root is obtained.

If the root consist of pure radicals, commonly *three* in number, it is easily found, and as easily divested of the serviles which attend it. But, as the servile letters may also constitute roots, it is sometimes a matter of difficulty to distinguish when these letters ought to be considered in their *radical*, and when in their *servile* capacity. This difficulty is increased in the verbs denominated *imperfect*. For, in some of their parts, either by contraction, or commutation, these verbs lose sometimes one, sometimes two, of their radical letters, which must be restored to their place before the root can be exhibited in its true form.

The learner must therefore endeavour, by frequent practice, to acquire a dexterity in discovering the radical letters, in divesting them of their serviles, and in restoring them where they are lost by the abbreviated flexions. This exercise is the more necessary, as, in almost all lexicons, the words are arranged according to the alphabetical order of the roots. These are commonly printed in a larger character, and have below them their derivatives, as children and descendants. By this plan, neither the signification of any verb, nor of any noun derived from it, can be found, till its root be investigated and determined.

The following directions will be found useful in the investigation of radical words.

The chief things to be attended to are, what letters are commonly servile, either in nouns or verbs; in what part of the word they most generally appear; and what is the most probable conjecture to be formed, in order to restore such radicals as are lost by the abbreviated flexions.

The servile letters in nouns are such as form the feminine gender, and the plural terminations, the prefixes, including the signs of the cases, the heemantic letters, and the possessive pronouns, or affixes.

The servile letters in verbs are the personal prefixes and postfixes, formerly named the *pronominal serviles*, the characteristics of the different forms, and the verbal affixes.

ו and י whether inserted in nouns or verbs, must be rejected in the investigation of the root.

As the serviles generally appear in greatest number at the end of words, the most proper method of discovering the root seems to be this:

Begin from the left hand, remove the serviles as you go along, retain the pure and the supposed radicals, reject the inserted ו and י, restore or commute the radicals lost by abbreviations, and, finally, reject the prefixes.

Directions for finding the Root, and for restoring the deficient Radicals.

I. If, after rejecting the serviles, three pure radicals remain, you may conclude these to be the root.

II. If only two remain, as is the common case in abbreviated roots, prefix to these either נ or י or insert ו betwixt them, or postpone ה or double the second.

The investigation of roots is not peculiar to the Hebrew, but common to all languages, and is of singular advantage, if we would attend to accuracy and propriety of writing.

In such languages as do not admit of the distinction between radical and servile letters, the following may be observed as general rules for reducing words to their first principles. Let that part of the word which remains unvaried be considered as the radical term, and let the changes of termination be disregarded, or cut off. Compound words must be resolved into their component parts, and the prepositions excluded. In those words which seem reducible to Hebrew roots consisting entirely of consonants, the intermediate vowels employed for their enunciation, are not to be considered as essential, or as constituting a part of the root. See Wilson's Elements of Hebrew Grammar. Masclef Gram. Heb. vol. i. c. 21. p. 214, &c. Robertson's Gram. Heb. Appendix, iii.

The Greek and Hebrew tongues are learnt by roots. Of dictionaries, some are in alphabetical order, others are disposed by roots, as Scapula, Faber's Thesaurus, and the first edition of the Dictionary of the French Academy. In the edition of 1718, this last is thrown into the usual alphabetical order.

ROOTS, in *Geography*, a town of Virginia, in the Mattapony; four miles N.E. of West Point.

Roots, a township of Portage county, in the Ohio, containing 216 inhabitants.

ROOTWELT, in *Husbandry*, a term applied to the hattocks of grain, when the butt-ends of the sheaves are turned up towards the wind and sun, in order to dry them. The practice is common in bad rainy harvests. See Harvest, and Harvesting *Grain*.

ROPALON, in *Botany*, a name given by some authors to the *nymphæa*, or water-lily, and also to the *faba Ægyptia* of the river Nile.

ROPE, an assemblage of several twists or strings of hemp, twisted together by means of a wheel; of various uses, as in binding, staying, drawing, suspending, &c.; or, all cordage, in general, above one inch in circumference, mostly made of hemp spun into yarns or threads of a certain length; and a number of these yarns or threads, according to the size of the rope, are twisted together, and called a strand. Three of these strands twisted or laid together, is called a hawser-laid rope, and nine of them a cable-laid rope. See Rope-*Making*.

R O P

When the rope is made very thick, it is called a *cable*; and when very fmall, a *cord*.

Though it be difficult to give a certain account of the forces required to bend ropes of different diameters, in making them go round bodies of different bigneffes, yet to make no allowance for the lofs of motion fuftained thereby, would be as prejudicial to the practice of mechanics, as it would be to overlook the friction of the parts of engines. The difficulty of afcertaining this force arifes from the different materials of which they are made, their different ftiffnefs according as they are more or lefs twifted; and fometimes from the temperature of the air, as to moifture and drynefs.

Dr. Defaguliers has computed the forces required to bend ropes of different diameters, ftretched by different weights, round rollers of different bigneffes. The refult of his experiment is expreffed in the following table.

Diameters of the ropes of three ftrands, expreffed in tenth parts of an inch.	Weights ftretching the ropes, expreffed in lb. avoirdupois.	Refiftance about a roller of half an inch diameter, in oz. avoirdupois.	Refiftance about a roller of one inch in diameter, in oz. avoirdupois.	Refiftance about a roller one and a half inch diameter, in oz. avoirdupois.
	lb.	oz.	oz.	oz.
0.5	60	225	112½	75
0.2	60	90	45	30
0.1	60	45	22½	15
0.5	40	150	75	50
0.2	40	60	30	20
0.1	40	30	15	10
0.5	20	75	37½	25
0.2	20	30	15	10
0.1	20	15	7½	*

On the whole, it has been found by experiments, that the difficulty of bending a rope round a roller decreafes directly as the diameter of the roller increafes, or is, inverfely, as the diameter of the roller. See Defaguliers, Experim. Phil. vol. i. p. 233, &c. See alfo CORDAGE.

A TABLE, fhewing how many fathoms, feet, and inches of a rope of any fize, under fourteen inches, makes a hundred weight, with the ufe of the table.

Inches.	Fathoms.	Feet.	Inches.	Inches.	Fathoms.	Feet.	Inches.	Inches.	Fathoms.	Feet.	Inches.	Inches.	Fathoms.	Feet.	Inches.
1	486	0	0	4½	24	0	0	8	7	3	6	11½	3	4	1
1¼	313	13	0	4¾	21	3	0	8¼	7	0	8	11¾	3	3	3
1½	216	0	0	5	19	3	0	8½	6	4	3	12	3	2	3
1¾	159	3	0	5¼	17	4	0	8¾	6	2	1	12¼	3	2	1
2	124	3	0	5½	16	1	0	9	6	0	0	12½	3	2	0
2¼	96	2	0	5¾	14	4	6	9¼	5	4	0	12¾	2	7	8
2½	77	3	0	6	13	3	0	9½	5	2	0	13	2	5	3
2¾	65	4	0	6¼	12	2	0	9¾	5	0	6	13¼	2	4	9
3	54	0	0	6½	11	3	0	10	4	5	0	13½	2	4	0
3¼	45	5	2	6¾	10	4	0	10¼	4	4	1	13¾	2	3	6
3½	39	3	0	7	9	5	6	10½	4	2	2	14	2	2	1
3¾	34	3	9	7¼	9	1	6	10¾	4	1	8				
4	30	1	6	7½	8	4	0	11	4	0	3				
4¼	26	5	3	7¾	8	3	6	11¼	3	5	7				

Suppofe I want to know how much of eight-inch and quarter rope will make a hundred weight? Find 8¼ under inches, and againft it, in the fixth column, you find 7 0 8, which fhews in a rope of 8¼, there will be feven fathoms eight inches required to make one hundred weight.

A TABLE, fhewing the weight of any cable or rope of 120 fathoms in length, and for every half inch from three inches to twenty-four in circumference.

Inches.	Cwts.	Qrs.	Inches.	Cwts.	Qrs.	Inches.	Cwts.	Qrs.	Inches.	Cwts.	Qrs.	Inches.	Cwts.	Qrs.
3	2	1	7½	14	0	12	36	0	16½	68	0	21	110	1
3½	4	0	8	16	0	12½	39	0	17	72	1	21½	115	2
4	4	1	8½	18	0	13	42	1	17½	76	2	22	121	0
4½	5	0	9	20	1	13½	45	7	18	81	0	22½	126	2
5	5	1	9½	22	2	14	49	0	18½	85	2	23	132	1
5½	7	0	10	25	0	14½	52	2	19	90	1	23½	138	0
6	9	0	10½	27	2	15	56	1	19½	95	0	24	144	0
6½	10	2	11	30	1	15½	60	0	20	100	0			
7	10	1	11½	33	0	16	64	0	20½	105	0			

The greateft confumption of rope is ufed for the purpofes of navigation in rigging of fhips: where, though ropes include the whole cordage, there are feveral particularly denominated, and which have particular names given to them; as follow. 1. Awning-ropes are the ridge and fide-ropes. The ridge-rope reeves through the trucks feized along the middle of the awning; the fide-ropes reeve through the trucks feized along the fide of the awning. By thefe ropes the awnings are fpread between the mafts. 2. Bell-rope, nine or ten feet in length, which fplices round a thimble in the eye of the bell-crank. In the middle of the rope is a diamond-knot, and at the end a double wall-knot crowned. 3. Boat-rope, or painter, that by which the boat is towed at the ftern; it fplices with a thimble to a ring-bolt infide the ftem. 4. Bolt-rope, the rope fewed to the edges of the fails, as the head-rope, foot-rope, and leech-rope. 5. Breaft-rope, that faftened along the laniard of the fhrouds, for fafety, when heaving the lead in the chains. 6. Bucket-rope, that which is faftened to the bucket for hauling up water. 7. Buoy-rope, the one faftened to the buoy and crown of the anchor. 8. Davit-rope, the lafhing which fecures the davit to the fhrouds when out of ufe. 9. Entering-ropes have their upper end thruft through the eye in the iron-ftantions at the gangways, and are walled and crowned; and diamond-knots are made at every nine inches afunder in the whole length. 10. Grapnel-rope, that which is bent to the grapnel, by which the boats ride. 11. Guift-rope, that faftened to an eye-bolt in the fhip's fide, and to the outer end of a boom projecting from the fhip's fide, by guys, to keep the boats clear from rubbing againft the fides. 12. Heel-rope, that which hauls out the bowfprit of cutters, and the jib and ftudding-fail boom. 13. Man-ropes are for the fecurity of the men going out upon the bowfprit. 14. Parral-ropes are to connect the ribs and trucks of the parral together. 15. Paffing-ropes lead round the fhip through the eyes in the quarter waift and forecaftle-ftantions, have one end ftopped through the eye of the gangway-ftantion, with a wall-knot crowned, and are fet forward through an eye-bolt in the knight-head with a laniard, having a thimble turned into the end. 16. Ring-ropes are occafionally made faft to the ring or ftopper-bolts in the deck, and by crofs turns round the cable, to confine it more fecurely in ftormy weather. 17. Slip-rope is to trice the bight of the cable into the heads;

heads; a ſlip-rope is alſo uſed in caſting off a veſſel, till got into the tide's way, &c. 18. Swab-rope is made faſt to the eye of the ſwab, to raiſe it out of the water. 19. Tiller-ropes are the ropes by which the tiller is worked by means of the ſteering-wheel. 20. Top-rope is the rope that is reeved through the ſheave-hole in the heel of the topmaſt, to raiſe it by its tackle to the maſt-head. 21. Yard-ropes are only temporarily uſed to heave the yards on board.

Ropes are diſtinguiſhed by being either *cable-laid* or *hawſer-laid:* the former are compoſed of nine ſtrands, *viz.* three great ſtrands, each of which is compoſed of three ſmaller ſtrands, and each containing an equal number of threads: and a rope, cable-laid, eight inches in circumference, has 333 threads, equally divided, and laid into nine ſtrands: the latter is made with three ſtrands, each of which contains a certain number of rope-yarns, in proportion to the ſize of the rope required. A rope hawſer-laid, eight inches in circumference, has 414 threads, equally divided, and laid into three ſtrands. Thirty fathoms of yarn make eighteen fathoms of rope cable-laid, and ſo in proportion. Thirty fathoms of yarn make twenty fathoms of rope hawſer-laid, and ſo in proportion. Ropes of from one to two and a half inches in circumference are hawſer-laid; of three inches to ten inches, either hawſer-laid or cable-laid; and from ten inches to any greater dimenſion, always cable-laid.

Twice-laid cordage is made of caſt rigging, as ſhrouds, ſtays, mooring and other cables, which, if not much worn, will make good ropes for netting ſhips' ſides, worming and woolding for cables, ſpun-yarn for ſeizing, worming for large ſtays, ſeizing for ſtrops of blocks, ſmall cable-laid ropes for warping ſhips, ratlines, ſcaffolding-ropes for dock yards, &c.

When the yarn of this old ſtuff is overhauled, a little thin tar ſhould be poured on it, which will make it pliable and lie better. The yarn unfit for knotting will pick into oakum for caulking.

To open a cable, for making it into ſmall ropes, hang the ſtrands upon three hooks in the tackle-board, ſtretch it out tight upon the hooks in the ſledge, and heave till they are untwiſted; then draw out the yarn.

The proceſs of making ſmall ropes is ſimilar to making large ones, except the twiſting and cloſing, which are done by a back-frame wheel or a table-wheel. See the next article.

Rope-*Making*, the art of preparing hemp, and ſpinning it into yarns or threads, and twiſting thoſe threads into ſtrands, and laying thoſe ſtrands into cordage of the largeſt ſize, as the ſmalleſt kind is called *cord* or *twine* ſpinning.

Before we proceed further, it may be neceſſary to inform our readers of the different ſorts of hemp proper to be made uſe of in the manufacturing of cordage. Of all the hemps yet produced at our Engliſh markets, the Ruſſian hemp has proved to be the beſt; it is grown in the ſouthernmoſt parts of Ruſſia, and ſhipped for England from the ports of St. Peterſburgh and Riga. The beſt ſort is Riga rhine hemp: the next in quality is termed Peterſburgh clean hemp. Theſe two are conſidered the beſt ſorts of hemp to be uſed in making the ſtrongeſt cordage.

The firſt proceſs in the art of rope-making is, *Hatchelling the Hemp.*

Hatchelling the hemp, is the combing or clearing the ends, which elſe, in ſpinning, would run in with the long hemp, and ſo preparing it ready for the ſpinner; in the proceſs of which, care and particular attention muſt be paid by the hatchellers that they do not uſe too great a quantity of oil, as in ſuch caſe it will prevent the yarn from imbibing its proper proportion of tar, and thereby prove a ſerious injury.

N. B. A ſmall quantity of train-oil, ſay one pint to every hundred weight, ſprinkled or daubed with a wad on the hemp, facilitates the hatcheller's buſineſs exceedingly, and is very neceſſary when the hemp is ſomewhat too dry, as the ſpinners are better able to perform their buſineſs when it has received ſuch aſſiſtance.

The ſecond and principal proceſs to be attended to in the manufacturing of cordage, is *Spinning the Yarn.*

In ſpinning, particular attention muſt be paid by the ſpinner that the yarn be ſpun even, ſolid, and round; to accompliſh which, he muſt ſpin with a ſtrong even grip of the hand, taking care not to make his yarn larger in one place than in another, nor make a practice of ſpinning too much in a hurry; and the ſpinning-wheel muſt be kept turning a conſtant regular pace, otherwiſe the yarn ſo ſpun will loſe its principal ſupport, which is its proper turn, or twiſt, and will be little ſtronger than a parcel of ſtraight hemp laid together, which would break in warping or ſtraining up. The following regulations muſt be attended to in ſpinning. Every ſpinner is to ſpin out of the beſt hemp ſix threads, one hundred and ſixty fathoms long, for a quarter of a day's work; but he is to ſpin out of the hemp which compoſe the bands by which the bales of hemp are bound together, no more than four threads, one hundred and ſixty fathoms long, for one quarter of a day's work. To every twelve ſpinners there are allowed two hatchellers, one wheel-turner, and one wheel-tender: the wheel-tender's buſineſs is to ſplice the threads, and wind them on winches. The latter mentioned perſons are paid in the ſame proportions as the ſpinners, that is, according to what work is done upon the wheel, only with this difference, the ſpinners are paid ſeven-pence *per* quarter for their work, the hatchellers, wheel-turner, and wheel-tender, only ſixpence.

Each thread of the under-mentioned ſizes of yarn to the ſpinning mark, (*viz.* 160 fathoms,) ſhould weigh as follows:

	lbs.	oz.	drs.		lbs.	oz.	drs.
16	4	0	0	21	3	0	4
17	3	12	4	22	2	14	9
18	3	8	14	23	2	12	8
19	3	5	14	24	2	10	10
20	3	3	3	25	2	8	15

The third proceſs to be attended to in the manufacturing of cordage, is *Warping the Yarn.*

Warping the yarn, is the ſtretching the yarns, previouſly to their being tarred, all to one given length, which, in full length rope grounds, is two hundred fathoms, and putting a ſlight turn or twiſt into it. The uſual method is to warp the yarn either in whole or half hawls, which is done by putting the number of threads you mean to draw down at once in a bite, into a block with one ſheave, (the one end of the bite of yarn being faſt at the upper end,) which being drawn down and fixed over the end of a hook made faſt to a poſt at one hundred fathoms diſtance from the warping poſt, forms, when opened, a length of two hundred fathoms, as above-mentioned. The number of half bites, or blocks of yarn, contained in a whole or half hawl, is to be governed, in a great meaſure, by the ſize of the yarn to be warped,—as, for inſtance, 16 to 19-thread yarn is warped three hundred and thirty-ſix threads in a hawl, 20 to 25-thread yarn is warped four hundred threads in a hawl. In winding the yarns on the winches after they are ſpun, it is moſt uſual to wind them on in companies of four in a company; but as that method cannot always be purſued, it frequently happens that whole or half hawls of yarn are obliged to be warped in half bites of an odd number.

The following rules and regulations reſpecting the warping of yarn muſt be particularly attended to.

In a hawl of yarn containing three hundred and thirty-ſix threads, there ſhould be warped as under-mentioned.

½ Bites.	Threads.			
37	3	of	9	threads in a ½ bite.
33	6		10	ditto.
30	6		11	ditto.
28	0		12	ditto.
25	11		13	ditto.
24	0		14	ditto.
22	6		15	ditto.
21	0		16	ditto.
19	13		17	ditto.
18	12		18	ditto.
17	13		19	ditto.
16	16		20	ditto.

In a hawl of yarn containing four hundred threads, there ſhould be warped as under-mentioned.

½ Bites.	Threads.			
44	4	of	9	threads in a ½ bite.
40	0		10	ditto.
36	4		11	ditto.
33	9		12	ditto.
30	11		13	ditto.
28	8		14	ditto.
26	10		15	ditto.
25	0		16	ditto.
23	9		17	ditto.
22	4		18	ditto.
21	1		19	ditto.
20	0		20	ditto.

When the yarn is warped in half hawls, it is to be carefully obſerved that only half the number of yarns, or threads, above-mentioned, are to be warped, and care ſhould be taken to warp the number of threads as near as poſſible.

It requires three men to warp a hawl of yarn, who are employed as follows: *viz.* two men to warp (or draw the yarns to their proper diſtance), and one man to ſet up (that is, to tighten the yarns, and bring each yarn to its proper bearing): each man is allowed twelve threads (or two quarters of a day's work) for his labour.

To take the hawl of yarn up after it is warped, and carry the ſame into the tar-houſe, requires ten men, who are each paid one thread (*viz.* one penny) for their labour.

The fourth proceſs to be attended to in the manufacturing of cordage, is *Tarring the Yarn.*

Tarring the yarn is a proceſs which ſhould be particularly attended to, being extremely careful that the tar is not boiling too faſt nor too ſlow; if too faſt, the tar will not ſtay in the yarn, if not hot enough, the tar will not ſufficiently penetrate the yarn; therefore a ſtrict medium muſt be carefully obſerved by the kettle-heater, as well as to keep the horſe, or men, which turn the capſtan round, going at a gentle, ſteady pace, thereby giving the yarn a proper time to imbibe its neceſſary proportion of tar, but at the ſame time not ſuffering it to be kept in the boiling tar too long, which is apt to make the yarn very tender, therefore ſhould be very carefully avoided; and ſhould the capſtan be ſtopped by accident, the ſtop that keeps the yarn down muſt be inſtantly raiſed, and the yarn taken out. Particular attention ſhould alſo be paid in paying (or coiling) the yarn into the kettle, that too long a length be not payed in at once; if it is ſo done, the yarn will, of courſe, touch the bottom of the kettle, which it ſhould, by no means, be ſuffered to do, as in ſuch caſe it will imbibe the dregs and ſettlements of the tar appertaining to the bottom of the kettle, and make the yarn in ſuch places black, or very much diſcoloured, and have a very unpleaſing appearance in the rope when made. Yarn for cables requires more tar than for hawſer-laid ropes. For ſtanding and running rigging the leſs tar the better, provided the thread is well covered. It ſhould be always remembered that the yarn, when tarred, ſhould be overſet (or removed) the ſame day, as this piece of buſineſs, being omitted, will be likely to prove of a ſerious conſequence in heating and tendering the yarn, which at all times muſt be carefully avoided. In overſetting the yarn it ſhould always be remembered that the yarn be well ſhook and opened for two or three days, as in ſo doing it admits the air, ſeparates and hardens the yarns, and contributes very much to the ſtrength of the cordage. The hawls or half hawls of yarn, when tarred, ſhould always be weighed and tallied.

Tarring yarn requires three men, who are employed as follows: *viz.* one to heat the kettle, one to pay (or coil) the yarn in the kettle, and one to haul off and overſet the yarn. They are, in general, paid in proportion to the work the ſpinners perform, which is called going by the wheel.

The fifth and laſt proceſs to be attended to, is *Laying the Cordage.*

In laying cables, and all ſorts of ropes in general, the great art lies in making each yarn to bear alike. For this purpoſe it was, particularly in the larger ſized cables, that the patent machines have been introduced. Particular attention muſt be paid to this point, as therein conſiſts the grand principle of making a ſtrong rope. For all ſorts of ropes which are to be immerged in the water, the utmoſt care muſt be taken to give the ſtrands their proper hardneſs in their firſt proceſs, according to the remarks laid down before, which will prevent the water from penetrating the ſtrands, and thereby preſerve the inſide yarns of the cable; as, if this proceſs is not regularly attended to, the inſide yarns will be always wet, and very ſoon decay. It frequently happens that when the yarn is tarred ſomewhat too deep, that many a cable is ſpoiled, though not intentionally; the fear in the perſon who has the direction in making the cable, of turning a very dark coloured rope out of hand, prevents the regular make being given the cordage, as in preſſing the yarn to their proper hardneſs, the tar will ſpring out, very much diſcolour the rope, and thereby give it a very unpleaſing appearance, eſpecially when the ſun is ſhining very hot upon the yarn; to prevent which, in a great meaſure, care ſhould be taken, in the ſummer months, to lay cables, and all ſorts of cordage in general, either early in the morning, before the ſun has much power on the yarn, which is alſo apt to tender it, or late in the evening, after the ſun has ſet, or gone off the ground, or in heavy weather (by no means rainy); in which caſe your cordage will have a bright pleaſing appearance, as the ſmall fibres of the hemp will all yield to the top, and lay ſmooth, which otherwiſe would look rough, and appear as if the cordage was made of inferior hemp, though in fact it was not ſo, as all ſorts of hemp have ſmall fibres appertaining to them, and which it is paſt the art of man to prevent the ſun from drawing up, and thereby making the rope look rough and unſeemly.

N. B. The above remarks reſpecting taking advantage of the time for laying the cordage are only to be obſerved in uncovered grounds.

In

In *laying cordage*, the yarn for twiſting into ſtrands is hung on the hooks in the tackle-board, at the upper end of the ground, and upon hooks in the breaſt-board of the ſledge, at the lower end, which are turned by men at both ends until the ſtrands are hard; and are kept up from the ground by the ſtake-heads.

Before the turn is put in, the yarn ſhould be ſtretched to its full extent by means of the tackle fixed from the ſledge to the capſtern, at twenty yards aſunder, at the lower end of the ground; and when ſtretched to two hundred fathoms, the preſs is put upon the ſledge and drag, before the tackle-fall is caſt off; for if the yarn be not properly ſtretched before the tackle-fall is caſt off, the rope will not be of its ſize, nor well made.

The ſtrands ſhould have a good hardening before the top is put in to lay the rope, and the layer ſhould ſee that the heavers at the upper end keep the ſame hardneſs that the ſtrands had before the top ſet off, nor ſhould he begin to lay the rope until the ſledge or wheel is moved by the power of the twiſt from the upper end.

When twiſted ſufficiently hard, the ſtrands are hung on one hook in the breaſt-board of the ſledge, but remain ſeparate on the three hooks at the other end. The top is placed in at the ſledge, and the rope twiſted by turning the hooks at both ends one way, and, as the rope cloſes, the top moves towards the upper end.

When the top is put in, ſome of the weight ſhould be taken off the ſledge or drag, for if laid with as much weight as is uſed in the hardening, it would be too ſtiff, but, by removing a part of the weight, the ſtrands will couch better.

The ſtrength of the men at the hooks being greatly inadequate to the force required for twiſting of cables, woolders are uſed, according to the ſize of the cable, at equal diſtances along the whole length.

Cables ſhould be rounded by the lower hook after they are laid, to throw the turn well up. They are generally thought to wear beſt when ſlack-laid; but ſome think when ſhort-laid.

Cablets uſed for tow-lines or hawſers, require the ſtrands to be laid ſhorter than cable-ſtrands, but not ſo ſhort-laid in cloſing; for being uſed in water, they would become ſtiff, hard, unhandy to coil away, and liable to break in cold weather.

In all cable-laid ropes, the proportion of the circumference is to the length of the ſtrand in one round, as 11 is to 15; that is, if the circumference be $14\frac{1}{3}$ inches, the length of the ſtrand in one circumference is $19\frac{7}{8}$ inches. In all hawſer-laid rope, the proportion is as 12 to 16; that is, if the circumference be 7 inches, the length of the ſtrand in one circumference is near $9\frac{3}{8}$.

The ſtrength of ropes depends on the hardening or well manufacturing, and not on the bare ſtrength of the hemp; for it ſtrengthens through every ſtage; *viz.* when firſt ſpun into yarn it is little better than hemp extended; when twiſted into ſtrands, it ſhortens and ſtrengthens as above, and increaſes in the ſame manner when laid into rope.

Where the diameter and circumference of one rope to another is as two to one, that is, where one rope is twice as big as another, the ſquare of the diameter is as four to one; which ſhews, that one rope has four times as much yarn in it as the other, and conſequently is four times as ſtrong, according to the different magnitudes.

Cable-laid ropes ſhorten as five to three, and hawſer-laid ropes as three to two; conſequently the length of the yarn and ſtrength will be accordingly; that is, the ſtrength will be in the yarn, after it is laid in the rope, as much as if the rope-maker, in ſpinning, had allowed the ſame quantity of hemp in two feet as he did in three feet, ſo that the ſtrength communicated by the proceſs is two-thirds.

A rope is the ſame ſize when laid as the yarns were before twiſted; ſo that what the yarns are leſſened by twiſting it is made up by ſhortening; from which it is inferred, that the yarns are always of an equal bigneſs, ſince the hemp is the ſame at one time as at another, and not any way diminiſhed.

Were the ſtrands ſingle, without being twiſted one about another, the ſtrength would then be only in proportion as the area of each particular ſtrand is in itſelf; but if the ſtrands could poſſibly be twiſted ſo as to be directly perpendicular to the baſe, the ſtrength would then be found, by multiplying the diameter of the ſtrands and the diameter of the whole rope one into the other, and the half of the product would be the ſtrength of the ſaid ſtrands; but more particularly take the area of the ſingle ſtrand and area of the whole cable, and add them together, and the half of that will ſhew the ſtrength of each ſtrand when they are well twiſted together.

But as it may be obſerved the ſtrands lie at a certain angle between a perpendicular and the baſe, ſo that, as the angle of incidence is to radius, ſo is the relative to the abſolute ſtrength.

Reſpecting the *Banding of Cordage.*—In the calculations ſpecifying the weights of the different lengths of cordage, ſuch weights are to be conſidered as the neat weights of the rope without bandage.

N. B. To every hundred weight of cordage the manufacturer is allowed to put on four pounds weight of bands; thoſe bands are compoſed of the ſhakings, flyings, and ſtrings with which the hemp is tied together, formed into an inferior kind of cordage; but it is to be obſerved thoſe are all weighed to the rope-makers as good hemp, and paid for accordingly, therefore if he was not allowed to apply the refuſe to ſuch purpoſe, he muſt either put a higher price on his cordage, or be a very conſiderable loſer. At the ſame time it ſhould be conſidered, that as it is neceſſary that every coil of rope ſhould be bound together for the convenience of carriage, ſtowage, &c. this kind of bandage anſwers ſuch purpoſe in every degree, as well as if the coils were bound with bands made from the beſt hemp.

Table I.

These sizes of Yarn are warped 336 Threads, and from 19 are warped 400 Threads in a Hawl.

	16	17	18	19	20	21	22	23	24	25
	lb. oz. dr.	lb. oz. dr.	lb. oz. dr.	lb. oz. dr.	lb. oz. dr.	lb. oz. dr.	lb. oz. dr.	lb. oz. dr.	lb. oz. dr.	lb. oz. dr.
A { Weight of one thread 200 fathoms long. }	5 0 0	4 11 5	4 7 2	4 3 6	4 0 0	3 12 5	3 10 3	3 7 10	3 5 5	3 3 3
B { One-tarred thread 200 fathoms long should weigh from }	6 3 0 to 6 4 0	5 13 3 to 5 14 2	5 8 0 to 5 8 14	5 3 6 to 5 4 3	4 15 3 to 5 0 0	4 11 5 to 4 12 3	4 8 0 to 4 8 11	4 4 14 to 4 5 9	4 2 0 to 4 2 10	3 15 6 to 4 0 0
C { Ten fathoms of each size of B should weigh from }	0 4 $15\frac{1}{4}$ to 0 5 0	0 4 $10\frac{1}{2}$ to 0 4 $11\frac{1}{4}$	0 4 $6\frac{1}{4}$ to 0 4 $6\frac{3}{4}$	0 4 $2\frac{3}{4}$ to 0 4 $3\frac{1}{4}$	0 3 $15\frac{1}{4}$ to 0 4 0	0 3 $12\frac{1}{4}$ to 0 3 13	0 3 $9\frac{1}{2}$ to 0 3 $10\frac{1}{4}$	0 3 7 to 0 3 $7\frac{3}{4}$	0 3 $4\frac{3}{4}$ to 0 3 $5\frac{1}{4}$	0 3 $2\frac{3}{4}$ to 0 3 $3\frac{1}{4}$
	C. qr. lb.	C. qr. lb.	C. qr. lb.	C. qr. lb.	C. qr. lb.	C. qr. lb.	C. qr. lb.	C. qr. lb.	C. qr. lb.	C. qr. lb.
D { Weight of each hawl before tarred. }	15 0 0	14 0 13	13 1 9	12 2 14	14 0 4	13 2 11	12 3 13	12 1 19	11 3 17	11 1 20
E { Weight of each hawl when tarred from }	18 2 7 to 18 3 0	17 1 25 to 17 2 16	16 2 0 to 16 2 18	15 2 15 to 15 3 4	17 2 20 to 17 3 12	16 3 9 to 17 0 0	15 3 19 to 16 0 9	15 1 14 to 15 2 3	14 2 25 to 14 3 14	14 0 16 to 14 1 4

N. B. The calculations of B and C will be found extremely useful, provided the yarn be spun and tarred regular, as by weighing one single yarn, or even ten fathoms, the size of the yarn may be ascertained, without being at the trouble of weighing the hawls.

Table II.

Shewing the Number of Threads to work *per* Hook for three-strand cable-laid Cordage of 6, 12, 18, and 24 Inches in Circumference, of the undermentioned Sizes of Yarn, with the Girt of each Strand, and Weight of each Cable: also the Number of Men required to lay both Strands and Cable, with the Allowance to each Man for his Labour.

The N° of Threads here mentioned weigh 99 lb. to 100 lb.		Sizes of Yarn										Weight of each Cable 120 Fathoms long.	Men for Strands.	Threads *per* Strand.	Men for Cables.	Threads *per* Cable.
		16	17	18	19	20	21	22	23	24	25					
Sizes in Inches.	Girt of Strands.	Threads *per* Hook.										C. qr. lb.				
6	3 $\frac{12}{18}$	18	19	20	21	22	23	24	25	27	28	9 0 0	7	6	15	6
12	$6\frac{1}{4}$ $\frac{6}{18}$	72	76	80	85	89	94	98	103	107	112	36 0 0	17	6	37	8
18	$9\frac{1}{2}$ $\frac{1}{2}$	162	171	181	191	201	211	221	231	242	252	81 0 0	31	8	73	12
24	$12\frac{1}{2}$ $\frac{13}{18}$	288	304	322	340	358	376	394	412	430	448	144 0 0	42	*10	108	18

* Six threads are called a quarter of a day's work, for which each workman is paid 7*d.*, and so on in proportion for a greater or less number.

Remarks and Directions how to apply Tables I. and II.

Example.—Suppose a cable of 12 inches in circumference is wanted to be made, the hawls of yarn out of which, upon examining the weights, are found to weigh 16 cwt. 2 qr. 10 lb. *per* hawl of 336 threads. A reference is to be made to Table I. line E, and the weight, being between 16 cwt. 2 qr. 0 lb. and 16 cwt. 2 qr. 18 lb. will be found to answer to 18-thread yarn. Then look down the 18-thread column, Table II., and upon the line of 12, (the size in the margin,) is found 80 threads *per* hook, which is the number of threads to be laid up *per* hook for the cable to be made of the weight *per* hawl of yarn of 336 threads above specified.

Again, if the hawls of yarn should be tarred of such a weight (say for example) requires to be worked between a 17 and an 18-thread yarn, in such case take the number of threads *per* hook to be worked for the size of the cable demanded, as should be worked both for 17 and 18-thread yarn; add them together, and take half the number of threads so added, to work *per* hook for the cable; but if there should happen in dividing to be an odd thread remaining, you must observe to which side the weight of your hawl of yarn is most inclining, and throw the thread in dispute to the heaviest side. The same rules must be observed in consulting all the following tables.

Remarks.—In laying three-strand cable-laid cordage, if you are in doubt respecting the size of your yarn, you must girt the yarn you purpose laying in one strand, and that should be half the size of your cable.

In hardening the strands in the laying of cable-laid cordage,

cordage, you muſt work with (in addition to your ſledge) one preſs-barrel to every 20 threads contained in your ſtrand; but in laying the ſtrand, hardening, and laying the cable, you muſt have only one preſs-barrel to every 40 threads contained in your ſtrand or cable. The above is to be conſidered as a ſtanding rule in covered rope-grounds, but in open grounds, the preſs muſt be varied according to the ſtate of the bottom of the ground, which, after a ſhower of rain, or in damp weather, will be naturally ſoft, and occaſion the ſledge to draw exceedingly heavy, and of courſe want the leſs weight of preſs.

N. B. The weight of a preſs-barrel ſhould be from $3\frac{1}{2}$ to 4 cwt.

Table III.

Shewing the different ſhrinking Proportions of the Yarns and Strands in each Proceſs in making the undermentioned Lengths of Cable.

	Length in fathoms of cable.	Length of yarns required to be warped.	In hardening the ſtrands, the yarn will ſhrink 1-5th part of the whole length warped, and is called the ſtrand's hardening mark.	In laying the ſtrands, the ſtrand will ſhrink 1-10th part of the whole length warped, and is called the ſtrand's going diſtance.	In hardening the cable-ſtrands previous to laying the cable, the ſtrands will ſhrink 1-30th part of the whole length warped, and is called the cable's hardening mark.	In laying the cable it will ſhrink 1-15th part of the whole length warped, which brings it to the length required.
The Sledge ſhould move up to the following Diſtances from the Tackle-Poſts.						
	fms.	fms. ft.	fms. ft.	fms. ft.	fms. ft. in.	fms.
⅓ Cable	40	66 4	53 2	46 4	44 2 8	40
½	60	100 0	80 0	70 0	66 4 0	60
⅔	80	133 2	106 4	93 2	88 5 4	80
Whole	120	200 0	160 0	140 0	133 2 0	120

Table IV.

Shewing the Weights of three-ſtrand cable-laid Cordage.

	fms.	3-Inch Cable.	6-Inch Cable.	9-Inch Cable.	12-Inch Cable.	15-Inch Cable.	18-Inch Cable.	21-Inch Cable.	24-Inch Cable.
		C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.
⅓ Cable	40	0 3 0 0	3 0 0 0	6 3 0 0	12 0 0 0	18 3 0 0	27 0 0 0	36 3 0 0	48 0 0 0
½	60	1 0 14 0	4 2 0 0	10 0 14 0	18 0 0 0	28 0 14 0	40 2 0 0	55 0 14 0	72 0 0 0
⅔	80	1 2 0 0	6 0 0 0	13 2 0 0	24 0 0 0	37 2 0 0	54 0 0 0	73 2 0 0	96 0 0 0
Whole	120	2 1 0 0	9 0 0 0	20 1 0 0	36 0 0 0	56 1 0 0	81 0 0 0	110 1 0 0	144 0 0 0

It is neceſſary to be underſtood, that in rope-making (according to the nature of the rope), weight will give ſize, and ſize will give weight, if properly made.

Rule.—To calculate very nearly the weight of any ſized rope from 3 to 24 inches in circumference, 120 fathoms long, and leſſer lengths in proportion; as may be readily proved by the above table, *viz.* multiply the ſize of the rope by itſelf, and one-fourth of that product is the weight of a hundred of 112 pounds.

Example.—Suppoſe the rope 12 inches in circumference; 12 × 12 :: 144, the fourth of which is 36 hundred weight, or 3732 pounds, the weight of 120 fathoms of rope 12 inches in circumference. Again, 40 fathoms is the third of 120 fathoms; and the third of 36 cwt. is 12 cwt. the weight of 40 fathoms of 12-inch cable, as above.

Directions how to apply the following Tables.

In which is conſidered the four moſt principal ſorts of yarns made uſe of in cable-laid cordage, *viz.* 16, 18, 20, and 25-thread yarn, and in hawſer-laid cordage, to the three principal ſorts of yarn made uſe of, *viz.* 18, 20, and 25-thread yarn, as it is very ſeldom any other ſize yarn is made for either cable or hawſer-laid rope, except very particularly ordered to the contrary. The particulars of every rope of the ſizes mentioned in the tables are fully explained to the length of twenty fathoms, which will be found quite a ſufficient guide for a rope of any length required:

As for Example.—Suppoſe I want a taper cable-laid rope to be made out of 16-thread yarn, 60 fathoms long, and 6 inches in circumference, to be tapered ⅔ds the length, and ⅔ds the ſize of the rope. I refer to Table V., and find under the figure 6, (the ſize demanded,) that it muſt be worked 5 threads *per* hook in the ſhank, the length of yarn to be warped for which, for 20 fathoms (I find in the margin) requires to be 33 fathoms 2 feet, three times which is 100 fathoms, the length of yarn required to be warped for the ſhank of a rope of 60 fathoms long. I then obſerve, in the next column on the right in the margin, the length of yarn required in the head for 20 fathoms is 11 fathoms 0 feet 8 inches, three times which is 33 fathoms 2 feet, the length of yarn required in the head to the firſt taper for a rope of 60 fathoms. Next refer to the number of tapers to be worked, which, upon looking under the figure 6, (the ſize demanded,) I find to be 9, the diſtance between them I find (upon caſting my eye down the column) to be 14 feet $7\frac{7}{9}$ inches for 20 fathoms, three times which is 44 feet $5\frac{1}{3}$ inches, the diſtance to be obſerved between the tapers for a rope of 60 fathoms, being the length demanded. The ſame rule is be obſerved, either adding or multiplying, according as required in all the tables of a ſimilar deſcription.

Table

TABLE V.

Shewing the Number of Threads to work *per* Hook, both in the Shank and Tapers, in making three-ftrand taper cable-laid Cordage of the following Sizes, and the Lengths thereto prefixed, with the Lengths of Yarn required to be warped for the fame, and the Diftance to be obferved between the Tapers; for 16, 18, 20, and 25-thread Yarn.

To Taper two-thirds the Length, and two-thirds the Size of the Rope

	Thread Yarn.	Inches. $3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7	$7\frac{1}{2}$	8	$8\frac{1}{2}$	9	$9\frac{1}{2}$	10
Sizes demanded - -															
Threads *per* hook at the head	16	6	8	10	12	15	18	21	24	28	32	36	40	45	50
	18	7	9	11	14	16	20	23	27	31	36	40	45	50	55
	20	8	9	12	15	18	22	26	30	34	40	45	50	56	62
	25	10	12	16	19	23	28	33	38	43	50	56	63	70	78
Number of threads to be worked in the fhank - -	16	2	3	4	4	5	6	7	8	10	11	12	14	15	17
	18	3	3	4	5	6	7	8	9	11	12	14	15	17	19
	20	3	3	4	5	6	8	9	10	12	14	15	17	19	22
	25	4	5	6	7	8	10	11	13	15	17	19	21	24	26
Number of threads to be worked in the tapers - -	16	4	5	6	8	10	12	14	16	18	21	24	26	30	33
	18	4	6	7	9	10	13	15	18	20	24	26	30	33	36
	20	5	6	8	10	12	14	17	20	22	26	30	33	37	40
	25	6	7	10	12	15	18	22	25	28	33	37	42	46	52

Fathoms demanded.	Lengths of Yarn in Shank or whole Parts. fms. ft.	Lengths of Yarn in the Head to the firft Taper. fms. ft. in.	Lengths of Yarn to Taper. fms. ft. in.		Diftance between the Tapers. ft. in.													
5	8 2	2 4 8	5 3 4	16	8 4	6 8	5 $6\frac{2}{3}$	4 2	3 4	2 $9\frac{1}{3}$	2 $4\frac{4}{7}$	2 1	1 $10\frac{2}{9}$	1 $7\frac{1}{21}$	1 $4\frac{2}{3}$	1 $3\frac{5}{13}$	1 $1\frac{1}{3}$	1 $0\frac{4}{33}$
10	16 4	5 3 4	11 0 8		16 8	13 4	11 $1\frac{1}{3}$	8 4	6 8	5 $6\frac{2}{3}$	4 $9\frac{1}{7}$	4 2	3 $8\frac{4}{9}$	3 $2\frac{2}{21}$	2 $9\frac{1}{3}$	2 $6\frac{10}{13}$	2 $2\frac{2}{3}$	2 $0\frac{8}{33}$
15	25 0	8 2 0	16 4 0		25 0	20 0	16 8	12 6	10 0	8 4	7 $1\frac{5}{7}$	6 3	5 $6\frac{6}{9}$	4 $9\frac{3}{21}$	4 2	3 $10\frac{2}{13}$	3 4	3 $0\frac{12}{33}$
20	33 2	11 0 8	22 1 4		33 4	26 8	22 $2\frac{2}{3}$	16 8	13 4	11 $1\frac{1}{3}$	9 $6\frac{2}{7}$	8 4	7 $4\frac{8}{9}$	6 $4\frac{4}{21}$	6 $2\frac{2}{3}$	5 $1\frac{7}{13}$	4 $5\frac{1}{3}$	4 $0\frac{16}{33}$
5	8 2	2 4 8	5 3 4	18	8 4	5 $6\frac{2}{3}$	4 $9\frac{1}{7}$	3 $8\frac{4}{9}$	3 4	2 $6\frac{10}{13}$	2 $2\frac{2}{3}$	1 $10\frac{2}{9}$	1 8	1 $4\frac{2}{3}$	1 $3\frac{5}{13}$	1 $1\frac{1}{3}$	1 $0\frac{4}{33}$	0 $11\frac{1}{9}$
10	16 4	5 3 4	11 0 8		16 8	11 $1\frac{1}{3}$	9 $6\frac{2}{7}$	7 $4\frac{8}{9}$	6 8	5 $1\frac{7}{13}$	4 $5\frac{1}{3}$	3 $8\frac{4}{9}$	3 4	2 $9\frac{1}{3}$	2 $6\frac{10}{13}$	2 $2\frac{2}{3}$	2 $0\frac{8}{33}$	1 $10\frac{2}{9}$
15	25 0	8 2 0	16 4 0		25 0	16 8	14 $3\frac{3}{7}$	11 $1\frac{3}{9}$	10 0	7 $8\frac{4}{13}$	6 8	5 $6\frac{6}{9}$	5 0	4 2	3 $10\frac{2}{13}$	3 4	3 $0\frac{12}{33}$	2 $9\frac{3}{9}$
20	33 2	11 0 8	22 1 4		33 4	22 $2\frac{2}{3}$	19 $0\frac{4}{7}$	14 $9\frac{7}{9}$	13 4	10 $3\frac{1}{13}$	8 $10\frac{2}{3}$	7 $5\frac{8}{9}$	6 8	5 $6\frac{2}{3}$	5 $1\frac{7}{13}$	4 $5\frac{1}{3}$	4 $0\frac{16}{33}$	3 $8\frac{4}{9}$
5	8 2	2 4 8	5 3 4	20	6 8	5 $6\frac{2}{3}$	4 2	3 4	2 $9\frac{1}{3}$	2 $4\frac{4}{7}$	1 $11\frac{9}{17}$	1 8	1 $6\frac{2}{11}$	1 $3\frac{5}{13}$	1 $1\frac{1}{3}$	1 $0\frac{4}{33}$	0 $10\frac{30}{37}$	0 10
10	16 4	5 3 4	11 0 8		13 4	11 $1\frac{1}{3}$	8 4	6 8	5 $6\frac{2}{3}$	4 $9\frac{1}{7}$	3 $11\frac{1}{17}$	3 4	3 $0\frac{4}{11}$	2 $6\frac{10}{13}$	2 $2\frac{2}{3}$	2 $0\frac{8}{33}$	1 $9\frac{23}{37}$	1 8
15	25 0	8 2 0	16 4 0		20 0	16 8	12 6	10 0	8 4	7 $1\frac{5}{7}$	5 $10\frac{10}{17}$	5 0	4 $6\frac{6}{11}$	3 $10\frac{2}{13}$	3 4	3 $0\frac{12}{33}$	2 $8\frac{16}{37}$	2 6
20	33 2	11 0 8	22 1 4		26 8	22 $2\frac{2}{3}$	16 8	13 4	11 $1\frac{1}{3}$	9 $6\frac{2}{7}$	7 $10\frac{2}{17}$	6 8	6 $0\frac{8}{11}$	5 $1\frac{7}{13}$	4 $5\frac{1}{3}$	4 $0\frac{16}{33}$	3 $7\frac{9}{37}$	3 4
5	8 2	2 4 8	5 3 4	25	5 $6\frac{2}{3}$	4 $9\frac{1}{7}$	3 4	2 $9\frac{1}{3}$	2 $2\frac{2}{3}$	1 $10\frac{2}{9}$	1 $6\frac{2}{11}$	1 4	1 $2\frac{2}{7}$	1 $0\frac{4}{33}$	0 $10\frac{30}{37}$	0 $9\frac{11}{21}$	0 $8\frac{16}{23}$	0 $8\frac{2}{11}$
10	16 4	5 3 4	11 0 8		11 $1\frac{1}{3}$	9 $6\frac{2}{7}$	6 8	5 $6\frac{2}{3}$	4 $5\frac{1}{3}$	3 $8\frac{4}{9}$	3 $0\frac{4}{11}$	2 8	2 $4\frac{4}{7}$	2 $0\frac{8}{33}$	1 $9\frac{23}{37}$	1 $7\frac{1}{21}$	1 $5\frac{9}{23}$	1 $4\frac{4}{11}$
15	25 0	8 2 0	16 4 0		16 8	14 $3\frac{3}{7}$	10 0	8 4	6 8	5 $6\frac{6}{9}$	4 $6\frac{6}{11}$	4 0	3 $6\frac{6}{7}$	3 $0\frac{12}{33}$	2 $8\frac{16}{37}$	2 $4\frac{12}{21}$	2 $2\frac{2}{23}$	2 $0\frac{6}{11}$
20	33 2	11 0 8	22 1 4		22 $2\frac{2}{3}$	19 $0\frac{1}{7}$	13 4	11 $1\frac{1}{3}$	8 $10\frac{2}{3}$	7 $5\frac{8}{9}$	6 $0\frac{8}{11}$	5 4	4 $9\frac{1}{7}$	4 $0\frac{16}{33}$	3 $7\frac{9}{37}$	3 $2\frac{2}{21}$	2 $10\frac{18}{23}$	2 $8\frac{8}{11}$

TABLE V.—*continued.*

To Taper half the Length and half the Size of the Rope.

	Thread Yarn.	Inches. $3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7	$7\frac{1}{2}$	8	$8\frac{1}{2}$	9	$9\frac{1}{2}$	10
Sizes demanded - -															
Threads *per* hook at the head	16	6	8	10	12	15	18	21	24	28	32	36	40	45	50
	18	7	9	11	14	16	20	23	27	31	36	40	45	50	55
	20	8	9	12	15	18	22	26	30	34	40	45	50	56	62
	25	10	12	16	19	23	28	33	38	43	50	56	63	70	78
Number of threads to be worked in the shank - -	16	3	4	5	6	8	9	11	12	14	16	18	20	23	25
	18	4	5	6	7	8	10	12	14	16	18	20	23	25	28
	20	4	4	6	8	9	11	13	15	17	20	23	25	28	32
	25	5	6	8	10	12	14	17	19	22	25	28	31	35	39
Number of threads to be worked in the tapers - -	16	3	4	5	6	7	9	10	12	14	16	18	20	22	25
	18	3	4	5	7	8	10	11	13	15	18	20	22	25	27
	20	4	5	6	7	9	11	13	15	17	20	22	25	28	30
	25	5	6	8	9	11	14	16	19	21	25	28	32	35	39

Fathoms demanded.	Lengths of Yarn in Shank or whole Parts. fms. ft.	Lengths of Yarn in the Head to the first Taper. ft.	Lengths of Yarn to Taper. ft.	Thread Yarn	Distance between the Tapers. ft. in.													
5	8 2	25	25	16	8 4	6 3	5 0	4 2	3 $6\frac{6}{7}$	2 $9\frac{1}{3}$	2 6	2 1	1 $9\frac{3}{7}$	1 $6\frac{3}{4}$	1 $4\frac{2}{3}$	1 3	1 $1\frac{7}{11}$	1 0
10	16 4	50	50		16 8	12 6	10 0	8 4	7 $1\frac{5}{7}$	5 $6\frac{2}{3}$	5 0	4 2	3 $6\frac{6}{7}$	3 $1\frac{1}{2}$	2 $9\frac{1}{3}$	2 6	2 $3\frac{3}{11}$	2 0
15	25 0	75	75		25 0	18 9	15 0	12 6	10 $8\frac{4}{7}$	8 4	7 6	6 3	5 $4\frac{2}{7}$	4 $8\frac{1}{4}$	4 2	3 9	3 $4\frac{10}{11}$	3 0
20	33 2	100	100		33 4	25 0	20 0	16 8	14 $3\frac{3}{7}$	11 $1\frac{1}{3}$	10 0	8 4	7 $1\frac{5}{7}$	6 3	5 $6\frac{2}{3}$	5 0	4 $6\frac{6}{11}$	4 0
5	8 2	25	25	18	8 4	6 3	5 0	3 $6\frac{6}{7}$	3 $1\frac{1}{2}$	2 6	2 $3\frac{3}{11}$	1 $11\frac{1}{13}$	1 8	1 $4\frac{2}{3}$	1 3	1 $1\frac{7}{11}$	1 0	0 $11\frac{1}{9}$
10	16 4	50	50		16 8	12 6	10 0	7 $1\frac{5}{7}$	6 3	5 0	4 $6\frac{6}{11}$	3 $10\frac{2}{13}$	3 4	2 $9\frac{1}{3}$	2 6	2 $3\frac{3}{11}$	2 0	1 $10\frac{2}{9}$
15	25 0	75	75		25 0	18 9	15 0	10 $8\frac{4}{7}$	9 $4\frac{1}{2}$	7 6	6 $9\frac{9}{11}$	5 $9\frac{3}{13}$	5 0	4 2	3 9	3 $4\frac{10}{11}$	3 0	2 $9\frac{3}{9}$
20	33 2	100	100		33 4	25 0	20 0	14 $3\frac{3}{7}$	12 6	10 0	9 $1\frac{1}{11}$	7 $8\frac{4}{13}$	6 8	5 $6\frac{2}{3}$	5 0	4 $6\frac{6}{11}$	4 0	3 $8\frac{4}{9}$
5	8 2	25	25	20	6 3	5 0	4 2	3 $6\frac{6}{7}$	2 $9\frac{1}{3}$	2 $3\frac{3}{11}$	1 $11\frac{1}{13}$	1 8	1 $5\frac{11}{17}$	1 3	1 $1\frac{7}{11}$	1 0	0 $10\frac{5}{7}$	0 10
10	16 4	50	50		12 6	10 0	8 4	7 $1\frac{5}{7}$	5 $6\frac{2}{3}$	4 $6\frac{6}{11}$	3 $10\frac{2}{13}$	3 4	2 $11\frac{5}{17}$	2 6	2 $3\frac{3}{11}$	2 0	1 $9\frac{3}{7}$	1 8
15	25 0	75	75		18 9	15 0	12 6	10 $8\frac{4}{7}$	8 4	6 $9\frac{9}{11}$	5 $9\frac{3}{13}$	5 0	4 $4\frac{16}{17}$	3 9	3 $4\frac{10}{11}$	3 0	2 $8\frac{1}{7}$	2 6
20	33 2	100	100		25 0	20 0	16 8	14 $3\frac{3}{7}$	11 $1\frac{1}{3}$	9 $1\frac{1}{11}$	7 $8\frac{4}{13}$	6 8	5 $10\frac{10}{17}$	5 0	4 $6\frac{6}{11}$	4 0	3 $6\frac{6}{7}$	3 4
5	8 2	25	25	25	5 0	4 2	3 $1\frac{1}{2}$	2 $9\frac{1}{3}$	2 $3\frac{3}{11}$	1 $9\frac{3}{7}$	1 $6\frac{3}{4}$	1 $3\frac{15}{19}$	1 $2\frac{2}{7}$	1 0	0 $10\frac{5}{7}$	0 $9\frac{3}{8}$	0 $8\frac{4}{7}$	0 $7\frac{9}{13}$
10	16 4	50	50		10 0	8 4	6 3	5 $6\frac{2}{3}$	4 $6\frac{6}{11}$	3 $6\frac{6}{7}$	3 $1\frac{1}{2}$	2 $7\frac{11}{19}$	2 $4\frac{4}{7}$	2 0	1 $9\frac{3}{7}$	1 $6\frac{6}{8}$	1 $5\frac{1}{7}$	1 $3\frac{5}{13}$
15	25 0	75	75		15 0	12 6	9 $4\frac{1}{2}$	8 4	6 $9\frac{9}{11}$	5 $4\frac{2}{7}$	4 $8\frac{1}{4}$	3 $11\frac{7}{19}$	3 $6\frac{6}{7}$	3 0	2 $8\frac{1}{7}$	2 $4\frac{1}{8}$	2 $1\frac{5}{7}$	1 $11\frac{1}{13}$
20	33 2	100	100		20 0	16 8	12 6	11 $1\frac{1}{3}$	9 $1\frac{1}{11}$	7 $1\frac{5}{7}$	6 3	5 $3\frac{3}{19}$	4 $9\frac{1}{7}$	4 0	3 $6\frac{6}{7}$	3 $1\frac{4}{8}$	2 $10\frac{2}{7}$	2 $6\frac{10}{13}$

Table VI.

Shewing the Number of Threads to work *per* Hook and Heart for cable-laid Stays, four Strands and a Heart, of 5, 10, 15, and 19 Inches in Circumference, of the undermentioned Sizes of Yarn, with the Girt of each Strand prefixed againſt each Size.

Number of Threads aſunder to weigh from 99 to 100lb.		16	17	18	19	20	21	22	23	24	25
Size in Inches.	Girt of each Strand.	Threads *per* Hook and Heart.									
5	2 $\frac{8}{9}$	9	9	10	11	11	12	12	13	13	14
10	$4\frac{1}{4}$ $\frac{7}{9}$	35	37	39	41	43	46	48	50	52	55
15	$6\frac{1}{2}$ $\frac{6}{9}$	79	84	89	94	99	104	109	114	119	124
19	$8\frac{1}{4}$ $\frac{7}{9}$	127	135	143	151	159	167	175	183	191	199

The ſhrinking proportions of cable-laid ſtays are exactly the ſame as in three-ſtrand cable-laid cordage, except in the cloſing the ſtay, which being compoſed of four ſtrands, lie much cloſer in the rope than three ſtrands, and having the heart of the ſtay to encompaſs, occaſions the ſtrands to ſhorten in a much greater proportion than in three-ſtrand cable-laid cordage. The ſtay, in cloſing, will ſhorten $\frac{2}{11}$ parts of the length of yarn firſt warped.

Table VII.

Shewing the Weight of cable-laid Stays, four Strands and a Heart, from 5 to 19 Inches in Circumference, and from 5 to 30 Fathoms in Length.

Fathoms in Length.	5-Inch Stay.				7-Inch Stay.				9-Inch Stay.				11-Inch Stay.			
	C.	qr.	lb.	oz.	C.	qr.	lb.	oz.	C.	qr.	lb.	oz.	C.	qr.	lb.	oz.
5	0	1	3	9	0	2	4	5	0	3	16	10	1	1	9	11
10	0	2	7	2	1	0	8	10	1	3	5	4	2	2	19	6
15	0	3	10	11	1	2	12	15	2	2	21	14	4	0	1	1
20	1	0	14	4	2	0	17	4	3	2	10	8	5	1	10	12
25	1	1	17	13	2	2	21	9	4	1	27	2	6	2	20	7
30	1	2	21	6	3	0	25	14	5	1	15	12	8	0	2	2

Fathoms in Length.	13-Inch Stay.				15-Inch Stay.				17-Inch Stay.				19-Inch Stay.			
	C.	qr.	lb.	oz.	C.	qr.	lb.	oz.	C.	qr.	lb.	oz.	C.	qr.	lb.	oz.
5	1	3	17	2	2	2	2	3	3	0	25	9	4	0	7	10
10	3	3	6	4	5	0	4	6	6	1	23	2	8	0	15	4
15	5	2	23	6	7	2	6	9	9	2	20	11	12	0	22	14
20	7	2	12	8	10	0	8	12	12	3	18	4	16	1	2	8
25	9	2	1	10	12	2	10	15	16	0	15	13	20	1	10	2
30	11	1	18	12	15	0	13	2	19	1	13	6	24	1	17	12

Table VIII.

Shewing the Number of Threads to work *per* Hook for four-ſtrand cable-laid Cordage without a Heart, from 5 to 24 Inches in Circumference, of the Sizes of Yarn undermentioned, with the Weight of each Cable prefixed.

No. of Threads weighing from 99 to 100lb.	16	17	18	19	20	21	22	23	24	25	Weight of each Cable 120 Fathoms long.		
Size in Inches.	Threads *per* Hook.										C.	qr.	lb.
5	9	10	10	11	12	12	13	13	14	15	6	2	10
10	38	40	42	45	47	50	52	54	57	59	25	3	6
15	85	91	96	101	107	112	118	123	128	134	58	3	0
20	152	162	171	181	190	200	209	219	228	238	104	1	9
24	219	233	247	260	274	288	301	315	329	343	150	1	2

Table IX.

Shewing the Length of Yarn required to be warped, and the different ſhrinking Proportions in making the undermentioned Lengths of four-ſtrand cable-laid Cordage.

Fathoms demanded.	Lengths of Yarn warped.	Strand's Hardening Mark.	Strand's Going Diſtance.	Cable's Hardening Mark.	Cable's Length.
	fms. ft. in.	fms. ft. in.	fms. ft. in.	fms. ft. in.	
10	17 0 6	13 4 0	11 5 9	11 2 4	10
20	34 1 0	27 2 0	23 5 6	22 4 8	20
40	68 2 0	54 4 0	47 5 0	45 3 4	40
60	102 3 0	82 0 0	71 4 6	68 2 0	60
80	136 4 0	109 2 0	95 4 0	91 0 8	80
120	205 0 0	164 0 0	143 3 0	136 4 0	120

N.B. The ſhrinking proportions of four-ſtrand cable-laid cordage is exactly the ſame as three-ſtrand, except in cloſing the cable, which conſiſting of four ſtrands, lie much cloſer in the rope than three ſtrands, but not having a heart to encompaſs it, does not diminiſh in length ſo much as cable-laid ſtays. The cable in cloſing will ſhorten $\frac{10}{121}$ parts of the length of yarn firſt warped.

It being rather unuſual to lay cables with a greater number of ſtrands than four, the above tables are not laid down for a greater proportion,—but to know how to find the number of threads to work *per* hook for a greater number may at ſome time be neceſſary, therefore the following method muſt be purſued to lay a cable in as many ſtrands as may be thought expedient. Suppoſe a five-ſtrand cable-laid rope is wanted to be made, you firſt ſquare the ſize of the rope propoſed to be made, and multiply that product by the ſize yarn you mean to make your cable from, that product divide by 52, and the quotient will be the number of threads to work *per* hook for a five-ſtrand cable-laid rope. If for a ſix-ſtrand, proceed as before, and divide by 62; for a ſeven-ſtrand, divide by 72; for an eight-ſtrand, divide by 82; and ſo on, adding 10 to your diviſor for every ſtrand you mean to increaſe in number in your cable.

Table X.

Shewing the Prime Coſt to the Manufacturer in each Proceſs, in making the undermentioned Sizes of three-ſtrand cable-laid Cordage, with the Weight of Hemp and Tar required for each Rope.

Size.	Hatchelling, Wheel-turning, and Tending.	Expence at 5*d.* per Quarter	Spinning.	Expence at 7*d.* per Quarter.	Warping, Taking-up, and Tarring, at 9*s.* per Hawl.	Laying at 7*d.* *per* Quarter.	Total Expence of Manufacturing into Cordage.	Weight of Hemp required for each Rope.	Weight of Tar required for each Rope.
In.	qr. thds.	*L.* *s.* *d.*	qr. thds.	*L.* *s.* *d.*	*L.* *s.* *d.*	*L.* *s.* *d.*	*L.* *s.* *d.*	C. qr. lb.	C. qr. lb.
5	7 3	0 3 9	22 3	0 13 1	0 2 10½	0 15 5	1 15 1½	5 0 0	1 1 0
10	31 1½	0 15 7½	93 4½	2 14 7½	0 12 1	2 6 1	6 8 5	20 0 0	5 0 0
15	70 3¾	1 15 3¾	211 5¼	6 3 6¼	1 7 3	5 17 10	15 3 11	45 0 0	11 1 0
20	125 0	3 2 6	375 0	10 18 9	2 8 2	11 18 3	28 7 5	80 0 0	20 0 0
24	180 0	4 10 0	540 0	15 15 0	3 9 5	15 11 6	39 5 11	115 0 23	28 3 5

The above table is calculated according to the uſual mode of rope-making, and is termed by the trade working by the ſquare, which is performed in the following manner: Suppoſe a cable 15 inches in circumference, the ſquare of 15 is 225, the half of which is 112½; that is, 113 threads *per* hook muſt be laid up for a 15-inch cable, proceeding in the ſame manner for any ſize demanded, which mode of working anſwers to ſixteen-thread yarn in all ſizes of three-ſtrand cable-laid cordage.

Where the diameter and circumference of one rope to another is as 2 to 1, that is, where one rope is twice as big as another, the ſquare of the diameter is as 4 to 1, which ſhews that one rope has four times as much yarn in it as the other, and conſequently is four times as ſtrong, according to the different magnitudes.

Table XI.

Shewing the Number of Threads *per* Hook to work for three-ftrand hawfer-laid Cordage, of 3, 6, 9, and 12 Inches in Circumference, of the Sizes of Yarn undermentioned, with the Weight of each Rope, and the Number of Men required to lay the fame, with the Allowance to each Man for his Labour.

N° of Threads 99 to 100lb. Weight.	16	17	18	19	20	21	22	23	24	25	Weight of each Rope 133.2 long.	Men for Rope.	Threads *per* Rope.
Size in Inches.	Threads *per* Hook.										C. qr. lb.		
3	16	17	18	19	20	21	22	23	24	25	2 2 17	8 0	6
6	64	68	72	76	80	84	88	92	96	100	10 2 12	22 0	12
9	144	153	162	171	180	189	198	207	216	225	23 1 13	37 0	15
12	256	272	288	304	320	336	352	368	384	400	42 1 20	45 0	15

Remarks.—In hardening the ftrands, and in laying hawfer-laid cordage, it muft be worked with (in addition to the weight of the fledge) one prefs-barrel for every twenty threads contained in the rope. This is to be confidered as a ftanding rule in covered rope-grounds, but in open grounds the prefs muft be varied according to the ftate of the ground, as mentioned in cable-laid cordage.

In laying three-ftrand hawfer-laid cordage, if there is any doubt refpecting the fize of the yarn, you muft girt the yarn you propofe laying in two of your readys (or ftrands), and that fhould be juft the fize of the rope.

Table XII.

Shewing the Length of Yarn required to be warped, and the different fhrinking Proportions of the Yarn in each Procefs, in making the undermentioned Lengths of hawfer-laid Rope, and alfo the Weight.

	Fathoms of Rope in Length.	Length of Yarn to be warped.	The Sledge fhould move to the following Marks from the Tackle-Pofts. Rope's Hardening Mark.	Rope's Length.	¾-Inch. Weight.	1½-Inch. Weight.	2-Inch. Weight.	4-Inch. Weight.	6-Inch. Weight.	8-Inch. Weight.	10-Inch. Weight.	12-Inch. Weight.
	fms. ft.	fms.	fms.	fms. ft.	qr. lb. oz.	qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.
	10 0	15	12	10 0	0 2 7½	0 4 15	0 0 9 14¼	0 1 11 9½	0 3 5 1½	1 1 18 6¼	2 0 23 8	3 0 20 6
	20 0	30	24	20 0	0 4 15	0 9 4	0 0 19 12½	0 2 23 3	1 2 10 3	2 3 8 12½	4 1 19 0	6 1 12 12
	40 0	60	48	40 0	0 9 14	0 19 12	0 1 11 9	1 1 18 6	3 0 20 6	5 2 17 9	8 3 10 0	12 2 25 8
Half Coil	66 4	100	80	66 4	0 16 8	1 5 0	0 2 10 0	2 1 12 0	5 1 6 0	9 1 20 0	14 2 26 0	21 0 24 0
	80 0	120	96	80 0	0 19 12	1 11 8	0 2 23 2	2 3 8 12	6 1 12 12	11 1 7 2	17 2 20 0	25 1 23 0
	100 0	150	120	100 0	0 24 11	1 21 6	0 3 14 14½	3 2 3 15	7 3 22 15	14 0 15 14½	22 0 11 0	31 3 7 12
	120 0	180	144	120 0	1 1 10	2 3 4	1 0 6 11	4 0 26 2	9 2 5 2	16 3 24 11	26 2 2 0	38 0 20 8
Whole Coil	133 2	200	160	133 2	1 5 0	2 10 0	1 0 20 0	4 2 24 0	10 2 12 0	18 3 12 0	29 1 24 0	42 1 20 0

Remarks.—In hardening the ftrands the yarn will fhrink one-fifth of the whole length, which is called the rope's hardening mark.

In laying the rope the ftrands will fhrink one-fixth of the remaining diftance, which brings the rope to the length required.

TABLE

Table XIII.

Shewing the exact Coft to the Manufacturer in each different Procefs as undermentioned, in making the following Sizes of three-ftrand hawfer-laid Cordage, with the proper Proportions of Hemp and Tar neceffary for each Rope.

Size in Inches.	Hatcheling, Wheel turning, and Tending.		Expence at 6*d.* per Quarter.			Spinning.		Expence at 7*d.* per Quarter.			Warping, Taking-up, and Tarring Expence at 9*s.* per Hawl.			Laying Expence at 7*d.* per Quarter.			Total Expence of manufacturing into Cordage.			Weight of Hemp required for each Rope.			Weight of Tar required for each Rope.		
	qr.	thds.	*L.*	*s.*	*d.*	qr.	thds.	*L.*	*s.*	*d.*	*L.*	*s.*	*d.*	*L.*	*s.*	*d.*	*L.*	*s.*	*d.*	C.	qrs.	lb.	C.	qrs.	lb.
2	1	4	0	0	10	5	0	0	2	11	0	0	$7\frac{1}{2}$	0	1	9	0	6	$1\frac{1}{2}$	0	3	22	0	0	26
4	6	4	0	3	4	20	0	0	11	8	0	2	7	0	7	0	1	4	$7\frac{1}{2}$	3	3	23	0	3	21
6	15	0	0	7	6	45	0	1	6	3	0	5	8	1	5	8	3	5	1	8	1	27	2	0	13
8	26	4	0	13	4	80	0	2	6	8	0	10	3	1	15	0	5	5	3	15	0	10	3	3	2
10	41	4	1	0	10	125	0	3	12	11	0	16	1	3	5	7	8	15	5	23	2	10	5	3	14
12	60	0	1	10	0	180	0	5	5	0	1	3	2	3	5	7	11	3	9	33	3	22	8	1	26

The foregoing table is grounded (as termed by the trade) upon the principle of the fquare, but the method of working upon this principle differs between cable and hawfer-laid cordage. The mode purfued for making hawfer-laid cordage is as follows: Suppofe it is wanted to make a three-ftrand hawfer-laid rope, fix inches in circumference; the fquare of 6 is 36, and twice 36 is 72, which is the number of threads to work *per* hook for a fix-inch three-ftrand hawfer-laid rope. The fame method muft be purfued, according to this way of working, for any other fize, and anfwers to eighteen-thread yarn in all three-ftrand hawfer-laid cordage. See Table XI.

Table XIV.

Shewing the Weight of Yarn (of the four moft general Sorts madeufe of) capable of being fpun by each of the following Number of Spinners, at eight Quarters, (or 48 Threads) *per* day, in 1 Day, 1 Week of 6 Days, 1 Month of 24 Days, and 1 Year of 13 Months; with the Yield of Cordage at the Year's End prefixed againft each Number of Spinner's Work.

Numb. of Spinners for		Weight of Yarn *per* Day.			Weight of Yarn *per* Week.			Weight of Yarn *per* Month.				Weight of Yarn *per* Year.				Yield of Cordage.			
		Cwt.	qrs.	lbs.	Cwt.	qrs.	lbs.	Tons.	cwt.	qrs.	lbs.	Tons.	cwt.	qrs.	lbs.	Tons.	cwt.	qrs.	lbs.
16-thread Yarn.	2	3	1	20	20	2	8	4	2	1	4	53	9	2	24	[illegible]	[illegible]	0	[illegible]
	4	6	3	12	41	0	16	8	4	2	8	106	19	1	20	[illegible]	[illegible]	1	4
	6	10	1	4	61	2	24	12	6	3	12	[illegible]	9	0	16	[illegible]	11	1	20
	8	13	2	24	82	1	4	16	9	0	16	213	18	3	12	[illegible]	8	2	[illegible]
	10	17	0	16	102	3	12	20	11	1	20	[illegible]	8	2	8	[illegible]	5	2	24
	12	20	2	8	123	1	20	24	13	2	24	320	18	1	4	[illegible]	2	3	12
18-thread Yarn.	2	3	0	0	18	0	0	3	12	0	0	[illegible]	[illegible]	0	0	[illegible]	10	0	0
	4	6	0	0	36	0	0	7	4	0	0	[illegible]	12	0	0	117	0	0	0
	6	9	0	0	54	0	0	10	16	0	0	[illegible]	8	0	0	[illegible]	10	0	0
	8	12	0	0	72	0	0	14	8	0	0	[illegible]	4	0	0	[illegible]	0	0	0
	10	15	0	0	90	0	0	18	0	0	0	[illegible]	0	0	0	[illegible]	10	0	0
	12	17	0	0	108	0	0	21	12	0	0	[illegible]	16	0	0	351	0	0	0
20-thread Yarn.	2	2	3	4	16	2	24	3	[illegible]	3	12	[illegible]	[illegible]	0	16	[illegible]	2	1	20
	4	5	2	8	33	1	20	6	7	2	24	86	18	1	4	[illegible]	0	[illegible]	12
	6	8	1	12	50	0	16	9	11	2	8	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	1	1
	8	11	0	16	66	3	12	12	15	1	20	[illegible]	[illegible]	2	8	[illegible]	1	2	21
	10	13	3	20	83	2	8	15	19	1	4	[illegible]	[illegible]	2	[illegible]	[illegible]	4	0	16
	12	16	2	24	100	1	4	19	3	0	16	[illegible]	14	3	12	[illegible]	[illegible]	2	8
25-thread Yarn.	2	2	0	22	13	0	20	2	12	2	24	[illegible]	5	1	[illegible]	[illegible]	[illegible]	[illegible]	12
	4	4	1	16	26	1	12	5	[illegible]	1	20	[illegible]	[illegible]	2	8	[illegible]	[illegible]	0	24
	6	6	2	10	39	2	4	7	18	0	16	102	15	3	12	[illegible]	[illegible]	[illegible]	8
	8	8	3	4	52	2	24	10	10	3	[illegible]	[illegible]	1	0	[illegible]	[illegible]	[illegible]	1	20
	10	10	3	26	65	3	16	13	[illegible]	2	[illegible]	[illegible]	[illegible]	1	[illegible]	214	[illegible]	0	4
	12	13	0	20	79	0	8	15	16	1	[illegible]	[illegible]	11	2	[illegible]	[illegible]	[illegible]	2	16

N.B. By the above table may be found how much yarn can be fpun by any number of fpinners in any given time whatever.

Table XV.

Shewing the Number of Threads to work *per* Hook, both in the Shank and Tapers, in making three-ſtrand taper hawſer-laid Cordage of the Sizes undermentioned, and the Lengths thereunto prefixed, with the Lengths of Yarn required to be warped for the ſame, and the Diſtance to be obſerved between the Tapers; grounded upon 18, 20, and 25-thread Yarn, and tapered two-thirds the Length, and two-thirds the Size of the Rope.

	Thread Yarn.	Inches. 2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7	$7\frac{1}{2}$	8	$8\frac{1}{2}$	9	$9\frac{1}{2}$	10
Sizes demanded - - -																		
Threads *per* hook at the head -	18	8	12	18	24	32	40	50	60	72	84	98	112	128	144	162	180	200
	20	9	14	20	27	35	45	55	67	80	93	108	125	142	160	180	200	222
	25	11	17	25	34	44	56	69	84	100	117	186	156	177	200	225	250	277
Number of threads to be worked in the ſhank - - - -	18	3	4	6	8	11	14	17	20	24	28	33	38	43	48	54	60	67
	20	3	5	7	9	12	15	19	23	27	31	36	42	48	54	60	67	74
	25	4	6	9	12	15	19	28	28	34	39	46	52	59	67	75	84	93
Number of threads to be worked in the tapers - - -	18	5	8	12	16	21	26	33	40	48	56	65	74	85	96	108	120	133
	20	6	9	13	18	23	30	36	44	53	62	72	63	94	106	120	133	148
	25	7	11	16	22	29	37	46	56	66	78	90	104	118	133	150	166	184

Fathoms demanded.	Lengths of Yarn in Shank or whole Parts.	Lengths of Yarn in the Head to the firſt Taper.	Lengths of Yarn to Taper.	Thread Yarn	Diſtance between the Tapers.																
	fms. ft.	fms. ft.	fms.		ft. in.																
5	7 3	2 3	5	18	6 0	3 9	2 6	1 $10\frac{1}{2}$	1 $4\frac{3}{7}$	1 $1\frac{11}{13}$	0 $10\frac{30}{33}$	0 9	0 $7\frac{1}{2}$	0 $6\frac{3}{7}$	0 $5\frac{34}{67}$	0 $4\frac{32}{37}$	0 $4\frac{20}{85}$	0 $3\frac{3}{4}$	0 $3\frac{1}{3}$	0 3	0 $2\frac{94}{133}$
10	15 0	5 0	10	18	12 0	7 6	5 0	3 9	2 $8\frac{6}{7}$	2 $3\frac{9}{13}$	1 $9\frac{27}{33}$	1 6	1 3	1 $0\frac{6}{7}$	0 $11\frac{5}{65}$	0 $9\frac{27}{37}$	0 $8\frac{43}{85}$	0 $7\frac{1}{2}$	0 $6\frac{2}{3}$	0 6	0 $5\frac{55}{133}$
15	22 3	7 3	15	18	18 0	11 3	7 6	5 $7\frac{1}{2}$	4 $1\frac{2}{7}$	3 $5\frac{7}{13}$	2 $8\frac{24}{33}$	2 3	1 $10\frac{1}{2}$	1 $7\frac{2}{7}$	1 $4\frac{40}{65}$	1 $2\frac{22}{37}$	1 $0\frac{60}{85}$	0 $11\frac{1}{4}$	0 10	0 9	0 $8\frac{16}{133}$
20	30 0	10 0	20	18	24 0	15 0	10 0	7 6	5 $5\frac{5}{7}$	4 $7\frac{5}{13}$	3 $7\frac{21}{33}$	3 0	2 6	2 $1\frac{5}{7}$	1 $10\frac{10}{65}$	1 $7\frac{17}{37}$	1 $4\frac{80}{85}$	1 3	1 $1\frac{1}{3}$	1 0	0 $10\frac{110}{133}$
5	7 3	2 3	5	20	5 0	3 4	2 $3\frac{9}{13}$	1 8	1 $3\frac{16}{23}$	1 0	0 10	0 $8\frac{2}{11}$	0 $6\frac{42}{53}$	0 $5\frac{25}{31}$	0 5	0 $4\frac{28}{83}$	0 $3\frac{19}{47}$	0 $3\frac{21}{53}$	0 3	0 $2\frac{94}{133}$	0 $2\frac{16}{37}$
10	15 0	5 0	10	20	10 0	6 8	4 $7\frac{5}{13}$	3 4	2 $7\frac{7}{23}$	2 0	1 8	1 $4\frac{4}{11}$	1 $1\frac{31}{53}$	0 $11\frac{19}{31}$	0 10	0 $8\frac{56}{83}$	0 $7\frac{31}{47}$	0 $6\frac{42}{53}$	0 6	0 $5\frac{55}{133}$	0 $4\frac{32}{37}$
15	22 3	7 3	15	20	15 0	10 0	6 $11\frac{1}{13}$	5 0	3 $10\frac{22}{23}$	3 0	2 6	2 $0\frac{6}{11}$	1 $8\frac{20}{53}$	1 $5\frac{13}{31}$	1 3	1 $1\frac{1}{83}$	0 $11\frac{23}{47}$	0 $10\frac{19}{53}$	0 9	0 $8\frac{16}{133}$	0 $7\frac{13}{37}$
20	30 0	10 0	20	20	20 0	13 4	9 $2\frac{10}{13}$	6 8	5 $2\frac{14}{23}$	4 0	3 4	2 $8\frac{8}{11}$	2 $3\frac{9}{53}$	1 $11\frac{7}{31}$	1 8	1 $5\frac{29}{83}$	1 $3\frac{15}{47}$	1 $1\frac{31}{53}$	1 0	0 $10\frac{110}{133}$	0 $9\frac{27}{37}$
5	7 3	2 3	5	25	4 $3\frac{3}{7}$	2 $8\frac{8}{11}$	1 $10\frac{1}{2}$	1 $4\frac{4}{11}$	1 $0\frac{12}{29}$	0 $9\frac{27}{37}$	0 $7\frac{19}{23}$	0 $6\frac{3}{7}$	0 $5\frac{5}{11}$	0 $4\frac{8}{13}$	0 4	0 $3\frac{6}{13}$	0 $3\frac{3}{59}$	0 $2\frac{94}{133}$	0 $2\frac{10}{25}$	0 $2\frac{14}{83}$	0 $1\frac{22}{23}$
10	15 0	5 0	10	25	8 $6\frac{6}{7}$	5 $5\frac{5}{11}$	3 9	2 $8\frac{8}{11}$	2 $0\frac{24}{29}$	1 $7\frac{17}{37}$	1 $3\frac{15}{23}$	1 $0\frac{6}{7}$	0 $10\frac{10}{11}$	0 $9\frac{3}{13}$	0 8	0 $6\frac{12}{13}$	0 $6\frac{6}{59}$	0 $5\frac{55}{133}$	0 $4\frac{20}{25}$	0 $4\frac{28}{83}$	0 $3\frac{21}{23}$
15	22 3	7 3	15	25	12 $10\frac{2}{7}$	8 $2\frac{2}{11}$	5 $7\frac{1}{2}$	4 $1\frac{1}{11}$	3 $1\frac{7}{29}$	2 $5\frac{7}{37}$	1 $11\frac{11}{23}$	1 $7\frac{2}{7}$	1 $4\frac{4}{11}$	1 $1\frac{11}{13}$	1 0	0 10 [illegible]	0 $9\frac{9}{59}$	0 $8\frac{16}{133}$	0 $7\frac{5}{25}$	0 $6\frac{42}{83}$	0 $5\frac{20}{23}$
20	30 0	10 0	20	25	17 $1\frac{5}{7}$	10 $10\frac{10}{11}$	7 6	5 $5\frac{5}{11}$	4 $1\frac{19}{29}$	3 $2\frac{34}{37}$	2 $7\frac{7}{23}$	2 $1\frac{5}{7}$	1 $9\frac{9}{11}$	1 $6\frac{6}{13}$	1 4	1 $1\frac{11}{13}$	1 $0\frac{12}{59}$	0 $10\frac{110}{133}$	0 $9\frac{15}{25}$	0 $8\frac{56}{83}$	0 $7\frac{19}{23}$

Table XV.—*continued.*

Tapered half the Length and half the Size of the Rope.

	Thread Yarn.	Inches, 2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10
Sizes demanded		2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10
Threads *per* hook at the head	18	8	12	18	24	32	40	50	60	72	84	98	112	128	144	162	180	200
	20	9	14	20	27	35	45	55	67	80	93	108	125	142	160	180	200	222
	25	11	17	25	34	44	56	69	84	100	117	136	156	177	200	225	250	277
Number of threads to be worked in the ſhank	18	4	6	9	12	16	20	25	30	36	42	49	56	64	72	81	90	100
	20	5	7	10	14	18	23	28	34	40	47	54	63	71	80	90	100	111
	25	6	9	13	17	22	28	35	42	50	59	68	78	89	100	113	125	139
Number of threads to be worked in the tapers	18	4	6	9	12	16	20	25	30	36	42	49	56	64	72	81	90	100
	20	4	7	11	13	17	22	27	33	40	46	54	62	71	80	90	100	111
	25	5	8	12	17	22	28	34	42	50	58	68	78	88	100	112	125	138

Diſtance between the Tapers.

Fathoms demanded.	Lengths of Yarn in Shank or whole Parts.	Lengths of Yarn in the Head to the firſt Taper.	Lengths of Yarn to Taper.	Thread Yarn	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10
	fms. ft.	fms. ft. in.	fms. ft. in.		ft. in.																
5	7 3	3 4 6	3 4 6	18	5 7½	3 9	2 6	1 10½	1 4 7/8	1 1 5/10	0 10 20/25	0 8 1/3	0 7½	0 6 3/7	0 5 25/47	0 4 23/28	0 4 7/32	0 3 3/4	0 3 27/81	0 3	0 2 15/50
10	15 0	7 3 0	7 3 0		11 3	7 6	5 0	3 9	2 9 6/8	2 3	1 9 15/25	1 4 2/3	1 3	1 0 6/7	0 11 [illegible]	0 9 13/28	0 8 14/32	0 7 1/2	0 6 [illegible]	0 6	0 5 [illegible]
15	22 3	11 1 6	11 1 6		16 10½	11 3	7 6	5 7½	4 2 [illegible]	3 4 [illegible]	2 8 15/25	2 1	1 10½	1 7 2/7	1 4 [illegible]	1 2 13/28	1 0 27/32	0 11 1/4	0 10	0 9	0 8 [illegible]
20	30 0	15 0 0	15 0 0		22 6	15 0	10 0	7 6	5 7 4/8	4 6	3 7 5/25	2 9 1/3	2 6	2 1 5/7	1 10 2/49	1 7 8/28	1 4 28/32	1 3	1 1 27/81	1 0	0 10 40/50
5	7 3	3 4 6	3 4 6	20	5 7½	3 2 1/7	2 3	1 8 10/13	1 3 15/17	1 0 1/11	0 10	0 8 2/11	0 6 15/20	0 5 20/23	0 5	0 4 11/31	0 3 57/71	0 3 15/40	0 3	0 2 35/50	0 2 16/37
10	15 0	7 3 0	7 3 0		11 3	6 5 1/7	4 6	3 5 7/13	2 7 [illegible]	2 0 6/11	1 8	1 4 4/11	1 1 [illegible]	0 11 17/23	0 10	0 8 22/31	0 7 [illegible]	0 6 [illegible]	0 6	0 5 [illegible]	0 4 [illegible]
15	22 3	11 1 6	11 1 6		16 10½	9 7 [illegible]	6 9	5 2 4/13	3 11 11/17	3 0 [illegible]	2 6	2 0 6/11	1 7 [illegible]	1 5 11/23	1 3	1 1 [illegible]	0 11 [illegible]	0 10 [illegible]	0 9	0 8 [illegible]	0 7 11/37
20	30 0	15 0 0	15 0 0		22 6	12 10 2/7	9 0	6 11 1/13	5 3 9/17	4 1 1/11	3 4	2 8 8/11	2 2	1 11 11/23	1 8	1 5 13/31	1 3 15/71	1 1 20/40	1 0	0 10 40/50	0 9 22/37
5	7 3	3 4 6	3 4 6	25	4 6	2 9 [illegible]	1 10½	1 3 15/17	1 0 [illegible]	0 9 2/14	0 7 16/17	0 6 3/7	0 5 [illegible]	0 4 [illegible]	0 3 [illegible]	0 3 [illegible]	0 3 [illegible]	0 2 [illegible]	0 2 [illegible]	0 2 [illegible]	0 1 [illegible]
10	15 0	7 3 0	7 3 0		9 0	5 7½	3 9	2 7 13/17	2 0 6/11	1 7 [illegible]	1 3 [illegible]	1 0 6/7	0 10 [illegible]	0 9 [illegible]	0 7 [illegible]	0 6 2/13	0 6 [illegible]	0 5 [illegible]	0 4 [illegible]	0 4 [illegible]	0 3 [illegible]
15	22 3	11 1 6	11 1 6		13 6	8 5¼	5 7½	3 11 11/17	3 0 [illegible]	2 4 [illegible]	1 11 13/17	1 7 6/7	1 4 [illegible]	1 1 [illegible]	0 11 [illegible]	0 10 [illegible]	0 9 [illegible]	0 8 [illegible]	0 7 [illegible]	0 6 [illegible]	0 5 [illegible]
20	30 0	15 0 0	15 0 0		18 0	11 3	7 6	5 3 [illegible]	4 1 1/11	3 2 [illegible]	2 7 11/17	2 1 5/7	1 9 [illegible]	1 6 [illegible]	1 3 [illegible]	1 1 11/13	1 0 [illegible]	0 10 [illegible]	0 9 [illegible]	0 8 [illegible]	0 7 [illegible]

Suppofe you want to make a rope either cable or hawfer-laid, to be tapered one-third the length, and one-third the fize; you muft refer to Table V. or XIV. for making taper-cable, or hawfer-laid cordage, two-thirds the length and two-thirds the fize, which you muft work almoft wholly the reverfe way, by working the number of threads there mentioned to be worked in the tapers in the fhank, and the number of threads in the fhank muft be worked in the tapers: the length of yarn there mentioned to be tapered muft be the length in the head to the firft taper, and the length there mentioned in the head muft be the length of the yarn to be tapered: the length of yarn requefted to be warped for the fhank will be the fame as there mentioned, and the diftance between the tapers will, in almoft all cafes, be the fame as there nominated; but if at any time there fhould be a difference, and you are at a lofs to find the diftance between the tapers you muft divide the length of yarn to be tapered by the number of threads you have to taper, and that will give the exact diftance between them.

Table XVI.

Shewing the Number of Threads to work *per* Hook for four-ftrand hawfer-laid Cordage, from 2 to 12 Inches in Circumference, of the Sizes of Yarn as undermentioned: the Ropes to be laid without Hearts, the Yarns comprifing which being equally divided in the Strands.

No. of Threads here mentioned to weigh 99 to 100lb.	16	17	18	19	20	21	22	23	24	25
Size in Inches.	Threads *per* Hook.									
2	5	6	6	6	7	7	7	8	8	8
4	22	23	24	25	26	27	29	30	32	33
6	48	51	54	57	60	63	66	69	72	75
8	84	90	96	101	107	112	117	122	128	133
10	133	142	150	158	167	175	183	192	200	208
12	192	204	216	228	240	252	264	276	288	300

Table XVII.

Shewing the Length of Yarn requefted to be warped for the undermentioned Lengths of four-ftrand hawfer-laid Cordage, with the Hardening Mark prefixed againft each refpective Length.

Fathoms demanded.	Length of Yarn required.			Hardening Mark.		
	fms.	ft.	in.	fms.	ft.	in.
10	15	2	6	12	2	0
20	30	5	0	24	4	0
40	61	4	0	49	2	0
60	92	3	0	74	0	0
80	123	2	0	98	4	0
100	154	1	0	123	2	0
120	185	0	0	148	0	0
130	200	2	6	160	2	0

Remarks.—It is very feldom that hawfer-laid cordage is compofed of more than four ftrands, but for the fake of experiment, or otherwife, it might be demanded to contain a greater number: as fuch, the following rule, carefully attended to, will inform our readers how to lay a hawfer-laid rope in as many ftrands as may be confidered expedient.

Suppofe you want a five-ftrand hawfer-laid rope, you muft fquare the fize of the rope propofed to be made; that product multiply by the fize yarn you propofe making your rope from; the product of which, divided by 15, will give the number of threads to work *per* hook for a five-ftrand hawfer-laid rope. If you want to make a fix-ftrand hawfer-laid-rope, you muft proceed as above, and divide by 18; if a feven-ftrand, divide by 21; if an eight-ftrand, by 24; and fo on, adding 3 to your divifor for every ftrand you mean to increafe in the rope.

The fhrinking proportion in making four-ftrand hawfer-laid cordage, in the firft procefs, is exactly the fame as in three-ftrand; the only difference is in clofing the rope, which, being compofed of four ftrands, occafions the rope to lay more round and clofe than in three-ftrand cordage, which makes the fhrinkage be in a much greater proportion. The rope, in clofing, will fhorten $\frac{3}{10}$th parts of the remaining length of yarn, after the rope is hard, inftead of $\frac{1}{6}$th, as in three-ftrand hawfer-laid cordage.

The weight of each coil of four-ftrand hawfer-laid cordage may be nearly afcertained, by referring to the table of the weight of three-ftrand (Table XII.), there being as near the number of threads in each fize rope as can poffibly be laid, for each ftrand to have an equal number. But it fhould be remembered, that a coil of four-ftrand hawfer-laid rope, made out of 200 fathoms of yarn, will be only 130 fathoms long, inftead of 133.2, as in three-ftrand hawfer-laid cordage.

Table XVIII.

Shewing the ſhrinking Proportions of the Yarn, in making the undermentioned Lengths of Bolt-Rope; alſo its Weight (untarred), from 1 to 8 Inches in Circumference.

	Length in Fathoms of Rope demanded.	Length of Yarn required in Fathoms.	The Sledge ſhould move to the following Marks from the Tackle-Poſt, and is called the Rope's Hardening-Mark.	1-Inch. Weight.	2-Inch. Weight.	3-Inch. Weight.	4-Inch. Weight.	5-Inch. Weight.	6-Inch. Weight.	7-Inch. Weight.	8-Inch. Weight.
			Fms. feet.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.
	10	14	11 4	0 0 2 8¼	0 0 7 11	0 0 16 12¼	0 1 1 5¾	0 1 18 2½	0 2 11 2	0 3 6 10	1 0 7 2½
	20	28	23 2	0 0 5 0½	0 0 15 6	0 1 5 9¼	0 2 2 11½	0 3 8 5	1 0 22 4	1 2 13 4	2 0 14 5
	40	56	46 4	0 0 10 1	0 1 2 12	0 2 11 1¼	1 0 5 7	1 2 16 10	2 1 16 8	3 0 26 8	4 1 0 10
	60	84	70 0	0 0 15 1½	0 1 18 2	0 3 16 10	1 2 8 2½	2 1 24 15	3 2 10 12	4 3 11 12	6 1 14 5
	80	112	93 2	0 0 20 2	0 2 5 8	1 0 22 3	2 0 10 14	3 1 5 4	4 3 5 0	6 1 25 0	8 2 1 4
	100	140	116 4	0 0 25 2½	0 2 20 14	1 1 27 11½	2 2 13 9½	4 0 13 9	5 3 27 4	8 0 10 4	10 2 15 9
	120	168	140 0	0 1 2 3	0 3 8 4	1 3 5 4	3 0 16 5	4 3 21 14	7 0 21 8	9 2 23 8	12 3 1 14
Coil	143	200	166 4	0 1 8 0	0 3 26 0	2 0 16 0	3 3 0 0	5 3 16 0	8 2 8 0	11 2 8 0	15 0 24 0

Remarks.—In hardening the ſtrands, the yarn will ſhrink one-ſixth part of the whole length, which is called the rope's hardening mark.

In laying the rope, the ſtrands will ſhrink one-ſeventh part of the remaining diſtance, which brings the rope to the length required.

N. B. Bolt-rope is uſually made of 20 or 25-thread yarn, and generally delivered from the rope-maker white; the proceſs of tarring it being uſually performed by the ſail-maker, and is called ſtoving it, it being done in a ſtove or oven calculated for the purpoſe. In laying up your work, you muſt work with the ſame number of threads as in common hawſer-laid cordage. Bolt-rope, for exportation, is ſometimes lightly tarred; in which caſe, in calculating the weight, you muſt add one-ſixth to the weights hereunto annexed.

Table XIX.

Shewing the Number of Threads to work *per* Hook for three-ſtrand hawſer-laid white Cordage, from 1 to 12 Inches in Circumference, of the undermentioned Sizes of Yarn, with the Weight of each Rope prefixed.

No. of Threads here mentioned to weigh 88 lbs.	16	17	18	19	20	21	22	23	24	25	Weight of each Rope 133.2 Fathoms long.
Size in Inches.	Threads *per* Hook.										C. qr. lb.
1	3	3	3	3	3	3	3	4	4	4	0 1 12
2	8	8	9	9	10	10	10	11	12	12	1 0 8
3	18	19	20	21	22	23	24	25	26	27	2 1 12
4	32	33	35	37	39	41	42	44	46	48	4 0 20
6	72	76	80	84	88	92	96	100	104	108	9 1 20
8	128	135	142	149	156	163	170	177	185	192	16 2 24
10	200	211	222	233	244	255	266	277	289	300	26 0 16
12	288	304	320	336	352	368	384	400	416	432	37 2 24

N. B. Eſpecial care ſhould be taken relative to making white cordage for tackle-falls, crane-ropes, &c. that the hemp be of the very beſt quality; and that the ſame be topped, *viz.* all the ſhort hemp taken out by the hatcheller; and that the ſpinner do ſpin his yarn for the ſame exceeding ſmart and even, by no means lighter than the weight ſpecified under the article *ſpinning the yarn:* if he does, his rope will not anſwer the ſize required to be made.

TABLE XX.

Shewing the Number of Threads to work *per* Hook for four-ſtrand hawſer-laid white Cordage, without Hearts, from 2 to 12 Inches in Circumference, of the Sizes of Yarn as undermentioned.

No. of Threads here mentioned to weigh 88 lbs.	16	17	18	19	20	21	22	23	24	25
Size in Inches.	Threads *per* Hook.									
2	6	6	7	7	7	8	8	8	9	9
3	13	14	15	15	16	17	18	19	19	20
4	24	25	26	27	29	30	32	33	35	36
5	37	39	41	43	45	47	49	51	54	56
6	54	57	60	63	66	69	72	75	78	81
8	96	101	107	112	117	122	128	133	139	144
10	150	158	167	175	183	192	200	208	217	225
12	216	228	240	252	264	276	288	300	312	324

N. B. The weight of the above ropes may be found by conſulting Table XVII. for three-ſtrand hawſer-laid white cordage; the number of threads in each rope of a ſize being of an equal number, as near as poſſible.

Cordage made by Contract for the Uſe of His Majeſty's Navy.—The under-mentioned ſhews the number of threads to work *per* hook; the loweſt weight, allowance in weight, bandage, and higheſt weight; the cordage is to be received and allowed for by the receiving officers of his majeſty's reſpective dock-yards, under the honourable commiſſioners of his majeſty's navy, to rope-makers who have made cordage (upon the uſual principle) by contract, in coils, hawſers, cablets, and cables, with the length of yarn to be warped for the ſame, and length of cordage when made, as ordered by the honourable navy-board.

N. B. The higheſt weight a hawl of yarn for each ſort of cordage ſhould weigh (and by no means more,) is here noted.

TABLE XXI. Cablets.

Size.	Threads *per* Hook.	Loweſt Weight.	Allowance in Weight.	Bandage.	Higheſt Weight.
		C. qr. lb.	C. qr. lb.	C. qr. lb.	C. qr. lb.
2	3	1 1 4	0 0 4	0 0 4	1 1 12
2½	4	1 3 0	0 0 5	0 0 5	1 3 10
3	6	2 2 1	0 0 7	0 0 8	2 2 16
3½	8	3 1 2	0 0 10	0 0 11	3 1 23
4	10	4 0 18	0 0 12	0 0 13	4 1 15
4½	12	5 0 23	0 0 15	0 0 16	5 1 26
5	15	6 2 1	0 0 18	0 0 20	6 3 11
5½	18	7 3 7	0 0 22	0 0 24	8 0 25
6	21	9 0 12	0 0 26	0 1 0	9 2 10
6½	24	10 1 19	0 1 1	0 1 4	10 3 24
7	28	12 0 18	0 1 6	0 1 9	12 3 5
7½	32	13 3 16	0 1 11	0 1 14	14 2 13
8	37	16 0 6	0 1 17	0 1 21	16 3 16
8½	42	18 0 27	0 1 23	0 2 0	19 0 22
9	47	20 1 17	0 2 1	0 2 7	21 1 25
9½	52	22 2 9	0 2 7	0 2 13	23 3 1

TABLE XXII. Cables.

Size.	Threads *per* Hook.	Loweſt Weight.	Allowance in Weight.	Higheſt Weight.
		C. qr. lb.	C. qr. lb.	C. qr. lb.
10	58	21 0 23	0 2 3	21 2 26
10½	64	23 1 17	0 2 9	23 3 26
11	70	25 2 10	0 2 15	26 0 25
11½	76	27 3 4	0 2 22	28 1 26
12	83	30 1 10	0 3 1	31 0 11
12½	90	32 3 17	0 3 8	33 2 25
13	98	35 3 9	0 3 16	36 2 25
13½	106	38 3 1	0 3 25	39 2 26
14	114	41 2 20	1 0 5	42 2 25
14½	122	44 2 12	1 0 12	45 2 24
15	130	47 2 3	1 0 21	48 2 24
15½	139	50 3 7	1 1 2	52 0 9
16	148	54 0 13	1 1 11	55 1 24
16½	157	57 1 16	1 1 20	58 3 8

It is to be obſerved, that the above ſizes in Tab. XX., *viz.* 2 to 9½ inches, are termed, in the navy contracts, cablets, the yarn for which ſhould be warped 200 fathoms long, and the cablets, when complete, to be 120 fathoms. A hawl of yarn containing 336 threads, ſhould weigh from 16 cwt. 0 qr. 8 lb. to 16 cwt. 1 qr. 25 lb., and no more, allowing one-ſixth part of ſuch weight for tar, which is the allowance made by the honourable navy-board, and no more.

Cablets from 4 to 9½ inches will not be rejected, if they are half an inch in girt above the dimenſions ordered.

The yarn for the above cables (Tab. XXII.) are warped 166 fms. 4 ft. long, and the cables, when complete, to be 100 fathoms long. A hawl of yarn containing 336 threads, 166 fms. 4 ft. long, ſhould weigh from 13 cwt. 2 qr. 6 lb. to 13 cwt. 3 qr. 16lb., and no more, tarred with the ſame proportion of tar as the yarn for the cablets before-mentioned.

Cables

Cables 10 inches and upwards, are allowed three-fourths of an inch in girt more than the dimenfions given.

In proportions of cordage wherein the cables contained in them do not exceed $13\frac{1}{2}$ inches in circumference, a proportion of $1\frac{1}{2}$ cwt. of fpun-yarn is allowed to be fent to every ton of cordage; but if the cables are 14 inches in circumference and upwards, then 3 cwt. for every ton is allowed, in order to work up the toppings (or hemp) which fhould be taken out of the hemp agreeable to contract, previous to its being fpun into cable-yarn (in particular), as it frequently happens that the great number of lives of fome of his majefty's moft valuable fubjects are at ftake upon the dependance of a fingle cable.

The cables made in the ufual mode, by contract, have of late never exceeded $16\frac{1}{2}$ inches in circumference, (Tab. XXII. extends no further): for all the higher fizes are made by patent machines, by which much manual labour is fpared, and the yarns and ftrands laid much clofer and more even, and bear the ftrain more equally.

Size.	Threads *per* Hook.	Loweft Weight.			Allowance in Weight.			Bandage.			Higheft Weight.		
		C.	qr.	lb.	C.	qr.	lb.	C.	qr.	lb.	C.	qr.	lb.
$\frac{3}{4}$	2	0	1	4	0	0	1	0	0	1	0	1	6
1	3	0	1	20	0	0	1	0	0	1	0	1	22
$1\frac{1}{2}$	6	0	3	13	0	0	2	0	0	2	0	3	17
2	9	1	1	6	0	0	4	0	0	4	1	1	14
$2\frac{1}{2}$	14	2	0	5	0	0	6	0	0	6	2	0	17
3	20	2	3	20	0	0	8	0	0	9	3	0	9
$3\frac{1}{2}$	26	3	3	7	0	0	11	0	0	11	4	0	1
4	35	5	0	14	0	0	14	0	0	16	5	1	16
$4\frac{1}{2}$	44	6	1	22	0	0	18	0	0	20	6	3	4
5	54	7	3	19	0	0	22	0	0	24	8	1	9
$5\frac{1}{2}$	65	9	2	2	0	0	27	0	1	1	10	0	2
6	77	11	1	3	0	1	4	0	1	7	11	3	14
$6\frac{1}{2}$	91	13	1	11	0	1	9	0	1	13	14	0	5

The fizes of cordage hereunto annexed, from $\frac{3}{4}$ to $3\frac{1}{2}$ inches in circumference, are termed, in the navy, contract coils; all above, *viz.* 4 to $6\frac{1}{2}$ inch, are called hawfers. The yarn for both coils and hawfers fhould be warped 195 fathoms long, and the ropes, when completed, are to be 130 fathoms long. A hawl of yarn, confifting of 336 threads, 195 fathoms long, fhould weigh from 16 cwt. 1 qr. 7 lb. to 16 cwt. 2 qr. 24 lb. and no more, tarred in the fame proportion as cablets and cables.

All cordage delivered into his majefty's dock-yards undergo a trial, which is, by proving one ftrand out of each rope, each thread (or yarn) of which having a weight, weighing one-third of an cwt. made faft to it, which it fhould lift; but if a certain number of yarns (according to the fize of each rope) fhould break in the trial, the rope is rejected, otherwife it is received.

Particular attention fhould be paid not to fend any kind of cordage into his majefty's dock-yards above its higheft weight, allowed according to contract, as, in fuch cafe, all above that weight will be a lofs to the manufacturer; the receiving officer not being authorifed to allow any more than is fpecified in the contract.

N. B. It is to be obferved, that, in making cordage by contract for the ufe of his majefty's navy, his majefty finds his own hemp, the contractor tar and labour at a certain price *per* ton. All cables and cordage to be tarred with good Stockholm tar, without mixture of any other, except about one-third part, which may be of Ruffia tar.

A white thread, twifted the contrary way, (fometimes called the rogue's yarn,) is to be laid in all the ftrands of the cables and large cordage; and a twine in the fmall cordage for the king's mark, fo as to be feen on the outfide of the ftrands.

In any of the ftrands, there is to be no greater number of threads at the ends of the cables or cordage than in the middle.

The only parliamentary regulations, relative to the manufacture of cordage, are contained in the following act; "An act for more effectually preventing deceits in the manufacturing of cordage for fhipping; and to prevent the illicit importation of foreign-made cordage." 25 Geo. III. c. 56.

In July 1799, a patent was granted to W. Chapman and E. W. Chapman, of Newcaftle-upon-Tyne, for their improved method of making cords and ropes, twined and untwined, from the fpinning of the yarn inclufive, to the finifhing of the rope or cordage. This invention appears, by the fpecification, to include material improvements in the fpinning of rope-yarn, and in the manufacturing of cordage. Rope-yarns are at prefent fpun by men, at an expence of from half a crown to five fhillings *per* day, according to the fituation of the place, whether in the out-ports, or on the river Thames. Or it is wholly fpun by machinery.

In the practice of the firft method rope-walks are neceffary, and the fibres of the hemp are drawn into the yarn of different lengths proportionate in a given degree to their pofition in the outfide or infide of the yarn; accordingly, when this yarn is ftrained, and its diameter collapfes, the infide fibres of hemp bear the greateft ftrain, and thus they break progreffively from the infide.

In the fpinning by a mill the fibres are all brought forward in a pofition parallel to each other, previoufly to their receiving their twift. They are confequently all of one length; and, when twifted, the outfide fibres are moft fhortened by forming the fame number of fpirals round a greater axis than the interior, and thus they muft confequently break the firft, on the fame principle that the outfide yarns of ftrands of ropes manufactured in the old method break before the interior yarns; and, confequently, with lefs ftrain than ropes of the improved principle, where the ftrands, (or immediate component parts of the rope) have been formed in fuch a manner as that all the yarns fhall bear equally at the time of the rope's breaking.

Neverthelefs, yarns fpun by a mill have been found ftronger than common yarns, on account of the great evennefs with which they are fpun; the manual labour in manufacturing is much lefs than in the common method: but, on the other hand, there is the expence of machinery, and the greater wafte of hemp in preparing it for being drawn out in the progreffive ftages of its advance to the fpindle.

The method invented by Meffrs. Chapman differs from both the preceding, in having, by an eafy and fimple contrivance, the fibres of the hemp laid in the yarn in fuch a manner as the yarns themfelves are laid in the ftrands of the rope manufactured on the new principle.

Their machinery confifts only of a fpindle, divided into two parts, the upper containing apparatus to draw forward the hemp from the fpinner with twift fufficient to combine the fibres; which enables them to employ women, children, and invalids, and alfo to appropriate the rope-ground folely to the purpofe of laying ropes.

The part we have defcribed is only an improvement on the

the methods of fpinning, granted to Mr. William Chapman on the 8th day of November, 1798.

The remaining parts of their invention confift chiefly in the giving, from a ftationary power, internal motion to a locomotive machine, *viz.* to the roper's fledge, on which the ftrands and the rope itfelf are twifted, by which contrivance they are enabled to apply a water-wheel, or fteam-engine, to the whole procefs of making ropes of all kinds whatever.

Mr. Jofeph Huddart of Iflington obtained a patent in Auguft of the fame year for an improved method of regiftering or forming the ftrands in the machinery for the manufacture of cordage. Having previoufly taken out a patent for this purpofe, he contrived to effect it by the following means:

1. By keeping the yarns feparate from each other, and drawing them from bobbins, which revolve, to keep up the twift whilft the ftrand is forming.

2. By paffing them through a regifter, which divides them by circular fhells of holes; the number in each fhell being agreeable to the diftance from the centre of the ftrand, and the angle which the yarns make with a line parallel to it, and which gives them a proper pofition to enter.

3. A cylindrical tube, which compreffes the ftrand, and maintains a cylindrical figure to its furface.

4. A gauge to determine the angle which the yarns in the outfide fhell make with a line parallel to the centre of the ftrand when regiftering; and, according to the angle made by the yarns in this fhell, the length of all the yarns in the ftrand will be determined.

5. By hardening up the ftrand, and thereby increafing the angle in the outfide fhell, which compenfates for the ftretching of the yarns, and the compreffion of the ftrand.

The patent which Mr. Huddart took out in Auguft relates to the invention of a machine that may be worked by men, or any other power, and by means of which the regiftering may be commodioufly and effectually carried on. But figures are neceffary for defcribing intelligibly his peculiar contrivance. Mr. Huddart, in the following year, took out a patent for improvements in the method of turning cordage in the manufacture of it. But our limits forbid our enlarging on this article. The fpecifications of the patents for regiftering, as well as faftening, may be confulted by thofe who are concerned in this manufacture.

Rope *Walk*, or *Rope-houfe Ground*, is the place where ropes are manufactured. This fhould be 400 yards long, and about 10 broad. At the upper end are fixed the fpinning-wheels, over which is the hatchelling-loft, alfo the back-frame wheels, tackle-boards, and pofts, winches for winding the yarn on as it is fpun, and reels on which to reel the ropes. On each fide are ftake-pofts; in the middle is fixed the warping-poft, and at the lower end, the capftern and reaching-poft. Back-frame wheels for fmall, and fledges and drags for large ropes, are ufed towards the lower end; the back-frame wheel, for laying cordage from a fix-thread ratline to a two-inch rope, is about four or five feet in diameter, and is hung between two uprights, fixed by tenons on a truck, and fupported by a knee of wood. Over its top is a femicircular frame, called the head, to contain three whirls (that turns on the braffes) with iron fpindles, fecured by a hafp and pin. They are worked by means of a leather band encircling the whirls and the wheel. Three of the whirls are turned when hardening the ftrands, and one only when clofing the rope, the ftrands being hung together upon it. The truck, on which the back-frame wheel is fixed, runs on four wheels, and is made of three-inch oak plank, about nine feet long and thirteen inches broad at one end, and eleven inches broad at the other. The capftern, about eight feet high, and fourteen inches in diameter, is turned either by men or horfes; its ufe is to draw the yarn, when tarring, out of the copper, through the nipper, to be coiled away in the yarn-houfe, and there properly hardened before it is ufed; otherwife it will kink, *i. e.* twift or curl, by being twifted too hard in clofing. Another capftern, or crab, is fixed at the lower end of the walk, for ftretching the yarn to its fulleft extent, before it is worked into ftrands, by means of the tackle-fall, led from the *fledge* to the capftern; thefe being about eighteen yards diftant from each other. The crank-wheel, which is ufed for fpinning of lines, box-cord, &c. is fixed on an iron fpindle or axis, with a handle by which to turn it. It hangs between two pofts, and in its upper part, above the wheel, is let in a femicircular board to receive three fets of whirl-bolts, with wheels upon them, on which the fpinners hang their threads: at the front fide of the wheel is a fhort poft, fupported by a knee of oak, on which the fpindle refts. The *drags* refemble the hinder part of the fledge, to which they are faftened by ropes, and they are lined with a board on the upper fide: their weight ferves as a prefs, when the rope requires more than the fledge can carry properly to ftretch the ftrands, and prevent their kinking. The *hatchel* ferves to clear the ends of the hemp, by drawing it through, having forty fharp-pointed iron-teeth, fimilar to the hatchel in the *clearer*, which has finer teeth. Iron-jacks are fometimes ufed inftead of the table-wheel or back-frame wheel, and differ from the latter by having an iron-wheel with cogs, which work in the whirls, that have likewife iron-cogs. The *loper*, which is ufed to lay lines, has two iron fwivel-hooks (running round in a brafs or iron box) at each end, for the line to hang on and work, by the power of the fore-turn, from the wheel at the upper end. The *nipper* is formed of two fteel-plates, with a femi-oval hole in each, which, by the motion of the upper plate, enlarges or contracts as the tarring of the yarn requires. It is thus fixed: a poft is placed between the kettle and the capftern, with a mortife cut eighteen inches long from the kettle's furface, and five inches wide. The under plate is turned up on each fide, to form two grooves, and is let into the front fide of the poft from the lower part of the mortife. The upper plate has a dove-tail on the back, that flides up and down in a groove into the grooves of the lower plate; and by a ftaff, made faft to its front, it is raifed or lowered, and regulated by a weight fufpended at the other end, fo that the yarn receives no more tar than is required, and that which is fqueezed out drops into a trough, and returns into the kettle. *Prefs-barrels* are old tar-barrels filled with clay, and laid on the fledge or drag to add weight when the rope is clofing. The *reaching-poft* is a poft in the ground at the lower end of the walk; ufed in ftretching the yarn by means of a tackle, one of the blocks of which is hooked to a ftrap round the poft, the other block to a pendant at the fledge, being about eighteen yards diftant from each other. *Sledges* are frames made of ftrong oak, clamped with iron in different parts; the two fides are the length of the fledge, made of oak, and tied in with oak bars at each end; near the front are two uprights, let into the fides, and fupported by two flanting pieces from the upper end. A breaft-board is faftened with iron pins to the uprights, and contains holes for the hooks to pafs through, on which the hooks are hung; which, being turned by men, is twifted into rope, and fo clofed or finifhed. Thefe fledges are loaded as the occafion of making the rope requires. The *fpinning-wheel* is hung between two pofts fixed

fixed in the ground; over its top is a semicircular frame, called the head, which contains twelve whirls, if it be for twelve spinners to spin at the same time; these whirls turn on iron spindles, with hooks to their front ends to hang the hemp on, and are worked by means of a leather band encircling the wheels and whirls. The tools and terms appropriate to rope-making are described in their proper places.

Rope-*Yarn*, the yarn of any rope untwisted. It commonly consists of cable-ends which are worn out; and are called *junks of the cables*. It serves for many purposes among the sailors.

Rope-yarn properly denotes the smallest and simplest part of any rope, being one of the threads of which a strand is composed; so that the size of the latter, and of the rope into which it is twisted, are determined by the number of rope-yarns.

Ropes, *Standing*, in a *Ship*, the shrouds and stays are so called, because they are not removed, unless to be eased or set taught. See Shrouds, and Stays.

Ropes, *Staple*, ropes made of hemp, not inferior to clean Petersburgh.

Rope-*Bands*, braided cordage, used to fasten the heads of sails to their respective yards. See Robbins.

Rope-*Deck*. See Deck.

Rope, in *Agriculture*, a thick sort of cord formed of hemp, or other material; much used by farmers. See Cordage.

A very useful sort of rope for traces, and other similar purposes, has lately been formed of the coarse wool of sheep.

Rope, *Cart*, that sort of rope used in loading hay, straw, or other bulky loads, by the farmer. These ropes should always be strong, and formed of the best materials, whatever the nature of them may be.

Rope is also a word signifying to tedder, as a horse, or other animal. It is a very injudicious practice, and one which should by no means be generally followed by farmers.

Rope, *Cord*, or *Strap*, in the *Manege*, is any of these tied round a pillar, to which the horse is fastened, when they begin to quicken, and supple, to teach him to fly from the chambrier, and not gallop fastly or incompactly.

In those maneges where there is no pillar, a man stands in the centre of the ground, and holds the end of the rope.

Ropes, *Drag*, in the *Artillery*, are those by which the soldiers pull the guns backwards and forwards both in their exercise, and in an engagement. They are of various lengths and dimensions, as they are used for guns or howitzers of different weights.

Ropes, *Foot*. See Foot-*Ropes*.

Ropes *of two Pillars*, are the ropes or reins of a caveson, used to a horse that works between two pillars. See Pillar.

Rope-*Dancer*. See Dancer, and Nusance.

Rope *of Sand*, a phrase familiarly used to denote disunion, or want of adhesion and continuity. In this sense it is applicable to a variety of cases, and in military language to the disagreement that subsists between the colonel and the captains of a regiment.

Rope *Machine for raising Water*, in *Hydraulics*.—If a vertical grooved wheel, fixed in a frame, be situated within the water at the bottom of a well, and another similar wheel, having a handle affixed to its axis, be situated in another frame at the upper part of the well; also an endless rope (*viz.* a rope whose two extremities are spliced into each other) be passed round both wheels; then, on turning the handle, the wheels and the rope will be caused to move, *viz.* the rope will ascend on one side, and will descend on the other, passing successively through the water of the well; but the ascending part will carry up a quantity of water adhering to its surface; and this water differs in quantity, according to the size of the rope, the depth of the well, and the quickness of the motion; *viz.* with a larger rope, in a less deep well and quickest motion, a greater quantity of water will be raised, than otherwise.

In order to intercept the water at the top of the well, the upper wheel is inclosed in a pretty large box, in the bottom of which there are two holes, through which the ascending and descending parts of the rope pass. To these holes are affixed two short tubes, which prevent the exit of the water which falls to the bottom of the box. There is also a lateral spout on the side of the box, close to the bottom, for the water to come out of; and on the broad sides of the box there are two holes for the axis of the wheel. The 9th and 10th figures of *Plate* XIV. *Hydraulics*, exhibit a section and a front view of a machine of this sort, which was put up in the year 1782, on the castle hill at Windsor, where the depth of the well is 95 feet. A similar machine was also placed on the round tower of Windsor castle, which draws the water from the depth of 178 feet.

The same letters refer to the like parts in both figures.

The wheel, H, at the bottom of the well is of lignum vitæ, one foot in diameter. Its axis is of steel, and turns with its extremities in sockets of bell-metal.

The frame, I I, is of iron.

The wheel, E E, at the top of the well is of iron; but its rim, with the groove which receives the rope, are of lead. The diameter of this wheel is three feet.

The axis, *d d*, is of steel, and its extremities turn in bell-metal sockets, which are fixed in two upright posts, A, A, that support the machine. T is the handle affixed to the axis, which handle describes a circle of 28 inches in diameter; *b b* is the wooden box, lined with lead, which incloses the wheel E. F, F, are the holes at the bottom of the box through which the rope passes. Their diameter is about two inches.

On the same axis, *d d*, another wheel, C C, of about four feet in diameter, is fixed. This wheel is of wood, loaded on the edge with lead, and it serves as a fly to facilitate the motion.

The rope is of horse-hair, and measures half an inch in diameter.

With this identical machine, several experiments were tried, the result of which is as follows:

When the machine was worked slowly, *viz.* so as to make about 30 revolutions of the handle in one minute, then very little water came up adhering to the rope; and of this water a very small portion was separated from the rope within the box, so as to come out of the spout Z, in the side of the box.

When the revolutions of the handle were about 50 in a minute, then a considerable quantity of water came up adhering to the rope; and on turning the wheel E E round, the greatest part of that water, having acquired a considerable velocity, flew off in a tangent from the rope, and formed a jet within the box. This water, falling to the bottom of the box, came out of the spout Z.

It was found, that the utmost exertion of an ordinary working man could not make more than 60 revolutions of the handle in a minute; in which case the rope moved at the rate of about 16 feet *per* second. With this velocity the quantity of water that came out of the spout, Z, was about six gallons *per* minute: but it would have been impossible

poſſible for the man to have worked at that rate for more than three or four minutes.

This machine may evidently be placed aſlant, *viz.* ſo as to convey the water from one place to another, which is not quite perpendicularly over the former. The ſame conſtruction, and almoſt the ſame expence, will adapt the machine to wells of different depths, though the effects will not be always the ſame.

More than one rope, or a broad band inſtead of a rope, might be adapted to this machine, for which purpoſe, the wheels muſt have more than one (or a broad) groove, &c.

The greateſt diſadvantage of this machine is, that the rope does not laſt long. Its being always wet deſtroys it very ſoon. In putting on the rope, care muſt be had to ſoke it well in water before it be ſpliced; otherwiſe it will either be too tight, or it will break. A hair rope has been found to laſt longer than one of hemp. See Cavallo's Elem. of Nat. and Exp. Philoſophy, vol. ii.

ROPI, in *Geography*, a town of South America, in the juriſdiction of Guamanga.

ROPITZ. See REPITZ.

ROPOUREA, in *Botany*. See CAMAX.

ROPPEN, in *Geography*, a town of the Tyrolese; 4 miles S.W. of Stambs.

ROQUE, JOHN DE LA, in *Biography*, a writer of voyages and travels, was the ſon of a merchant at Marſeilles. He ſtudied in his native city, and afterwards travelled into the Eaſt, but in what capacity is not known. In 1689 he viſited Syria, mount Lebanon, and other countries in the Eaſt. In 1715 he was a reſident in Paris, and was there aſſociated with his brother in publiſhing the "Mercure de France." He died in 1745, in his 84th year. The following is a liſt of his principal publications: "Voyage de l'Arabie Heureuſe par l'Ocean oriental et le detroit de la Mer Rouge, fait par les François, &c. avec un Memoire concernant l'Arbre du Caffe," 1716. "Voyage de la Paleſtine, fait par l'Ordre de Louis XIV." 1717: to this is annexed a tranſlation of Abulfeda's Deſcription of Arabia. "Voyage de Syrie et du Mont Liban, &c. avec un Abrègè de la Vie de M. M. de Chaſtenil," 2 vols. He was a member of the Royal Academy of Belles Lettres at Marſeilles.

ROQUE, *La*, in *Geography*, a town of France, in the department of the Var; 6 miles S.W. of Brignoles.

ROQUE, *Cape*, a cape on the coaſt of Braſil. S. lat. 5°. W. long. 35° 40′.

ROQUEBROUE, LA, a town of France, in the department of the Cantal, and chief place of a canton, in the diſtrict of Aurillac; 12 miles W. of Aurillac. The place contains 1277, and the canton 9812 inhabitants, on a territory of 310 kiliometres, in 15 communes.

ROQUEBRUSSANNE, LA, a town of France, in the department of the Var, and chief place of a canton, in the diſtrict of Brignoles. The place contains 1436, and the canton 5220 inhabitants, on a territory of 187½ kiliometres, in 8 communes.

ROQUECOR, a town of France, in the department of the Lot and Garonne; 7 miles N.E. of Agen.

ROQUE-COURBE, a town of France, in the department of the Tarn, and chief place of a canton, in the diſtrict of Caſtres; 4 miles N.N.E. of Caſtres. The place contains 1294, and the canton 3829 inhabitants, on a territory of 132½ kiliometres, in 6 communes.

ROQUEFEUIL, a town of France, in the department of the Aude; 15 miles S.W. of Alet.

ROQUEFORT, a town of France, in the department of the Aude, and chief place of a canton, in the diſtrict of Limoux; 7 miles S. of Quellan. The place contains 567, and the canton 4920 inhabitants, on a territory of 322½ kiliometres, in 13 communes.—Alſo, a town of France, in the department of the Landes, and chief place of a canton, in the diſtrict of Mont-de-Marſan; 12 miles N.E. of Mont-de-Marſan. The place contains 1077, and the canton 8380 inhabitants, on a territory of 565 kiliometres, in 14 communes.

ROQUELAURE, a town of France, in the department of the Gers; 3 miles from Auche.

ROQUE-LIMBAUT, LA. See ROQUETAIMBAUT.

ROQUEMADOUR, a town of France, in the department of the Dordogne; 12 miles S.E. of Sarlat.

ROQUEMAURE, a town of France, in the department of the Gard, and chief place of a canton, in the diſtrict of Uzés, on the W. ſide of the Rhone; 6 miles N. of Avignon.

ROQUE-D'OLMES, a town of France, in the department of the Arriège; 7 miles S. of Mirepoix.

ROQUEPIC, an iſland in the Indian ſea, covered with cocoa and other trees, flowers, and odoriferous plants. N. lat. 9° 56′. E. long 95° 14′.

ROQUES, PETER, in *Biography*, a French Proteſtant divine in the 18th century, was born at Caune, in Upper Languedoc, in 1685. Having been educated for the miniſtry, he was choſen, at the age of 25, paſtor of the French Proteſtant church at Baſil, in connection with which he ſpent the remainder of his life. He died in 1748, at the age of 63. He was author of many works, which bore teſtimony to his learning, and the excellence of his judgment: of theſe, the principal are, "A Picture of the Behaviour of a Chriſtian;" "The Evangelical Paſtor;" "Elements of the Hiſtorical, Dogmatic, and Moral Truths contained in the Sacred Scriptures." He was the author of numerous papers inſerted in the "Journal Helvetique," and "Bibliotheque Germanique."

ROQUESTARON, in *Geography*, a town of France, in the department of the Maritime Alps, in the diſtrict of Puget-Theniers. The place contains 344, and the canton 2224 inhabitants, on a territory of 217½ kiliometres, in 7 communes.

ROQUET, in *Zoology*, the name of a ſpecies of American lizard, of ſmall ſize, and of a reddiſh-brown colour, variegated with black and yellow ſpots. Its fore-legs are remarkably long for a creature of this kind; its eyes are particularly vivid and ſparkling, and its head is carried continually erect; and the creature is almoſt always in motion, hopping about like a bird, and it uſually carries its tail bent into a ſemicircle over the back. It is far from being ſhy or timorous, and is delighted at the ſight of men; when tired with play or with running, it will open its mouth and pant, and loll out its tongue as the dogs do.

ROQUETAIMBAUT, in *Geography*, a town of France, in the department of the Lot and Garonne, and chief place of a canton, in the diſtrict of Agen; ſeven miles N.E. of Agen. The place contains 1294, and the canton 5494 inhabitants, on a territory of 87½ kiliometres, in 10 communes.

ROQUETAS, a town of Spain, in the province of Grenada, on the coaſt of the Mediterranean; 10 miles S.W. of Almeria.

ROQUEVAIRE, a town of France, in the department of the Mouths of the Rhone, and chief place of a canton, in the diſtrict of Marſeilles; 12 miles E.N.E. of Marſeilles. The place contains 3182, and the canton 17,926 inhabitants, on a territory of 275 kiliometres, in 10 communes.

ROQUILLE, a meafure of capacity in the Weft Indies; thus, the Englifh gallon is divided into two pots, four pintes, eight chopines, fixteen roquilles, thirty-two muces, or fixty-four demi-muces.

ROQUITE, in *Geography*, a river of Africa, which runs into the Atlantic; 70 miles S.E. of cape Bajador.

ROR, a town of Bavaria; four miles S.W. of Abenfperg.

RORAAS, a town of Norway, in the province of Drontheim; near which is a large copper mine, difcovered in the year 1644; 68 miles S.S.E. of Drontheim. This mine is in the fouthern flope of the chain of Dofra, in a rock of what the Germans call horn-fchiffer, or hornblende flate. The veins are from fix inches to fix ells in thicknefs; and the ore of a pale yellow. The mines of Roraas are very productive, and a fource of confiderable revenue.

RORARIUS, Jerome, in *Biography*, who flourifhed about the middle of the 16th century, was a native of Pordenonè, in Italy, and in the courfe of time he became nuncio from pope Clement VII. at the court of Ferdinand, king of Hungary. He was author of a curious work, entitled "Quod animalia Bruta Ratione utantur melius Homine," in which he undertakes to fhew, not only that beafts are rational creatures, but alfo that they make a better ufe of their reafon than man. This work, after lying concealed in the obfcure receffes of libraries 100 years, was publifhed by M. Naude at Paris in 1645. Bayle.

RORBACH, in *Geography*, a town of Auftria; 18 miles W. of Freyftatt.—Alfo, a town of France, in the department of the Mofelle, and chief place of a canton, in the diftrict of Sarreguemines; fix miles W. of Bitche. The place contains 655, and the canton 10,280 inhabitants, on a territory of $187\frac{1}{2}$ kiliometres, in 20 communes.—Alfo, a town of Germany, in the principality of Culmbach; feven miles S.S.E. of Gemunden.

RORE, in *Biography*. See Cipriano.

RORENTZBERG, in *Geography*, a mountain of Germany, on the Brifgau; two miles S. of Triberg.

RORHAW, a town of Auftria; eight miles W.S.W. of Hainburg.

RORICHE, a river of Brandenburg, which runs into the Oder; three miles N.W. of Königfberg.

RORIDULA, in *Botany*, from *roridus*, moift with dew, in allufion to the glandular moifture which clothes its herbage, like that of *Drofera*, the Sun-dew.—Linn. Gen. 567. Schreb. 157. Willd. Sp. Pl. v. 1. 1184. Mart. Mill. Dict. v. 4. Juff. 426. Lamarck Illuftr. t. 141. Gærtn. t. 62.—Clafs and order, *Pentandria Monogynia*. Nat. Ord. uncertain, Juff.

Gen. Ch. *Cal.* Perianth inferior, of five lanceolate, equal, permanent leaves. *Cor.* Petals five, ovate-oblong, equal, larger than the calyx. *Stam.* Filaments five, awl-fhaped, half the length of the corolla; anthers inferted a little above their bafe, oblong, of two parallel, nearly cylindrical lobes, opening obliquely at the top, and feparated almoft half way down; their bafe pouch-like, projecting downwards, termed by Linnæus the nectary. *Pift.* Germen fuperior, oblong; ftyle thread-fhaped, the length of the ftamens; ftigma abrupt, flightly three-lobed. *Peric.* Capfule oblong, triangular, of three cells and three valves, the partitions contrary to the valves. *Seeds* folitary, oval, angular at one fide, minutely dotted in rows.

Eff. Ch. Corolla of five petals. Calyx of five leaves. Anthers with a pouch at the bafe. Capfule of three valves and three cells. Seeds folitary.

Obf. Linnæus defcribes numerous feeds, but Gærtner and Juffieu found them folitary in each cell. There is no reafon to fuppofe thefe writers did not examine the very identical fpecies.

1. R. *dentata*. Linn. Gen. Pl. 567. Syft. Veg. ed. 14. 244. Willd. n. 1. (R. mufcicapa; Gærtn. v. 1. 298. Ireon verticillata; Burm. Prodr. Cap. 6.) Native of bogs at the Cape of Good Hope, but apparently either in fome remote tract, or not of frequent occurrence. The *ftem* is fhrubby, branched, round, fmooth, purplifh. *Leaves* numerous, crowded about the ends of the lateral fhoots, linear-lanceolate, pointed, about two inches long, finely downy, deeply pinnatifid, or pectinate; their fegments awl-fhaped, fringed with glandular-tipped briftles. *Flower-ftalks* firft terminal, then lateral, folitary, racemofe, woolly, longer than the leaves, each bearing about four large and handfome *flowers*. *Bracteas* and *calyx* fringed like the leaves. The *petals* feem to be white, or blufh-coloured. This is a very fine and fingular plant, with which it is pity we are not acquainted in a recent ftate. May it not be allied to Juffieu's *Tiliaceæ*?

RORIFEROUS Duct, *q. d. dew dropping-pipe*; a name given by fome to the thoracic duct; from its flow manner of conveying, and, as it were, diftilling, the chyle into the common ftream of blood.

RORIPA, or Rorippa, in *Botany*, Scop. Carn. ed. 1. 520. Adanfon Fam. v. 2. 417, a name which Scopoli fays he borrowed from Gefner, and by which he defignated a genus, which he feparated from *Sifymbrium*, on account of its coloured calyx, four converging glands, and fhort pods. The fame author, in his fecond edition of *Flora Carniolica*, reduces this genus, as moft others have done, to Sisymbrium; fee that article.

RORNBACH, in *Geography*, a town of the bifhopric of Paffau; two miles N. of Paffau.

RORSBACH, a town of the Helvetian republic, belonging to the abbey of St. Gall; fix miles N.E. of St. Gall.

RORSHEIM, a town of Weftphalia, in the principality of Halberftadt; fix miles N.E. of Ofterwick.

ROS, Dew. See Dew.

Ros *Solis*, in *Botany*, Sun Dew, a plant fo called from the clear drops of vifcid moifture, ftanding on the briftles which clothe its foliage; moft abundant and confpicuous in hot bright weather. See Drosera.

Ros *Vitrioli*, among *Chemifts*, is fometimes ufed for the firft phlegm diftilled from vitriol in balneo Mariæ.

Ros *fur Couefnon*, in *Geography*, a town of France, in the department of the Ille and Vilaine; feven miles E.N.E. of Dol.

ROSA, in *Botany*, an ancient and popular name, derived, with moft probability, from the Celtic, *rôs* or *rhos*; whence comes alfo its Greek fynonym, ῥόδον; and the name of the fame flower in various modern languages, Rofe, Rofa, &c. De Theis remarks, that the Celtic *rhodd*, or *rhudd*, red, is the primary root of thefe words, the rofe colour being almoft fynonimous with rednefs. Hence alfo came *Rhus*, *Rubia*, *Rubus*, and the Greek name of the Pomegranate, ῥόα, or ῥοδία, ftill in ufe. All thefe words have a manifeft reference to a red colour, in fome part of each of the plants. —Linn. Gen. 254. Schreb. 341. Willd. Sp. Pl. v. 2. 1063. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 537. Prodr. Fl. Græc. Sibth. v. 1. 347. Ait. Hort. Kew. v. 3. 257. Purfh 344. Juff. 335. Lamarck Illuftr. t. 440. Gærtn. t. 73.—Clafs and order, *Icofandria Polygynia*. Nat. Ord. *Senticofæ*, Linn. *Rofaceæ*, Juff.

Gen. Ch. *Cal.* Perianth of one leaf; tube fwelling, ovate or globofe, contracted at the top; limb fpreading, in five deep,

deep, converging, long, narrow-lanceolate fegments, two of which are ufually fringed, at both edges, with unequal leafy appendages, the third at one edge only, the two remaining having both edges naked; in fome fpecies all are fimple and naked. *Cor.* Petals five, inverfely heart-fhaped, the length of the calyx, and inferted into its neck. *Stam.* Filaments very numerous, capillary, fhort, inferted into the neck of the calyx; anthers roundifh-triangular. *Pift.* Germens numerous, in the cavity of the calyx; ftyles as many, villous, very fhort, inferted laterally into each germen, and clofely compreffed by the neck of the calyx; ftigmas obtufe. *Peric.* none, except a fpurious berry, formed of the turbinate tube of the calyx become foft and coloured, of one cell, contracted and clofed at the neck, crowned with the faded hardened fegments of the limb. *Seeds* numerous, oblong, hard, angular, hifpid, lining the interior furface of the calyx.

Eff. Ch. Petals five. Calyx urceolate, five-cleft, flefhy, contracted at the neck. Seeds numerous, hifpid, lining the infide of the calyx.

No genus more natural than this, in habit, or technical characters, can poffibly be found. The Rofe is alfo the moft favourite of plants in all countries of the globe, the type of beauty and love, beftowing its name to enrich other flowers, which derive from thence their chief celebrity, and taking unqueftioned precedence in all matters of ornament or tafte. But thorns are proverbially the accompaniments of rofes; nor can any one be more fenfible of this, than the botanift, who attempts to extricate and define the fpecies of this beautiful family. Cultivated plants in general are known to fport in luxuriant varieties, often tranfient indeed, but fufficiently durable to caufe much perplexity to the accurate obferver. No wonder therefore that rofes, fo abundant in every garden, fhould affume various afpects from difference of foil and treatment; though lefs perhaps, than moft other tribes, from crofs impregnation. The habit of this genus is invariably fhrubby, and almoft univerfally prickly; the branches round; leaves alternate, pinnate with an odd leaflet, ferrated, frequently prickly or glandular; one fpecies only being known to have fimple leaves, or, in other words, to want the lateral leaflets. Stipulas almoft always united to the bafe of the common footftalk. Flowers terminal, ftalked, ufually red, varioufly and delicioufly fragrant; fometimes white; very rarely yellow, and in that cafe either inodorous or fœtid. Fruit harmlefs, but feldom pleafant. Seeds flow in germination.

The generality of writers on Rofes have come under the defcription of florifts rather than botanifts, and their figures have been executed accordingly. Linnæus found the determination of fpecies very difficult. Ehrhart paid confiderable attention to the fubject, and in his *Beiträge* has thrown much light upon it, by which Willdenow has profited. The garden Rofes are well arranged in the new edition of Aiton's Hortus Kewenfis, where we fhall find but little to improve or correct; and they are elegantly difplayed in Mifs Lawrance's ample collection of figures, publifhed in 1799, except that we could have wifhed for much more delicacy, and difcrimination of tints, in their various foliage. Several new Britifh ones have been firft defcribed, by the writer of the prefent article, in *Englifh Botany*, where Mr. Sowerby has, as ufual, been happy in his reprefentations of their diftinctive habits and characters.

The fpecies are diftributed by Linnæus, and all his followers, into two fections, diftinguifhed by the fhape of the tube of the calyx, inaccurately termed by him the germen. Of this error Willdenow takes notice, without correcting it, not being at that time aware of the meafure adopted in our *Flora Britannica*, where, by fubftituting *fruit* for *germen*, every inconvenience and inaccuracy is avoided. Mr. Dryander and Mr. Aiton in *Hort. Kew.*, while they follow, as we fhall here do, Willdenow's general and particular diftribution of the fpecies, have, in the point juft mentioned, corrected his phrafeology. Our new fpecies, chiefly fupplied by Englifh Botany, and Purfh's Flora of North America, will be inferted, as nearly as poffible, according to their affinities. Perhaps fome of the old ones might have been better placed; but except any glaring impropriety prefented itfelf, more inconvenience than benefit would arife from difturbing an arrangement fo generally received, and which Linnæus firft formed in his *Syftema Naturæ*, ed. 12. We have only brought *canina* and its allies nearer together than they are placed in the above-mentioned books.

Section 1. *Fruit nearly globofe.*

1. R. *berberifolia.* Barberry-leaved Rofe. "Pallas in Nov. Act. Petrop. v. 10. 379. t. 10. f. 5." Willd. n. 1. Ait. n. 1. (R. fimplicifolia; Salif. Hort. 359. Parad. t. 101. Poiret in Lamarck Dict. v. 6. 276.)—Fruit globofe, prickly, as well as the flower-ftalk. Leaves fimple, nearly feffile, with ftipulary recurved prickles. Found by Michaux and Olivier in the north of Perfia. Seeds fent by the former to fir J. Banks were raifed at Kew about the year 1790, but the plants did not long furvive. This fpecies is extremely remarkable for its fimple *leaves*, which are obovate, glaucous, coarfely ferrated, about an inch long, fmooth, on fhort ftalks, without *ftipulas*, but having in their ftead a pair of recurved taper prickles, fpreading from the bafe of each footftalk. The *branches* are alfo befet with fhorter prickles. *Flowers* folitary, on fhort, terminal, prickly, downy ftalks. *Petals* yellow, crimfon at the bafe. *Fruit* globular, very prickly, crowned with the fimple narrow fegments of the *calyx*. We wifh the name *fimplicifolia* had been retained, as much the beft; and if Juffieu had actually given it as a name, in his Gen. Pl. 452, it might, by the right of priority, have fuperfeded Pallas's appellation.

2. R. *lutea.* Yellow Sweet-briar. Mill. Dict. ed. 8. n. 11. Willd. n. 2. Ait. n. 2. Curt. Lond. t. 363. Lawr. Rof. t. 12. Lob. Ic. v. 2. 209. Ger. Em. 1267. (R. lutea fimplex; Bauh. Pin. 483. R. Eglanteria; Linn. Sp. Pl. 703. R. chlorophylla unicolor; Ehrh. Beitr. v. 2. 70. Arb. 156. R. fœtida; Herm. Rof. 18. Allion. Ped. v. 2. 138.)

β. bicolor. Auftrian Rofe, or Copper Sweet-briar; Jacq. Hort. Vind. v. 1. t. 1. Curt. Mag. t. 1077. Lawr. Rof. t. 6. (R. fylveftris auftriaca, flore phœniceo; Hort. Angl. 66. t. 18.)—Fruit globofe, fmooth, as well as the flower-ftalk. Calyx and leaf-ftalks minutely prickly. Prickles of the branches ftraight. Leaflets obovate, doubly ferrated, rather glutinous, fmooth.—Native of Germany and Italy; but not, as Willdenow reports, of England. It is however frequent here in old country gardens, in a pure air, flowering in June. Gerarde cultivated this fpecies, and even raifed it from feed, in order to refute a vulgar error, of its being fome common rofe, turned yellow by grafting on a broom-ftock. The beautiful red or copper-coloured variety, β, is more difficult of cultivation, efpecially with refpect to air. The *ftem* is bufhy, four or five feet high. *Leaves* deciduous, of five or feven obovate, ftrongly ferrated, deep green, fhining leaflets, rather vifcid to the touch, and exhaling a moft fweet and peculiar aromatic odour, more grateful to us than that of the Common Sweet-briar. *Flowers* copious, large, ufually of an uniform golden yellow, with the fmell of bugs; but in the variety β the upper fide of the *petals* is of a tawny red, and the difagreeable

agreeable odour is lefs. We have, under the article Eglanteria, given the hiftory of Linnæus's miftake, in confounding the prefent fpecies, firft with the Common Sweet-briar, and then with the Double Oriental Yellow Rofe, (fee hereafter *R. fulphurea* and *R. rubiginofa*); as well as our reafons for following the Hort. Kew., Willdenow, &c. in thefe names. The *fruit* of *R. lutea* has never been feen or heard of by us, in a ftate of maturity.

3. R. *fulphurea.* Double Yellow Rofe. Ait. Hort. Kew. ed. 1. n. 2. ed. 2. n. 3. Willd. n. 3. Lawr. Rof. t. 77. (R. glaucophylla; Ehrh. Beitr. v. 2. 69. R. hemifphærica; Herm. Rof. 18. R. lutea multiplex; Ger. Em. 1267. Hort. Angl. 66. t. 18. R. lutea maxima, flore pleno; Hort. Eyft. vern. ord. 6. t. 2. f. 4. R. flava, pleno flore; Cluf. Cur. Poft. 6.)—Fruit globofe, fomewhat prickly. Flower-ftalks fmooth. Stem with two fets of copious ftraight prickles. Stipulas jagged. Leaflets obovate, fimply ferrated, glaucous, fmooth. This fine and fingular fpecies, ftrangely confounded, by many botanifts, with the laft, was received by Clufius from the Levant, but its native country is not precifely known. It has been cultivated in England for near 200 years, and is perfectly hardy as to cold, but very impatient of low, confined, or fmoky fituations; nor does it, in the moft favourable, often expand its copious and truly glorious flowers to advantage. We have feen them in the greateft perfection, on a poor gravelly foil, expofed to eaft winds, about outhoufes and hovels, where no care was taken of the plant. The bufh is larger than *R. lutea*, and evidently diftinguifhable by the pale glaucous hue of its fmooth inodorous *leaves*. The prickles of the *ftem* are of two kinds; fome twice as large as the others. *Flowers* large and very double, without fcent, of a rich but delicate golden yellow; their inner petals, when perfect, fo profufely and elegantly crumpled, and fo brightly tranfparent, that neither the ftructure, nor the colour, of any other rofe, can give the flighteft idea of their beauty; much lefs has any artift, except perhaps Van Huyfum, in one or two of his fineft pictures, done this flower tolerable juftice. The foliage in Mifs Lawrance's plate is much too dark, and wants the glaucous pale afpect which characterizes the fpecies. The flower is well drawn in the old Hortus Eyftetenfis.

4. R. *Bankfiæ.* Lady Banks's Rofe. Ait. n. 4.—"Smooth, naked, and without prickles. Fruit globofe. Leaves ternate or pinnate, fhining. Stipulas fetaceous, diftinct."—Native of China, from whence it is faid to have been brought, by Mr. W. Kerr, in 1807. It is marked, by Mr Aiton, as a green-houfe *fhrub*, bloffoming in June and July. We have feen neither fpecimen nor figure.

5. R. *blanda.* Labrador, or Hudfon's bay, Rofe. Ait. Hort. Kew. ed. 1. n. 3. ed. 2. n. 5. Willd. n. 4. Purfh n. 1. Lawr. Rof. t. 27.—Fruit globofe, fmooth. Adult ftems, like the flower-ftalks, quite fmooth, and without prickles.—Native of the moft northern parts of America, on the eaft, as well as weft, coafts, flowering there, as in our gardens, from May to Auguft. Mr. Gordon is known to have cultivated it in 1773, but the fpecies has not excited general notice. The young *branches*, and their *leaf-ftalks*, bear copious, ftraight, red prickles, but they afterwards become fmooth, naked, red and fhining. The *leaflets* are ufually feven, oblong, or obovate, large, varying in breadth. *Stipulas* broad and long, with glandular fpreading points. *Flowers* folitary, moderately large, crimfon. Tube of the *calyx* fhort, and almoft hemifpherical; fegments long and fimple, tapering gradually to a point.

6. R. *cinnamomea.* Cinnamon Rofe. Linn. Sp. Pl. 703. Willd. n. 5. Ait. n. 6. Engl. Bot. t. 2388. Ger. Em. 1268. Lawr. Rof. t. 34. (R. fluvialis; Fl. Dan. t. 868. Retz. Scandin. ed. 2. 120. R. majalis; Herm. Rof. 8. Rofier printanier; Reynier Mém. de la Suiffe, v. 1. 222.)

β. R. collincola; Ehrh. Beitr. v. 2. 70. Arb. 25.

Fruit globofe, fmooth as well as the flower-ftalks. Stem with occafional, fmall, twin prickles, below the ftipulas. Footftalks fcarcely prickly. Leaflets oblong, finely downy, glaucous beneath.—Native of Germany, Switzerland, Sweden, and Denmark; firft obferved wild in England by Mr. Salifbury, in the wood in Aketon pafture, near Pontefract, Yorkfhire. In gardens the double variety is common. This is one of our earlieft Rofes, flowering in May. The bufh is rather tall, with brown or reddifh twigs, fhining and fmooth, except the fmall, and not univerfal, twin prickles, under each *ftipula*. The *leaves* have a dull glaucous afpect, and are ufually elliptic-oblong, unequally ferrated; in β, Ehrhart's *collincola*, which our friend Dr. Afzelius is inclined to make a diftinct fpecies, they are broader and more obtufe, but we can find no permanent fpecific mark. Still lefs can we diftinguifh, even as a variety, the *fluvialis* of Fl. Dan. The *flowers* are of a delicate purplifh blufh-colour, at leaft fuch are the double ones, feen in gardens; in which we could never detect any of the cinnamon fcent, mentioned by Bauhin, to juftify the name. The *fruit* of the wild kind is fmall, globofe, fcarlet. Segments of the *calyx* fimple, long, and flender, for the moft part flightly fpatulate at the end, but not invariably fo. The bufh, when young, is fometimes very prickly.

7. R. *kamtfchatica.* Kamtfchatka Rofe. Venten. Hort. Cels. t. 67, not 68. Ait. n. 7.—Fruit globofe, fmooth as well as the flower-ftalks. Stem downy, very prickly. Leaf-ftalks fomewhat prickly. Leaflets obovate, abrupt.—Native of Kamtfchatka.—Sent to Kew by M. Cels, from his garden at Paris, in 1802; but it was, long before, cultivated in Chelfea garden, from whence we received a fpecimen in 1791. Every part is larger than the preceding. The *ftem* is downy, and armed with numerous, fcattered, ftraight, pale, flender prickles; fome of which are alfo found on the leaf-ftalks. *Leaflets* ufually feven, of a pale glaucous green, veiny and rugged; fomewhat downy beneath; coarfely ferrated, abrupt and emarginate. *Stipulas* obovate, dilated, obtufe, veiny and downy. *Flowers* folitary, purplifh rofe-coloured, fragrant. Segments of the *calyx* fimple, entire, fpatulate at the ends. *Fruit* fmall, globofe, red. Perhaps this fpecies ought to have been introduced between *blanda* and *cinnamomea*.

8. R. *arvenfis.* White Dog Rofe. Hudf. Angl. ed. 1. 192. Linn. Mant. 2. 245. Willd. n. 6. Ait. n. 8. Fl. Brit. n. 2. Engl. Bot. t. 188. Lawr. Rof. t. 86. (R. fylveftris; Herm. Rof. 10. R. Herporhodon; Ehrh. Beitr. v. 2. 71. R. ferpens; Ehrh. Arb. 35. R. fylveftris folio glabro, flore planè albo; Bauh. Hift. v. 2. 44.)—Fruit nearly globofe, fmooth. Flower-ftalks glandular, fomewhat cymofe. Prickles of the ftem and leaf-ftalks hooked. Styles elongated, combined.—Native of England, Germany, and Switzerland. It often decorates, in profufion, the hedges and thickets of the gravelly counties of England, flowering in June and July, when its long, trailing, purplifh-brown twigs, and copious milk-white bloffoms, are highly ornamental. We believe this fpecies is unknown in Sweden and Denmark; for the t. 398 of Fl. Dan. cited by Linnæus, whom Willdenow like Hudfon copies, is moft evidently, as it calls itfelf, *fpinofiffima*. There is a glaucous hue on the young *fhoots*, as well as on the backs of the *leaflets*, which are moftly five, oval, pointed, fmooth, with fharp unequal ferratures. *Stipulas* linear, pointed. *Flower-ftalks* rough with glandular briftles, not prickly. Bafe of the *calyx* fmooth and ovate, but

but the *fruit* is globose, of a deep red, crowned with the elongated *styles*, so combined as to seem one.

9. R. *spinosissima*. Burnet Rose. Linn. Sp. Pl. ed. 1. 491. ed. 2. 705? Willd. n. 8. Ait. n. 9. Fl. Brit. n. 1. Engl. Bot. t. 187. Fl. Dan. t. 398. Lawr. Ros. t. 48 and t. 78. Ehrh. Arb. 85. (R. pimpinellifolia; Linn. Syst. Nat. ed. 10. 1062. Sp. Pl. 703. R. n. 1106; Hall. Hist. v. 2. 40. R. campestris spinosissima, flore albo odoro; Bauh. Pin. 483. R. campestris odora; Clus. Pan. 111. R. campestris odorato flore; Clus. Hist. 116. R. pimpinellæ folio; Ger. Em. 1270.)—Fruit globose, smooth as well as the flower-stalks. Prickles of the stem very numerous, straight and setaceous. Leaflets roundish, smooth. Calyx of the fruit reflexed.—Native of sandy downs near the sea, as well as the borders of fields, and mountains, in various parts of Europe; not uncommon in Britain, flowering in July.—This is a bush of humble growth, seldom more than two or three feet high, and much branched. The *stem* is copiously clothed with innumerable, straight, crowded, needle-like, pale prickles. The *leaf-stalks* are occasionally prickly. *Leaflets* seven or nine, roundish, or slightly elliptical, obtuse, serrated, small, even and smooth, a little glaucous, not shining. *Flower-stalks* terminal, solitary, single-flowered, rather swelling upwards, always, as far as we have seen, smooth and naked. *Germen* depressed, and nearly hemispherical. Segments of the *calyx* tapering, smooth, and entire. *Flowers* with a light pleasant scent, usually cream-coloured, yellow in the middle; but Miss Lawrance's t. 78 represents the red variegated variety, first described by Sibbald in his Scotia Illustrata, p. 2. 46. t. 2, under the name of *R. Ciphiana*. The *fruit* is much larger than the leaflets, globose, dark purple, and finally quite black, with large *seeds*, and crowned with the reflexed *calyx*.——We feel no scruple in referring the *pimpinellifolia* of Linnæus to his *spinosissima*, of which it is not even a variety; but we cannot take into consideration all the different things which various authors have supposed one or other of these species. We shall notice *pimpinellifolia* of Villars under *alpina*. Miss Lawrance's t. 15 and t. 19, are doubtful, on many accounts. The former indeed answers to our next species. Her t. 63 is surely different from both. The synonyms of old writers, regarding this Rose, are very puzzling, nor have they ever been well explained. The figure in Clusius's Stirp. Pannon. 114, belongs in truth to *spinosissima*, as he gives it in his Historia; while his 4th Rose, or χαμαιρόδον of the former work, to which that figure seems annexed, is *pumila* of Jacquin. His other cut, at p. 111, more resembles *cinnamomea*, which is often very prickly the first season, as professor Swartz remarks. Our learned correspondent just named likewise suggests that the *cinnamomea* is one of various things which Linnæus in Fl. Suec. confounded under the name of *spinosissima*. Haller has certainly not adverted to all the Roses known to be found in Switzerland, but his n. 1106 can be no other than our *spinosissima*.

10. R. *rubella*. Red-fruited Dwarf Rose. Sm. Engl. Bot. t. 2521. (R. spinosissima γ; Fl. Brit. 537? β; Lawr. Ros. t. 15.)—Fruit globose, somewhat bristly. Flower-stalks bristly. Prickles of the stem very numerous, straight, and setaceous. Leaflets elliptical, smooth. Calyx of the fruit inflexed.—Gathered near Newcastle, by Mr. Winch. We have also specimens from Mr. James Backhouse, who has just informed us that he finds the inflexed *calyx*, after flowering, an invariable character of this species, that of the foregoing being always reflexed. The rough *flower-stalks* are less unalterable, though tolerably constant. The scarlet *fruit* is a very remarkable difference. The *flowers* are elegantly tinged with red. Mr. Backhouse thinks this rather the taller-growing shrub of the two, and he observes that the *leaves* fold together, or *sleep*, at night. We know not whether this is the case with *spinosissima*.

11. R. *involuta*. Dr. Walker's Rose. Fl. Brit. 1398. Engl. Bot. t. 2068. Ait. n. 10.—Fruit globose, very prickly as well as the flower-stalks. Prickles of the stem very numerous, and nearly straight. Petals involute and imperfectly expanded. Leaflets elliptical, hairy beneath.—Native of the Hebrides, where it was gathered by the Rev. Dr. Walker, and Mr. J. Mackay.—The present species has the general habit, and very prickly *stem*, of the two last. But the *flower-stalks*, *leaf-stalks*, and young *fruit*, are all extremely prickly, the latter being more disposed to be ovate than depressed. The *leaflets* are more elliptical, their under side hairy, especially the ribs. Segments of the *calyx* long, simple, pointed, rough externally with glandular prickles. *Petals* pale blush, with deeper tints here and there, concave and involute, seldom more than half expanded. Ripe *fruit* unknown to us.

12. R. *parviflora*. Small American Rose. Ehrh. Beitr. v. 4. 21. Willd n. 9. Pursh n. 2. (R. caroliniana; Mich. Boreal-Amer. v. 1. 295. R. carolina; Sm. Inf. of Georgia, v. 1. 49. t. 25.)—Fruit globose, slightly depressed, bristly as well as the flower-stalks and calyx. Leaf-stalks downy, somewhat prickly. Prickles in pairs under the stipulas, straight. Leaflets elliptic-lanceolate, simply serrated, smooth. Flowers solitary or in pairs.—"Native of woods on the sides of hills, from New York to Carolina, flowering in June and July. About two feet high. There are a number of varieties of this species." *Pursh*. Our specimens, sent by the Rev. Dr. Muhlenberg, answer well to the figure above cited, and have, like that, solitary *flowers*, of a pale pink hue. The *stem* is slender and smooth, except a pair of awl-shaped, slender, straight prickles under each *stipula*. *Leaflets* five, elegantly elliptical; their common *stalk* reddish, channelled, prickly, somewhat downy, or hairy. The Rose in Dill. Elth. t. 245. f. 316, is exactly our's, though quoted by authors for the *lucida*.

13. R. *nitida*. Polished American Rose. "Willd. Enum. 544." Pursh n. 3.—"Fruit globose. Calyx, flower-stalks, and branches hispid. Leaf-stalks rather downy, without prickles. Leaflets oblong-lanceolate, polished and smooth on both sides."—In Pennsylvania and Virginia, flowering from June to August. *Petals* red, obcordate. *Leaflets* seven. *Pursh*. We have not met with any specimen or figure.

14. R. *lucida*. Shining American Rose. Ehrh. Beitr. v. 4. 22. Arb. 76. Willd. n. 10. Pursh n. 4; excluding the synonym of Dillenius. (R. alpina β; Ait. n. 27. Lawr. Ros. t. 75.)—Fruit globose, depressed, rather hispid as well as the flower-stalks. Leaf-stalks somewhat prickly, not downy. Prickles usually in pairs under the stipulas, straight. Leaflets ovato-lanceolate, bluntish, coarsely serrated, very smooth, shining. Corymbs of few flowers.—On the borders of swamps, from New York to Carolina, flowering in July and August. From four to six feet high. *Pursh*. By Ehrhart's specimen, the only one we have seen, it evidently appears, that the R. carolina fragrans, foliis mediotenus serratis; Dill. Elth. 325. t. 245. f. 316, is very erroneously referred by Willdenow and Pursh to the present species; belonging, if we are right in what we take for *parviflora*, n. 12, indubitably to that plant. The present has seven *leaflets*, of a larger size and firmer texture. Stipulary *prickles* shorter, thicker, not always present. *Flowers* corymbose, four or five together. If we are right in Miss Lawrance's figure, this species, as well as *parviflora*, ought to be placed on the list of our garden plants.

15. R. *gemella.* Twin-flowered American Rofe. "Willd. Enum. 544." Purfh n. 5.—Fruit globofe, fmooth as well as the flower-ftalks. Flowers moftly in pairs. Leaflets elliptic-oblong, opaque; their veins hairy beneath. Leaf-ftalks downy. Prickles in pairs under the ftipulas, hooked. —On dry funny hills, from New England to Carolina, flowering in July and Auguft. A low *fhrub*, with large red *flowers*. *Purfh.* Specimens in the herbarium of Linnæus, referred by him to *R. carolina*, have flender *branches*, quite fmooth, and fomewhat glaucous. *Leaflets* feven, fmaller, thinner, and more acutely ferrated than the laft; rather glaucous and downy beneath; their veins as if fringed. *Leaf-ftalks* and *ftipulas* finely downy and hoary. *Flowers* terminal, in pairs, on fhort fmooth *ftalks*, enveloped in large downy *bracteas*. *Germen* exactly globular, quite fmooth and naked. Segments of the *calyx* fmooth at the bafe, downy at the edges and upper part, fimple; fpatulate at the end.

16. R. *Lyonii.* Lyon's American Rofe. Purfh n. 6.—"Fruit nearly globofe, fmoothifh. Flower-ftalks hifpid, moftly ternate. Leaf-ftalks rather prickly. Stem with ftraight fcattered prickles, not hairy. Leaflets ovate-oblong, acute, ferrated; fmoothifh above; downy beneath: the upper leaves fimple. Stipulas linear. Segments of the calyx downy, linear, fcarcely laciniated."—Gathered by Mr. Lyon in Teneffee, North America, flowering in July. The *leaflets* are three or five, fmall, with coloured veins. *Flowers* pale red. *Purfh.*

17. R. *fetigera.* Fringe-cupped American Rofe. Mich. Boreal-Amer. v. 1. 295. Purfh n. 7.—"Fruit globofe. Stalks and ribs of the leaves prickly. Branches not hairy; their prickles in pairs or fcattered. Leaflets pointed, fmooth. Segments of the calyx fringed with briftles."—In fwamps of Virginia and Lower Carolina, flowering in June and July. From five to eight feet high. *Leaflets* three or five. *Purfh.*

18. R. *carolina.* Carolina Rofe. Linn. Sp. Pl. 703, omitting the reference to Dillenius. Willd. n. 11. Ait. n. 11. Purfh n. 8. Lawr. Rof. t. 24. t. 3. t. 54; alfo perhaps t. 68, and t. 66; fcarcely t. 36. (R. corymbofa; Ehrh. Beitr. v. 4. 21.)—Fruit globofe, briftly as well as the flower-ftalks. Leaf-ftalks hairy, fomewhat prickly. Stem fmooth. Stipulary prickles flightly hooked. Leaflets elliptic-lanceolate, acute, finely ferrated; downy and glaucous beneath. Flowers corymbofe.—In fwamps, and on the banks of ponds, from New England to Virginia, flowering in June and July. Purfh fays, "there are a great many varieties of this fpecies." So little, however, have thefe been attended to, that five or fix of thofe fpecies which we have laft defcribed have, by Linnæus and others, been ufually referred to *R. carolina.* The true *carolina* common in our fhrubberies, flowering in June and July, is well diftinguifhed by the above characters, firft pointed out by the accurate and obferving Ehrhart. This *fhrub* is five or fix feet high, bufhy, but erect, with red, fmooth, a little glaucous, twigs. *Leaflets* large, more copioufly and minutely ferrated than in *lucida*, n. 14, which this fpecies, at firft fight, moft refembles; but they differ alfo from that in their glaucous and downy under fide, as well as in having a fine taper point. The *flowers* are more numerous in each *corymb*, large, of a full crimfon. The Penfylvanian Rofe of the gardens, figured by Mifs Lawrance, t. 68, and t. 66, differs in fome refpects from the common *carolina.* Its *leaflets* are more coarfely and fharply ferrated; pale, but not glaucous nor downy, beneath. *Flowers* fmaller and paler; in the double variety peculiarly beautiful, moft of the outer petals being of a light flefh-colour, the central ones involute or tufted, of a rich crimfon.

19. R. *rubifolia.* Bramble-leaved Rofe. Ait. n. 12. Purfh n. 9.—"Fruit globofe, rather hifpid as well as the flower-ftalks. Calyx unexpanded, pointlefs. Leaves ternate; downy beneath. Leaf-ftalks glandular and prickly. Stem with fomewhat hooked, ftipulary and fcattered, prickles, not hairy. Flowers corymbofe."—Difcovered in North America, by the late Mr. Francis Maffon, who fent it to Kew in 1800. It is a hardy *fhrub*, flowering in June and July, but has not yet fallen under our obfervation.

20. R. *villofa.* Apple Rofe. Linn. Sp. Pl. 704. Willd. n. 12. Ait. n. 13. Fl. Brit. n. 3. Engl. Bot. t. 583. Lawr. Rof. t. 33, and t. 29. (R. pomifera major; Park. Parad. 418. f. 7.)—Fruit globofe, briftly as well as the flower-ftalks. Prickles of the ftem nearly ftraight. Leaflets elliptic-oblong, downy on both fides. Segments of the calyx the length of the ripe fruit.—Native of mountainous woods and thickets, in the north of Europe. Plentiful in Weftmoreland, Cumberland, and the north of Yorkfhire, flowering in June. It is often cultivated in fhrubberies for the fake of the beauty of its large fcarlet briftly fruit, above an inch in diameter. The double-flowered variety, when luxuriant, is one of our handfomeft flowering fhrubs. Mifs Lawrance's figures of this fpecies are not happy. The bufh is from four to fix feet high, with ftrong, ftraight, fcattered *prickles*. *Leaflets* five or feven, large, of a peculiar elliptic-oblong fhape, fomewhat rounded at the end, doubly ferrated and glandular at the edges, finely downy and hoary on both fides, aromatic or pungent, in fome degree, when rubbed. *Flowers* one or two at the end of each branch, lightly fcented, of a fine pale pink. *Fruit* at every period armed with ftrong thorns, and crowned when ripe with the hifpid, involute, twifted *calyx*, which then hardly exceeds it in length.

21. R. *mollis.* Soft-leaved Round-fruited Rofe. Sm. Engl. Bot. t. 2459. (R. villofa β; Fl. Brit. 538. Relh. Cant. 193. R. fylveftris, folio molliter hirfuto, fructu rotundo glabro, calyce et pediculo hifpidis; Dill. in Raii Syn. 478.)—Fruit globofe, half as long as the fegments of the calyx, briftly as well as the flower-ftalks. Prickles of the ftem ftraight. Leaflets elliptic-ovate, downy on both fides.—Native of bufhy places, in England, Scotland, and Wales, flowering in June or July. A much more humble fhrub than the *villofa;* the *leaflets* lefs oblong, and more ovate; *petals* of a deeper red; ripe *fruit* much fmaller, purplifh, not fcarlet, its length or diameter not above half the length of the permanent *calyx*, one fegment of which, and no more, is often very diftinctly pinnated. The Rev. H. Davies has found the *fruit* variable in Anglefea, from perfect fmoothnefs, as mentioned by Dillenius, to every degree of roughnefs. The prickles of the *ftem* vary in fize, and are frequently hooked.

22. R. *glutinofa.* Clammy Cretan Rofe. Sm. Prodr. Fl. Græc. Sibth. v. 1. 348. Fl. Græc. t. 482, unpublifhed. (R. cretica montana, foliis fubrotundis glutinofis et villofis; Tourn. Cor. 43. R. pumila alpina, pimpinellæ exactè foliis fparfis, fpinis incurvis, aquatè purpurea; Cupan. Panphyt. ed. 1. v. 1. t. 61.)—Fruit globofe, hifpid as well as the flower-ftalks. Prickles of the ftem copious, hooked. Leaflets roundifh; downy and glandular on both fides.—Native of the Sphaciote mountains of Crete, and, from Cupani's fynonym, of the mountains of Sicily. By a fpecimen fent to Linnæus, the plant feems to have been cultivated in the French gardens, but we know it not in England. The *ftem* is low, bufhy, with numerous ftout *branches*, armed with many, fcattered, ftrong, hooked prickles. *Leaflets* feven, roundifh and obtufe, ftrongly and

often doubly ferrated; downy, fomewhat hoary, glandular and vifcid on both fides, as are alfo the *leaf-ftalks*. *Flowers* fmall, pale-blufh, terminal, folitary, on fhort, briftly, vifcid *ftalks*. *Fruit* globofe, fcarlet, covered with rigid glandular-pointed briftles, its diameter full half an inch, which nearly equals the length of the permanent, upright, converging, hifpid *calyx*.

23. R. *hibernica*. Irifh Rofe. Sm. Engl. Bot. t. 2196. Ait. n. 14.—Fruit nearly globofe, fmooth as well as the flower-ftalks. Prickles of the ftem flightly hooked. Leaflets elliptical, fmooth; their ribs hairy beneath.—Difcovered by John Templeton, efq. in the county of Down, about Belfaft harbour, where it grows abundantly, flowering from the early part of June, till the middle of November. The difcoverer thus became entitled to the liberal premium of fifty pounds, offered by the patrons of botany at Dublin, for the detection of any new Irifh plant. The above characters readily diftinguifh this fpecies, from every other defcribed rofe. The *ftem* is fix feet high, erect, much branched, and very prickly. *Leaflets* broadly ovate, deeply and acutely ferrated, fmooth, except the back of their ribs and veins, which are hairy. Sometimes a few coarfe hairs occur on the upper furface. *Flower-ftalks* often folitary, fometimes two or three together. *Petals* pale blufh-coloured. *Fruit* fcarlet, fmooth, accurately globofe when young, but in ripening fometimes elongated at the fummit, fo as to become flightly ovate.

This is not the only new Irifh Rofe that has been difcovered of late; Dr. Taylor having favoured us with incomplete fpecimens of what will certainly prove two or three others, hitherto nondefcript; one of them with remarkably large, twin, hooked, ftipulary *prickles*, unlike any other fpecies with which we are acquainted.

24. R. *finica*. Three-leaved Chinefe Rofe. Linn. Syft. Veg. ed. 13. 394. Ait. n. 15.—"Fruit nearly globofe, fmooth. Flower-ftalks prickly, hifpid. Stem and leaf-ftalks prickly. Segments of the calyx lanceolate, fomewhat ftalked."—Native of China. Cultivated by Miller in 1759. A hardy fhrub, flowering from May to July. *Aiton*. We adopt this entirely on the authority of the *Hortus Kewenfis*, having never feen the garden plant; nor have we any authentic fpecimen to prove what *R. finica* of Linnæus really is; he having mentioned it only, under the above characters, in his *Syftema Vegetabilium*. There occurs in his herbarium, a fpecimen from the Upfal garden, marked *China*, which anfwers to the above characters; efpecially in the paradoxical account of the ftalked leaves, or fegments of the *calyx*, they being here in a deformed or monftrous ftate. But the leaflets are five, not three, as Mr. Aiton's Englifh name implies; and the very young *fruit*, though "nearly globofe," has all the appearance of being truly oval when perfectly formed. Indeed we believe this fpecimen to be not effentially different from *R. indica*, the Pale China Rofe, now fo common in gardens.

25. R. *rugofa*. Rugofe Japan Rofe. Thunb. Jap. 213. Willd. n. 13.—" Fruit globofe, fmooth. Flower-ftalks, leaf-ftalks, and ftem prickly. Leaflets obtufe with a point, rugofe, downy beneath."—Native of Miaco in Japan, flowering in May and June, and known by the name of Ramanas.—*Stem* fhrubby. *Branches* fomewhat downy, armed with larger and fmaller, very denfe, fpreading, white prickles. *Leaflets* nine, an inch long, ovate, blunt, with a point, ferrated; green and rugofe above; downy, veiny and rugofe beneath; their *common ftalk* downy, befet with fcattered, fpreading, white prickles. *Flowers* folitary, on downy *ftalks*, furnifhed alfo with copious, very flender, fpreading, white prickles. *Calyx* downy within; hairy without. Young *fruit* globofe, deftitute of prickles or pubefcence. *Thunberg*.

26. R. *provincialis*. Provins Rofe. Mill. Dict. ed. 8. n. 18. Ait. Hort. Kew. ed. 1. n. 11. ed. 2. n. 16. Willd. n. 14. Lawr. Rof. t. 8. t. 22. t. 1. t. 4. t. 43. t. 21.

β. R. mufcofa; Ait. n. 25. Willd. n. 22. Curt. Mag. t. 69. Lawr. Rof. t. 14. (R. rubra plena fpinofiffima, pedunculo mufcofo; Mill. Ic. 148. t. 221. f. 1. R. provincialis fpinofiffima, pedunculo mufcofo; Hort. Angl. 66. t. 18.)

γ. Leaves and flowers much fmaller. Rofe de Meaux, &c.; Lawr. Rof. t. 31. t. 50. t. 71. Curt. Mag. t. 407. To which are moft akin Lawr. Rof. t. 88 and t. 76; mere evanefcent varieties.

Fruit roundifh. Flower-ftalks and leaf-ftalks hifpid. Prickles of the branches fcattered, fomewhat hooked. Leaflets roundifh-ovate; hairy beneath; with glandular ferratures.—Native of the fouth of Europe; at leaft it is fo confidered; though a plant too generally cultivated for any thing to be averred on this fubject. With us it is hardy, flowering in June and July. Moft of the varieties are increafed by roots or layers, and remain tolerably diftinct; the different forms of variety γ are leaft permanent. *Stems* ufually three or four feet high, ftraight, very prickly. *Leaflets* five, of a rounded bluntifh figure, veiny and rugofe. *Stipulas* linear-lanceolate, acute, undivided; moft entire in their lower part. *Flowers* two or three, or more, at the top of each branch, large, delightfully fragrant, of that peculiar bright crimfon hue popularly termed a rofe-colour, with broad brown ftains on the backs of the outer *petals*, which are permanent in the otherwife white variety, reprefented in Mifs Lawrance's t. 4. In all our cultivated varieties the *flowers* are double, with flight remains of *ftamens* or *ftyles*; fo that the *fruit* never ripens. We have however feen, in the ample collection of rofes at Meffrs. Lee and Kennedy's, perfectly fingle *flowers* of the Mofs Rofe, which thofe experienced cultivators have proved to be only a variety of the Common Provins Rofe. Indeed we have been told in Italy, that this variety lofes its moffinefs, almoft immediately, in that climate.

27. R. *ferox*. Hedge-hog Rofe. Ait. n. 17. Lawr. Rof. t. 42.—Fruit globofe, hifpid. Leaflets elliptic-oblong, rugofe, four pair with an odd one. Stem, leaf-ftalks, and young branches, very denfely fpinous.—Native of mount Caucafus. Introduced about 1796, by Lee and Kennedy. Hardy, flowering from June to Auguft.—A ftout bufhy *fhrub*, very remarkable for its copious, long, ftraight prickles. The *leaflets* are recurved, convex, and rugofe, of a glaucous hue. *Flowers* large, crimfon, on fhort ftalks.

Section 2. *Fruit ovate, or oblong.*

28. R. *gallica*. Red Officinal Rofe. Linn. Sp. Pl. 704. Willd. n. 16. Ait. n. 19. Ehrh. Off. 324. Woodv. Med. Bot. t. 141. Lawr. Rof. t. 16. t. 13. t. 57. t. 7, and t. 49. (R. rubra; Ger. Em. 1261. Bauh. Pin. 481. Rofa; Matth. Valgr. v. 1. 168. R. milefia rubra, flore fimplici; Hort. Eyft. vern. ord. 6. t. 6. f. 3. R. præneftina variegata; ibid. t. 2. f. 2. Mill. Ic. 148. t. 221. f. 2.

β. R. *centifolia*. Linn. Sp. Pl. 704. Willd. n. 15. Ait. n. 18. Lawr. Rof. t. 11. t. 40. t. 85. t. 44. t. 51. t. 2. t. 35. t. 46. t. 67. t. 20. t. 59. t. 47. t. 55. t. 39. t. 73. t. 82. t. 87. t. 79. t. 89. (R. centifolia rubra; Hort. Eyft. vern. ord. 6. t. 2. f. 1. R. hollandica, five batava; Ger. Em. 1262.)

Fruit ovate, hifpid as well as the flower-ftalks. Stem hifpid hispid and finely prickly. Leaflets ovate; hairy beneath. Calyx half-pinnate.—Native of the southern parts of Europe. This, in its nearly single state, is the Rose always used medicinally, for conserve, tincture, &c. on account of the richer colour, and more astringent quality, of its petals. Its numerous varieties are common in gardens throughout Europe, blooming in June and July. We perfectly agree with our friend Mr. Lee of Hammersmith, that the *R. centifolia* of authors, of which so many trifling varieties are indicated above, is itself merely a variety of the *gallica*. This a comparison of their *leaves* will readily prove. The roughness of their *leaf-stalks* is undoubtedly variable. *R. gallica* in its natural state, as it is said to be in the south of France, and as we see it usually in country gardens and shrubberies, is scarcely three feet high, throwing up, from its creeping *roots*, many *stems*, armed with fine, dispersed, and not numerous, straight, short *prickles*. *Leaflets* five, large, ovate, doubly serrated, overlapping each other at their heart-shaped base; the under side pale, downy or hairy, often whitish; the upper smooth, of a fine, rather shining, green. *Stipulas* linear-lanceolate, pointed, entire, downy and glandular. *Flowers* of a few large spreading *petals*, whose colour is a peculiarly rich and deep crimson, their base, like the *stamens*, of a fine golden yellow. Segments of the *calyx* downy, broad at the base, some of them fringed at the keel or margin, with a row of linear-lanceolate leaflets, as if pinnate. *Fruit* globular, pale scarlet, becoming nearly smooth as it ripens. The red and white parti-coloured variety, or *Rosa mundi*, Miss Lawrance's t. 13, differs only in colour. This is often termed the York and Lancaster Rose. The Giant Rose, her t. 49, is gigantic in size and height, but paler in colour. The Velvet Rose, her t. 51 and t. 2, Hort. Angl. t. 18, is of so very dark a colour, at least those flowers which first expand, that some persons take the liberty of calling it black, and confirm the misnomer by a round assertion of its being produced by grafting on a black-currant bush. The innumerable varieties of the *centifolia* differ chiefly in the disposition of their richly multiplied, though diminished, *petals*, and are, many of them, very beautiful from their fullness, and precise neatness of figure; their colours are different shades of crimson, verging to pink, or to a blueish-purple.

29. R. *damascena*. Damask Rose. Mill. Dict. ed. 8. n. 15. Willd. n. 17. Ait. n. 20. Lob. Ic. v. 2. 206. Lawr. Ros. t. 38. t. 52. t. 10. t. 5. t. 17. t. 70. t. 58. t. 18. t. 83. t. 80, and t. 90.—Fruit ovate, turgid, hispid as well as the flower-stalks. Stem and leaf-stalks with hooked prickles. Leaflets ovate, pointed, hoary; villous beneath. Calyx half-pinnate.—Native of the south of Europe, and cultivated, time out of mind, in our gardens, flowering in June and July. The specific name seems to have originated with Lobel, and indicates that this species of Rose came from Damascus. Perhaps it may be what is reported to have been brought from Syria by a Comte de Brie, at his return from the crusades, of which the abbé Rozier speaks in his Cours complèt d'Agriculture; though that author's description accords with the common *R. gallica*, and not with our *damascena*, and he calls it moreover *R. provincialis*. We have seen an extract only from his work, communicated by a learned friend, to whom we, as well as Mr. Aiton, are indebted for the more correct orthography of Provins, instead of Provence, Rose, for our n. 26. We cite Rozier to shew that some particular sort of Rose was brought from Syria to France; but whether it might be our *damascena*, or the *moschata* hereafter mentioned, which many old authors have termed *damascena*, and which is certainly an oriental Rose; we have not materials even to form a conjecture. The Damask Rose is proverbially sweet, nor can any be more so than the species now under our consideration, which forms a bush four or five feet high. The *leaves* are distinguished, at first sight, by a hoary aspect, and more downy surface, than the *provincialis* or *gallica*, as well as by the longer, more pointed, shape of their *leaflets*. The prickles of the *stem* are broader, and hooked. *Flowers* more copious, with more slender and hoary *stalks*, as well as *calyx*. Their usual colour is a delicate uniform pink, verging rather towards purple than scarlet, and their fragrance is deliciously sweet as well as lasting. The name of York and Lancaster Rose, given to a very casual and transient variety of this, Lawr. t. 10, some of whose petals are white, others blush-coloured, appears much more suitable to the red and white *R. gallica*.

30. R. *sempervirens*. Evergreen Rose. Linn. Sp. Pl. 704. Willd. n. 18. Ait. n. 21. Sm. Prodr. Fl. Græc. Sibth. v. 1. 348. Fl. Græc. t. 483, unpublished. Lawr. Ros. t. 45. Clus. Exot. append. alt. Dill. Elth. 326. t. 246. (R. moschata sempervirens; Tourn. Inst. 637.)—Fruit ovate, hispid as well as the calyx and flower-stalks. Stem and leaf-stalks with hooked prickles. Leaflets ovate, pointed, smooth and shining. Flowers somewhat umbellate. Bracteas lanceolate, recurved.—Native of Germany, in hedges near Tubingen. *Roth*. Dr. Sibthorp found it very frequent in the hedges of Greece, and the neighbouring islands, and judiciously considered it as the genuine κυνοσβατον of Dioscorides, with whose rather ample description it exactly agrees. The reader may see in John Bauhin's Hist. v. 2. 33, what uncertainty has enveloped this subject. This Rose has been cultivated about two hundred years, or perhaps longer, in England, being, on account of its singularly luxuriant and rapid growth, as well as the beauty of its shining evergreen *leaves*, very fit for covering tall buildings, as well as for making an impervious hedge or trellis. The *flowers* moreover are beautiful, sweet, of a delicate white, and plentiful whenever they appear at all, lasting through June, July, and August; but we have, like Clusius, found this shrub little disposed to blossom. Its general aspect, both in *leaf* and *flower*, is most like our wild *R. arvensis*, n. 8; but the ovate *fruit*, yellow when ripe, and the want of a glaucous hue about the *foliage*, *flower-stalks* or *buds*, are, among other things, sufficient marks of difference.

31. R. *lævigata*. Climbing American Rose. Mich. Boreal-Amer. v. 1. 295. Pursh n. 10.—"Fruit ovate, very densely hispid. Segments of the calyx nearly entire. Prickles in pairs, recurved. Leaf-stalks slightly prickly. Leaflets lanceolate-oval, almost ribless, polished. Stipulas narrow, with awl-shaped points."—Found in the shady woods of Georgia, North America, climbing to a great height. An evergreen *shrub*. *Leaflets* three or five. Tube of the *calyx* clothed with long and slender *spines*. *Pursh*, *Michaux*.

32. R. *pumila*. Dwarf Austrian Rose. Clus. Hist. 117. Linn. Suppl. 262. Willd. n. 19. Ait. n. 22. Jacq. Austr. v. 2. 59. t. 198. (R. austriaca; Crantz Fasc. 2. 33.)—Fruit obovate, hispid as well as the flower-stalks. Leaf-stalks and stem with straightish prickles. Leaflets elliptical, glaucous beneath; their serratures glandular.—Common in Austria, on dry grassy hills, especially about woods and thickets, flowering in May and June. *Jacquin*. *Root* creeping. *Stems* twelve or eighteen inches high, erect, simple, or slightly branched, beset, in the upper part chiefly, with copious, small, slender, nearly straight *prickles*. *Leaflets* five, sometimes but three, drooping, of a roundish-elliptical shape, with double glandular serratures; smooth and green

green above; paler, glaucous, and fometimes downy, beneath. *Flowers* folitary, rather large, crimfon; pale or whitifh in the centre; very fweet-fcented. Segments of the *calyx* partly pinnate, downy within and without. *Fruit* obovate, or pear-fhaped, fcarlet, more or lefs hifpid, its pulp fweet and agreeable.—We are much inclined to refer this, as a variety, to *R. gallica*, n. 28; at leaft, if a more natural arrangement of the fpecies were attempted, they ought to ftand next to each other. Schleicher has found the *pumila* in Switzerland, nor can we doubt its being Haller's n. 1104, though Jacquin fays the contrary, on the authority of a dried fpecimen, of what authority we know not. Haller, in his *Hiftoria*, adopted his n. 1104 from other authors, nor did he there attempt a fpecific character; but in his *Nomenclator*, he has given one which precifely anfwers to Jacquin's plant.

33. R. *turbinata*. Frankfort Rofe. Ait. ed. 1. n. 17. ed. 2. n. 23. Willd. n. 20. Lawr. Rof. t. 69, marked 63. (R. campanulata; Ehrh. Beitr. v. 6. 97. R. inapertis floribus, alabaftro craffiore, francofurtenfis quibufdam; Tourn. Inft. 639. R. francofurtenfis; Park. Parad. 414. t. 415. f. 3.)—Fruit turbinate, hairy as well as the flower-ftalks. Leaf-ftalks and leaflets villous. Prickles fcattered, hooked. —The native country of this Rofe is not known; but the fhrub has been cultivated in gardens, ever fince the days of Parkinfon, from June to Auguft. There is an appearance of monftrofity about the *calyx*, whofe tube is bell-fhaped, thick, and dilated at the top; the fegments however are, moft of them, quite fimple and entire. *Petals* large, crimfon. *Leaves* broad, villous.

34. R. *rubiginofa*. Common Sweet-briar, or Eglantine. Linn. Mant. 2. 564. Willd. n. 21. Ait. n. 24. Fl. Brit. n. 5. Engl. Bot. t. 991. Jacq. Auftr. t. 50. Ehrh. Beitr. v. 4. 22. Arb. 75. Lawr. Rof. t. 56. t. 65. t. 72. t. 41. t. 61. t. 74. (R. eglanteria; Herm. Rof. 17. Hudf. Angl. 218. R. fuavifolia; Lightf. Scot. 262. Fl. Dan. t. 870. R. fylveftris odora; Ger. Em. 1269. f. 1. R. n. 1103; Hall. Hift. v. 2. 39.)—Fruit obovate, briftly as well as the flower-ftalks. Prickles of the ftem and leaf-ftalks hooked. Leaflets elliptical, clothed beneath with rufty-coloured glands.—Native of dry funny banks in various parts of Europe, flowering in June and July; truly wild in many places in England, where the foil is gravelly or fandy, fometimes even in wet fituations about rivers. The *ftem* is bufhy, much branched, about a yard high, with copious, broad, ftrongly hooked prickles, of a pale brown, all over its green branches. *Leaflets* five or feven, of a roundifh, elliptical figure, with ftrong, double, glandular ferratures; their upper furface bright green, flightly hairy; the under clothed with reddifh vifcid glands, the feat of a delightful fragrance, which renders the plant acceptable to moft people, though often compared to the fcent of apples, which many perfons diflike. *Flowers* alfo fweet-fcented, of a full and uniform pink: occafionally double, and fometimes pale or whitifh, as reprefented in fome of Mifs Lawrance's plates. *Fruit* fcarlet, more or lefs obovate, briftly, often nearly fmooth; internally mealy and infipid. This well-known fhrub makes beautiful and fragrant, though not long-lived, hedges. It bears forcing well, and hence is generally introduced, in winter or fpring, into the apartments of thofe who delight in fuch innocent luxuries. Care fhould be taken to obtain the true fort, and not the following fpecies.

35. R. *micrantha*. Small-flowered Sweet-briar. Sm. Engl. Bot. t. 2490.—Fruit ovate, fomewhat briftly, as well as the flower-ftalks. Stem ftraggling, with fcattered hooked prickles. Leaflets ovate, acute, clothed beneath with rufty-coloured glands.—Mr. W. Borrer finds this fpecies of Rofe common in hedges and thickets, in England, flowering about June and July. We have alfo met with it in gardens, confounded with the genuine Sweet-briar, from which it differs as follows. The *ftem* is lefs prickly, lefs bufhy, and of a more elevated and ftraggling form of growth, like *R. canina*. *Leaflets* lefs rounded, lefs rufty beneath, and not fo fragrant as thofe of *rubiginofa*. *Flowers* paler, and fmaller, being lefs than thofe of any other Britifh Rofe. *Fruit* ovate, with a more gradual neck, not obovate or pear-fhaped. It varies in roughnefs. *Footftalks*, and backs of the *leaves*, downy as well as glandular.

36. R. *fuaveolens*. American Sweet-briar. Purfh n. 11. ("R. eglanteria americana; Andrews's Rofes, with a figure.")—Fruit ovate. Flower-ftalks, and prickly leaf-ftalks, rough with glandular briftles. Stem fmooth; its prickles long, flender, flightly curved. Leaflets roundifh-elliptical; downy above; fomewhat glandular beneath.—Native of North America. We received fpecimens from Pennfylvania, gathered by the Rev. Dr. Muhlenberg. Linnæus cultivated this fpecies at Upfal, and has preferved a branch, without name or defcription, in his herbarium. The plant differs from both the foregoing, in its long, flender, flightly curved, but by no means hooked, *prickles*, which often ftand, two together, near, or clofe to, the bafe of the *leaf-ftalks*. The *leaflets* are of a broad roundifh form; finely hairy above; loofely befprinkled with ftalked glands, though not rufty, beneath. *Flowers* pink, fmall, often, but not always, folitary, nor are the fegments of the *calyx*, as Mr. Purfh defcribes them, always fimple or entire; fome of them are pinnate. *Fruit* fmooth, or fomewhat prickly.

37. R. *fcabriufcula*. Roughifh-leaved Dog Rofe. Sm. Engl. Bot. t. 1896. (R. n. 459; Winch Guide, v. 1. 48. v. 2. preface, 5.)—Fruit roundifh-ovate, briftly as well as the flower-ftalks. Prickles awl-fhaped, nearly ftraight. Leaflets elliptical, roughifh with minute hairs.—Native of hedges in Durham and Northumberland, as well as on the north fide of Bury in Suffolk, flowering in June.—This Rofe has a general refemblance to *canina* and *tomentofa*, hereafter defcribed; but its *pubefcence* is hairy, more of the nature of the two or three laft, as are alfo the glandular ferratures of the *leaves*. There is a harfhnefs about them, very unlike the *tomentofa*, nor have they any greyifh hoary hue. Their fcent is fcarcely any. The *ftem* is tall, with copious, fcattered, nearly ftraight, and rather flender, brown *prickles*. *Leaf-ftalks* hairy, prickly, and clothed with glandular briftles. *Leaflets* elliptical, pointed, doubly and fharply ferrated, of a light bright green; finely hairy all over their upper furface, but moft fo on the rib and veins beneath. *Flower-ftalks* and young *fruit* befet with ftrong glandular briftles. *Calyx* partly pinnate; downy within; glandular and briftly at the outfide. *Petals* moderately large; Mr. Winch finds them always white, tinged or blotched with red; in Suffolk they are moftly of a pale pink. *Fruit* large, red, inclining to a globular figure.

38. R. *cæfia*. Glaucous-leaved Dog Rofe. Sm. Engl. Bot. t. 2367. (R. canina pubefcens; Afzel. in Sims and Kon. Ann. of Bot. v. 2. 211.)—Fruit roundifh-ovate, fmooth. Prickles of the ftem hooked. Leaflets ovate, pointed, doubly ferrated, downy; very glaucous as well as the germen and young branches.—Found by Dr. Adam Afzelius in Sweden, and by Mr. W. Borrer in the highland valleys of Perthfhire and Argylefhire, flowering profufely in July. Mr. Borrer defcribes the *bufh* as "compact, not fo tall as the *canina*. *Flowers* ufually folitary; fometimes in pairs, generally of an uniform, but very beautiful, carnation hue; occafionally white. *Calyx* fometimes fprinkled with glands, fometimes not. Young *twigs*, *leaves* and *germen*

men remarkably cæsious." His specimens accord precisely with those sent by Dr. Afzelius. The very glaucous *leaves*, clothed on both sides with fine hairy pubescence, essentially distinguishes this plant from *canina*, under which so many distinct species have been negligently confounded, by most botanists, till within a few years past. The *fruit* has been observed by Dr. Swartz to vary somewhat in form, being occasionally oblong, obovate, or nearly globose: in a young state it is glaucous and blueish; always smooth. *Calyx* partly pinnate.

39. R. *tomentosa*. Downy-leaved Dog Rose. Fl. Brit. n. 4. Engl. Bot. t. 990. Ait. n. 31. (R. villosa; Ehrh. Arb. 45. Villars Dauph. v. 3. 551. R. sylvestris alba, cum aliquo rubore, folio hirsuto; Bauh. Hist. v. 2. 44.)—Fruit ovate, bristly as well as the flower-stalks. Prickles of the stem hooked. Leaflets ovate, downy on both sides.—Native of woods, hedges, and thickets, in various parts of England, flowering in June and July. It is also found in Germany and Dauphiny. The *stem* is bushy, and moderately tall. *Prickles* hooked, generally placed under the insertion of each leaf-stalk, either solitary or in pairs. *Leaflets* five or seven, ovate, acute, with fine double glandular serratures, of a grey hoary green, densely clothed on both sides with soft pubescence, and, when rubbed, exhaling a slight acescent fragrance, most like the smell of *R. villosa*, n. 20. *Calyx* pinnate, in the manner described in the generic character, clothed externally with glandular bristles. *Fruit* in every state, more or less bristly, though sometimes nearly smooth, while the *flower-stalks* are always very bristly; its colour when ripe is a tawny scarlet. *Petals* almost white towards their base, otherwise elegantly rose-coloured, and a little fragrant. Specimens from Ehrhart and Villars have determined their synonyms; though the latter, at least, by his description, has apparently confounded the true *villosa* with our *tomentosa*. So little were Roses understood or considered at one time, that we recollect many grave debates among the Norwich botanists, about thirty years ago, whether this most distinct species were different or not from the common *canina*!

40. R. *canina*. Common Dog Rose, Wild Briar, or Hep-tree. Linn. Sp. Pl. 704. Willd. n. 31. Ait. n. 30. Fl. Brit. n. 6. Engl. Bot. t. 992. Curt. Lond. fasc. 5. t. 34. Woodv. Med. Bot. t. 139. Fl. Dan. t. 555. Lawr. Rof. t. 81. t. 60. Ehrh. Arb. 55. (R. n. 1101; Hall. Hist. v. 2. 38.)—Fruit ovate, smooth as well as the flower-stalks. Prickles of the stem scattered, hooked. Leaflets ovate, pointed, very smooth, unequally serrated.—Very common in hedges and thickets in Britain, as well as throughout Europe, flowering in June. Few plants contribute so much to the ornament of the country, for it is certainly the most elegant of our Roses; the scent of its *flowers*, and the flavour of its *fruit*, are both peculiarly grateful. The latter, when mellowed by frost, affords a most agreeable conserve, kept in the apothecaries' shops. The *stem* is often six or seven feet high, erect and straggling, with irregularly dispersed, pale brown, broad *prickles*. *Leaflets* usually seven, of a dark shining myrtle-like green; paler, or glaucous in some degree, underneath; with numerous, sharp, unequal, not glandular, serratures. *Leaf-stalks* smooth, armed with a few hooked prickles. *Flower-stalks* terminal, naked and very smooth, often solitary, sometimes two, three, or four in a kind of umbel. *Calyx* downy, scarcely ever glandular. *Fruit* oblong-ovate, of a coral red, almost always quite smooth.

41. R. *collina*. Rough-stalked Dog Rose. Jacq. Austr. v. 2. 58. t. 197. Willd. n. 32. Ait. n. 32. Engl. Bot. t. 1895.—Fruit ovate, smooth. Flower-stalks bristly, clustered. Prickles of the stem scattered, hooked. Leaflets ovate, downy beneath, simply serrated. Leaf-stalks downy.—Gathered by Jacquin on hills in Austria. Mr. W. Borrer finds it common in Sussex, flowering in July, and ripening fruit in October.—Its habit and general aspect are like the *canina*. The *prickles* are dispersed, hooked. *Leaflets* usually seven, variable in length and roundness, simply, and tolerably equally, serrated; always downy, or finely hairy, beneath, especially the rib; sometimes slightly so above. They have no scent, and are thicker, as well as less shining, than those of *canina*. *Leaf-stalks* downy and prickly. *Flowers* pale pink, fragrant, commonly two or three together, on *stalks* covered with glandular bristles. *Fruit* in every stage ovate and smooth, except now and then a straggling bristle or two; scarlet when ripe, and said not to be distinguishable from *canina*. We have never tasted it. The *styles*, after flowering, are combined and elongated, as in *R. arvensis*.

42. R. *dumetorum*. Downy-stalked Dog Rose. "Pers. Syn. part 2. sect. 1. 50?" Engl. Bot. t. 2579.—Fruit ovate, smooth. Flower-stalks villous, somewhat bristly, clustered. Prickles of the stem hooked, rather aggregate. Leaflets ovate, doubly serrated; slightly hairy beneath. Leaf-stalks very downy.—Gathered by Mr. W. Borrer, in bushy places in Sussex, flowering in July, and ripening fruit in October. We believe it also to have been found in Switzerland, near Orbe, by the late Mr. Davall, and there is a specimen, without name, or any mark, in the Linnæan herbarium. The synonym of Persoon was suggested by Mr. Borrer, nor have we any further authority for its application. The habit of the *shrub* is more robust than *R. canina*, with very strong hooked *prickles*, usually placed in pairs under each *footstalk*, and sometimes three or more together under the lateral branches. It differs also from that species in having very downy *footstalks*; *leaflets* rounder and flatter, doubly serrated, their ribs and veins hairy beneath; the *flower-stalks* either villous and bristly, or only villous, with soft, spreading, permanent hairs; rarely smooth. These hairs, and the double serratures, distinguish it from *collina*, with which its downy *leaf-stalks* agree. The *flowers* are smaller and paler than in either of those species. The *styles* accord with *canina*, not with those of *collina*.

43. R. *moschata*. Musk, or Cluster, Rose. Mill. Dict. ed. 8. n. 13. Willd. n. 23. Ait. n. 26. Desfont. Atlant. v. 1. 400. Lawr. Rof. t. 64. t. 53. Jacq. Hort. Schoenbr. v. 3. 16. t. 280. Ger. Em. 1265. f. 1 and 2. (R. moschata minor, flore simplici; Bauh. Hist. v. 2. 45; and flore pleno; ibid. 47.)—Fruit ovate, villous when young, as well as the flower-stalks. Stem and leaf-stalks prickly. Leaflets oblong, pointed, smooth. Panicles many-flowered, downy as well as the calyx.—Desfontaines found this elegant and fragrant Rose growing every where in the hedges of Barbary. It is cultivated by the inhabitants of Tunis, who obtain from its petals, by distillation, a very fragrant essential oil; the same, if we mistake not, which in the East Indies is called *Ottar*. The *shrub* is common in our gardens, and has been so from Gerarde's time, flowering from July to October. The semidouble kind most usually occurs. The *stems* are long and lax, smooth, beset with scattered, short, hooked *prickles*. *Leaves* of a light, slightly glaucous green, especially beneath, smooth, except some downiness on their *footstalks*, and their ribs beneath. *Stipulas* small, narrow, fringed with glands, and divaricated at the points. *Flowers* rather small, white, exceedingly numerous, in large terminal *panicles*, whose *stalks* are slender, downy, destitute of prickles or glands, as is likewise the slender, downy, partly pinnate, *calyx*. *Petals* with slender claws. *Fruit* small, smooth, orange-coloured.—R. moschata major, Bauh. Hist.

v. 2.

v. 2. 45. Lob. Ic. v. 2. 208, quoted by Miller incautioufly for this, may be *R. damafcena.*

44. R. *rubrifolia.* Red-leaved Rofe. Villars Dauph. v. 3. 549. Willd. n. 24. Bellardi Append. ad Fl. Pedem. 23. t. 4. (Rofier multiflore; Reynier Mem. de la Suiffe, v. 1. 222.—Fruit roundifh-ovate, fmooth as well as the flower-ftalks. Prickles of the ftem and leaf-ftalks hooked. Leaflets ovate, fmooth, coloured, fimply ferrated. Flowers corymbofe, with fheathing dilated bracteas and ftipulas.—Native of the mountains of Switzerland, Dauphiny, and Savoy; a ftranger to our gardens. The whole plant, *branches, leaves, ftalks,* and tube of the *calyx,* are more or lefs tinged with a vinous red. The *ftem* is erect and robuft, ten to fifteen feet high, armed with fcattered, diftant, recurved *prickles. Leaflets* feven or nine, large, broadly ovate, with ftrong fharp ferratures, fmooth on both fides, with numerous, parallel, red veins. *Stipulas* red, fmooth; the upper ones, near the flowers, much dilated, and replaced immediately by fimilar, but fmaller, *bracteas. Flowers* from three to five, of a fine pink, forming a fhort fmooth *corymb.* Segments of the *calyx* almoft entirely fimple, very long and flender, downy within, flightly glandular at the edges, each terminating in a long, lanceolate, leafy point. *Fruit* oval, fmall, fmooth. Villars fays the cultivated plant retains the peculiar red tints of its *bark* and *foliage;* only the fize of the *flowers* is fomewhat diminifhed.

45. R. *lagenaria.* Bottle-fruited Rofe. Villars Dauph. v. 3. 553. Willd. n. 25.—Fruit obovate, beaked, fmooth, pendulous. Stem without prickles. Leaf-ftalks rather prickly. Flower-ftalks downy, fomewhat cymofe. Leaflets elliptical, doubly ferrated, fmooth as well as the calyx.—Native of France, in the diftrict of Embrun, among the woods of Bofcodon. Villars fays he never met with this fpecies elfewhere. He defcribes it as akin to the following, but differing in its large leafy *calyx,* and the greatly elongated fpindle-fhaped *fruit,* having a neck like that of a bottle. The *ftem* is from three to five feet high, without thorns. *Leaflets* thin, obtufe. *Flower-ftalks* three together, flightly downy, recurved. We have feen no fpecimen.

46. R. *alpina.* Alpine Rofe. Linn. Sp. Pl. 703. Willd. n. 26. Ait. n. 27. Villars Dauph. v. 3. 552. Sm. Tour on the Cont. v. 3. 137. 140. Jacq. Auftr. t. 279. Lawr. Rof. t. 30. (R. n. 1107; Hall. Hift. v. 2. 41.)—Fruit ovate, fmooth. Stem without prickles. Leaf-ftalks and flower-ftalks briftly. Leaflets elliptic-oblong, doubly ferrated, fmooth.—Very common in the alpine thickets of Switzerland, Savoy, Dauphiny, Auftria, &c. flowering from June to Auguft. It has long been cultivated in botanic gardens, but is not one of our popular fpecies, being, though an elegant plant, and remarkable for the want of prickles, lefs ftriking than *R. pendulina,* which is alfo known by the name of "the Rofe without a thorn." The prefent has fmooth, fpreading, fometimes procumbent, *ftems* and *branches,* of a fhining deep red, obferved by Jacquin to be occafionally hairy or briftly, but never thorny. *Leaflets* feven or nine, elliptic-oblong, ufually more than an inch in length, thin, fmooth, doubly and fharply ferrated; paler beneath, with fome hairs, now and then, on the midrib. *Flowers* generally folitary, of a rich and elegant rofe-colour, on drooping, red *ftalks,* clothed with glandular briftles. *Calyx* downy, with long, fimple, flender, rather leafy-pointed fegments; its tube generally fmooth, though we have from M. Du Cros, a fpecimen with briftles on that part, as well as on the fegments of the calyx. *Fruit* pendulous, oval, fomewhat beaked, of a fine fcarlet.—Mifs Lawrance's t. 75 cannot poffibly have any relationfhip to this fpecies; fee *lucida,* n. 14.

47. R. *pyrenaica.* Pyrenæan Rofe. Gouan. Illuftr. 31. t. 19. Willd. n. 27.

β. R. pimpinellifolia; Villars Dauph. v. 3. 553. (R. glandulofa; Bellardi Append. ad Fl. Pedem. 24.)

Fruit ovate, hifpid as well as the flower-ftalks, and fomewhat prickly leaf-ftalks. Stem without prickles. Leaflets elliptical, doubly ferrated, fmooth.—Native of vallies among the Pyrenæan mountains, as well as of Switzerland and Dauphiny. We are fully perfuaded that the *R. pimpinellifolia* of Villars is, as he himfelf fuggefts, but a variety of Gouan's *pyrenaica,* nor can we trace out fufficient marks to defcribe it even as a variety. The glandular edging of the *ftipulas,* on which our worthy friend Bellardi has founded its character and name, is no lefs evident and conftant in *pyrenaica,* and even in *alpina* itfelf; of which laft indeed we are ftrongly inclined to confider the fuppofed fpecies, both of Gouan and Villars, as mere varieties, differing from the ufual kind in their briftly *calyx* and *fruit.* The fegments of the *calyx* are fimple, with more or lefs leafy points in all, nor does Gouan mention any thing that affords a permanent mark of difcrimination between *pyrenaiea* and *alpina.*

48. R. *pendulina.* Smooth Pendulous Rofe. Rofe without a thorn. Linn. Sp. Pl. 705. Willd. n. 28. Ait. n. 28. Purfh n. 12. Ehrh. Arb. 105. Lawr. Rof. t. 9. (R. fanguiforbæ majoris folio, fructu longo pendulo; Dill. Elth. 325. t. 245. f. 317.)—Fruit ovate, elongated, fmooth, pendulous. Stem and branches fmooth, without prickles. Flower-ftalks and leaf-ftalks hifpid. Leaflets elliptical, doubly ferrated, fmooth, rather numerous. Segments of the calyx fimple, naked and entire. Dillenius fays this fpecies was raifed, in the Eltham garden, from New England feeds; but Mr. Purfh never met with it wild in any part of North America; and Ehrhart gives his fpecimen as a Swifs plant. We believe however that it is a North American, not an European fhrub. In our gardens it bloffoms towards the end of May, ripening fruit in Auguft. The *ftem* is five or fix feet high, bufhy, fmooth, dark red, nor is there a prickle to be found on any part of the plant. *Leaves* bearing a confiderable refemblance to thofe of the Greater Burnet, *Sanguiforba,* and compofed of from nine to thirteen large, elliptical, fmooth *leaflets,* paler beneath, with double glandular ferratures. *Flowers* folitary, crimfon, on glandular, rather than briftly, *ftalks.* Tube of the *calyx* oblong, very fmooth; its fegments quite fimple, entire, narrow, downy at the edges, but deftitute of dorfal prickles or glands. *Fruit* pendulous, fcarlet, fmooth and fhining, remarkably elongated, beaked and curved, fufficiently difcriminating the fpecies, which neverthelefs is nearly related to *R. alpina,* but in every part more robuft.

49. R. *montana.* Round-leaved Mountain Rofe. Villars Dauph. v. 3. 547. Willd. n. 29.—Fruit oval, briftly as well as the flower-ftalks. Leaf-ftalks prickly and glandular. Stem with hooked folitary prickles, below each leaf. Leaflets roundifh, abrupt, doubly ferrated, fmooth.—Native of hills in Dauphiny and Switzerland. A very diftinct fpecies, of which we have fpecimens from Mr. Schleicher. The *ftem* is only two or three feet high, but ftrong, with many fpreading, reddifh, fmooth *branches. Prickles* pale brown, moderately hooked or deflexed, awl-fhaped, with a long linear bafe. They ftand folitary, a little below each branch or leaf. *Stipulas* broad, fringed with glands. *Leaf-ftalks* purplifh, flightly prickly and glandular. *Leaflets* feven, fomewhat glaucous, much refembling thofe of the Leffer Burnet, *Poterium;* their termination generally abrupt, and their ferratures coarfe, fcarcely glandular; the midrib now and then hairy beneath. *Flower-ftalks* terminal, fhort, very briftly and glandular, either folitary,

litary, or two or three together, enveloped in the uppermoſt *ſtipulas*. *Petals* ſmall, generally white, ſometimes red. Segments of the *calyx*, briſtly and glandular at the back, partly pinnate. *Fruit* red, armed with many ſtrong briſtles. This ſpecies has but a remote affinity to either *canina* or *arvenſis*, with which Villars contraſts it, except that the *ſtyles* are ſaid to be elongated, after flowering, as in the latter.

50. R. *multiflora*. Bramble-flowered Chineſe Roſe. Thunb. Jap. 214. Willd. n. 30. Ait. n. 29. Curt. Mag. t. 1059. ("R. flava; Donn. Cant. ed. 4. 121.")—Fruit ovate, villous, unarmed. Flower-ſtalks villous, racemoſe. Stem and leaf-ſtalks prickly. Leaflets ovate, ſimply ſerrated; downy beneath.—Native of Japan and China. Introduced into this country by Thomas Evans, eſq. of Stepney, about the year 1804. It is hardy, flowering in June and July, and a great acquiſition to the gardens, being a *ſhrub* of luxuriant growth, eaſily trained to a conſiderable height. The *leaves* are of a greyiſh aſpect; ſmooth above; paler and downy beneath; their ſerratures ſimple. *Flowers* in cluſters, ſimple or compound, reſembling thoſe of the double-flowering Bramble, and not much larger. Thunberg deſcribes them white; with us they are pink, with very numerous, ſmall, imbricated *petals*, a few remains of *ſtamens*, and ſome elongated, dilated, greeniſh *ſtyles*. The *flowers*, on the firſt introduction of the plant, were reported to be yellow, but we have not heard of any ſuch variety having made its appearance.

51. R. *caucaſica*. Caucaſian Roſe. "Marſch. Taurico-Caucaſ. v. 1. 400." Ait. n. 33.—"Fruit ovate, ſmooth as well as the flower-ſtalks. Leaf-ſtalks prickly. Stem not hairy; its prickles hooked. Leaflets doubly ſerrated, downy. Flowers umbellate."—Native of mount Caucaſus, from whence it is ſaid, in Hort. Kew., to have been brought to England about the year 1798. It is a hardy ſhrub, flowering in June and July. We have ſeen neither ſpecimen nor figure. If the plant ſtill exiſts in our collections, it ought to be delineated and given to the public.

52. R. *parvifolia*. Small-leaved, or Burgundy, Roſe. Ehrh. Beitr. v. 6. 97. Willd. n. 33.—"Fruit ovate, nearly ſmooth. Flower-ſtalks glandular. Leaf-ſtalks and ſtem with minute ſtraight prickles. Leaflets ovate, rugged; ſomewhat villous beneath; their ſerratures glandular." Said to be a native of Europe. A dwarf *ſhrub*. *Leaflets* five, ſmall, ovate, acute. *Flowers* ſmall. *Willdenow*. We know not what is intended under the above deſcription, unleſs it be the Burgundy Roſe, Miſs Lawrance's t. 44, which we have, after the example of Hort. Kew. conſidered as a variety of *centifolia* or *gallica*, ſee n. 28. The characters anſwer, as far as any thing can be made out by the figure. We ſhould have ſuſpected the Roſe de Meaux, Miſs Lawrance's t. 31, might have been Ehrhart's and Willdenow's plant; but the latter has duly referred that, as we have done, to *provincialis* in its proper place, and having ſeen both in a living ſtate, muſt be preſumed to have diſtinguiſhed them. There ſeems a great probability that the *parvifolia* in queſtion is ſome garden variety of the *gallica*, to which its characters approach ſufficiently near to authorize this opinion. We leave it for the final determination of thoſe who may meet with authentic ſpecimens.

53. R. *ſemperflorens*. Dark Chineſe Roſe. Curt. Mag. t. 284. Willd. n. 34. Ait. n. 34. Sm. Exot. Bot. v. 2. 63. t. 91. Lawr. Roſ. t. 28. Jacq. Hort. Schoenbr. v. 3. 17. t. 281. (R. diverſifolia; Venten. Jard. de Cels, t. 35.)—Fruit ovate, roughiſh. Stem, leaf-ſtalks, and flower-ſtalks, hiſpid or prickly. Prickles hooked. Leaflets three or five, ovate, ſmooth; paler beneath, with a hairy rib. Calyx reflexed, entire.—Native of China, from whence it was introduced by the late Mr. Slater, about the year 1789. The ſhrub is perfectly uninjured by any of our froſts, and where the air is pure, grows luxuriantly in the open ground, flowering moſt part of the year. Yet it ſometimes dies off unaccountably, and is not become ſo general an ornament of every cottage garden as the Pale Chineſe Roſe, hereafter mentioned, brought to England about the ſame period. The *ſemperflorens* is generally of humble growth, but in a rich loamy ſoil, on the outſide of a greenhouſe, may be trained to a conſiderable height. The *ſtem* is much and variouſly branched, armed with ſcattered, ſhort, hooked prickles. *Leaflets* three or five, ovate, acute, rigid, unequally ſerrated; of a dark ſhining green, and ſmooth, above; paler, and rather glaucous, beneath, with a denſely hairy rib. *Leaf-ſtalks* clothed with glandular briſtles, and ſome ſoft hairs, as well as with a few hooked prickles. *Stipulas* linear, acute, fringed with ſtalked glands. *Flower-ſtalks* terminal, uſually ſolitary, rough with glands or prickles, ſingle-flowered. Segments of the *calyx* reflexed, lanceolate, coloured, ſimple and entire, downy, more or leſs fringed or glandular at the edges. *Petals* deep crimſon, ſometimes very dark, tremulous from the ſlenderneſs of their claws; paler at the back. The figures in Ventenat, and our Exotic Botany, exhibit the *flowers* in a ſingle ſtate; the reſt have double *flowers*, as uſually ſeen in gardens. Jacquin repreſents a ſuppoſed bluſh-coloured variety, which is probably *indica*, n. 55. The *fruit* is moſtly roughiſh, at leaſt when young; but ſometimes quite ſmooth. We have not met with it ripe. The *ſhrub* is readily increaſed by cuttings.

54. R. *chinenſis*. Slender Chineſe Roſe. Jacq. Obſ. faſc. 3. 7. t. 55.—"Fruit ovate, ſmooth as well as the flower-ſtalks. Leaf-ſtalks and ſtem prickly. Leaflets uſually three, ovato-lanceolate, finely ſerrated, ſmooth."—Native of China. Deſcribed by Jacquin from ſome ſpecimens belonging to Gronovius. He ſpeaks of the *leaves* as perfectly ſmooth and ſhining, and the ſegments of the *calyx* fringed with down. The *leaves* were moſtly ternate, ſome of them only having a ſmall additional leaflet at one ſide. This is very likely to be, as Willdenow ſuſpected, the ſame ſpecies with our *ſemperflorens*. If it ſhould ſo prove, we hope the latter name, though of poſterior date, will not be ſacrificed to one ſo vague and indiſcriminate as *chinenſis*; eſpecially as *ſemperflorens* is now eſtabliſhed in ſyſtematic works of authority, and Jacquin himſelf, who, in his Hort. Schoenbr. conſidered theſe plants as the ſame, has liberally preferred it.

55. R. *indica*. Bluſh Chineſe Roſe. Linn. Sp. Pl. 705. Willd. n. 36. Ait. n. 35. (R. ſemperflorens β; Lawr. Roſ. t. 26. R. longifolia; Willd. n. 37.)—Fruit ovate, ſmooth. Flower-ſtalks briſtly and glandular. Leaf-ſtalks glandular and prickly. Leaflets ovate, pointed, ſmooth; paler beneath. Prickles of the ſtem ſcattered, ſlightly hooked. Flowers ſomewhat corymboſe. Calyx partly pinnate and leafy.—Native of China and the Eaſt Indies. Introduced by ſir J. Banks, about the year 1789, into the gardens of England, where it proves quite hardy, flowering profuſely, almoſt throughout the year; and is undoubtedly one of the moſt deſirable acquiſitions, of the ornamental kind, that our collections have for a long time received. The *ſhrub* is of rapid and lofty growth, much ſtronger than *R. ſemperflorens*. *Stem* more or leſs armed with ſcattered, very ſtrong, reddiſh, ſharp, hooked or recurved *prickles*, which we have never found entirely wanting. *Leaves* of a full, bright, ſhining green on the upper ſide; paler, opaque, and a little glaucous, beneath; their *leaflets* for the more part five, ovate, taper-pointed, ſharply and pretty

pretty equally, but not ſtrongly, ſerrated. *Leaf-ſtalks* bordered with glandular briſtles, and furniſhed with a few hooked prickles. *Stipulas* linear, narrow, reticulated, fringed with red glandular briſtles; their points acute, divaricated at right angles. *Flower-ſtalks* terminal, very numerous and corymboſe in ſtrong-growing plants; in ordinary ones fewer; in ſome ſolitary and ſingle-flowered at the ends of weak lateral branches. They are always clothed with minute glandular briſtles, even in the original ſpecimen of Linnæus, which he deſcribed as ſmooth. Neither are the *leaves* of that ſpecimen downy beneath. He ſeems to have taken that character from another, which he confounded therewith, but which we judge to be *moſchata*, whoſe very young *leaves* bear a few hairs on their ribs and veins. *Flowers* moderately large, in a double ſtate conſiſting of numerous, lax, diſorderly *petals*, varying with every tint of pink or carnation, and having a ſweet, though light, odour, as in *ſemperflorens*, but not exactly the ſame. The perfume of both is very inferior to moſt of our garden Roſes, and even to the wild *R. canina*. The *calyx* of *R. indica* is variable in luxuriance, but always in ſome degree leafy, pinnate, or jagged. *Fruit* large, pale ſcarlet. On a careful compariſon of Willdenow's *longifolia*, (ſent by the Rev. Dr. Rottler, and by the late Dr. Koenig, from the Eaſt Indies,) with our garden plant, and the Linnæan ſpecimen, we can have no doubt of their perfect identity; though the prickles of the *ſtem* ſeem wanting on the upper part, at leaſt, of the luxuriant Indian ſpecimens. Every one, who has attended to the cultivated *R. indica*, will be aware that this circumſtance is of no importance, in the conſideration of ſuch materials as we have before us.

56. R. *bracteata*. Macartney Roſe, or Sir George Staunton's Roſe. Willd. n. 38. Ait. n. 36. Venten. Jard. de Cels, t. 28. Curt. Mag. t. 1377. (R. lucida; Lawr. Roſ. t. 84.)—Fruit obovate. Bracteas pectinated, concealing the flower-ſtalk, which is villous like the young branches. Prickles in pairs under the prickly leaf-ſtalks. Leaflets obovate, obtuſe, crenate, ſmooth and ſhining. Stipulas deeply jagged. Calyx ſilky, taper-pointed.—Native of China, from whence it was brought by lord Macartney and ſir G. Leonard Staunton, in 1795. It proves tolerably hardy in England, flowering from Auguſt to the end of autumn; but is often ſo much injured by expoſure to our ſevere froſts, as ſeldom to recover ſufficiently to bloſſom well in the enſuing ſummer. The *ſtem* is four or five feet high, downy, armed with a pair of deflexed reddiſh prickles under each *leaf-ſtalk*, and with innumerable minute ſtraight ones over the whole ſurface. *Leaf-ſtalks* hairy, glandular, and prickly. *Leaflets* about ſeven or nine, rigid, ſhining, of a fine green; their ribs minutely prickly. *Stipulas* but little attached to the leaf-ſtalk, deeply cut, or pectinated, at one ſide. *Flowers* terminal, ſolitary, large, cream-coloured, agreeably ſcented, on ſhort hairy *ſtalks*, which are concealed by ſeveral large, ſheathing, deeply pectinate, or pinnatifid, *bracteas*. *Calyx* coriaceous, taper-pointed, very ſilky externally. Ventenat mentions a ſmall central point, in the ſinus of each *petal*, which we do not find conſtant. The *ſtipulas*, and eſpecially the *bracteas*, are ſo peculiar, that this ſpecies can be confounded with no other.

57. R. *alba*. White Garden Roſe. Linn. Sp. Pl. 705. Willd. n. 39. Ait. n. 37. Lawr. Roſ. t. 37. t. 25. t. 23. t. 32. Ger. Em. 1260, with the ſame cut which Lobel uſes for *R. damaſcena*.—Fruit ovate, ſmooth. Flower-ſtalks and calyx briſtly. Leaf-ſtalks downy, armed like the ſtem with hooked prickles. Leaflets roundiſh-ovate, ſharply ſerrated, downy beneath. Calyx partly pinnate. —Native of Europe; in the hedges and thickets of Heſſe and Saxony, according to Roth. Common in our gardens from the days of Gerarde, flowering in June and July. The buſh is five or ſix feet high. *Leaves* dark green, of five or ſeven large, broad *leaflets*, ſharply and copiouſly ſerrated, veiny; paler, and more or leſs downy, beneath. *Stipulas* paler, broad, dilated upwards, with glandular ſerratures, and obliquely ſpreading points. *Flowers* large, ſomewhat corymboſe, pleaſantly but weakly ſcented, uſually pure white, but often tinged with a moſt delicate bluſh, as in Miſs Lawrance's t. 23 and t. 32. Segments of the *calyx* partly bordered with long leafy appendages, glandular at the edges. *Bracteas* like the *ſtipulas*, but more ovate. *Fruit* tawny, rarely perfected in gardens. We can give no good reaſon for placing the preſent ſpecies here, at a diſtance from *gallica*, n. 28, to which it is moſt naturally allied. No difficulty or confuſion indeed can ariſe reſpecting a plant ſo well known, and ſo clearly defined. The White Roſe was formerly an article of the Materia Medica, its diſtilled water, which poſſeſſes a ſlight aſtringency, being ſuppoſed good for inflammations and weakneſſes of the eyes. A more fragrant water, equally colourleſs and efficacious, is diſtilled from the Provins roſe, n. 26; which, we believe, is uſually kept in the ſhops. In ſome of this, after long keeping, we have ſeen a floating oilineſs, as deliciouſly and powerfully fragrant as the oriental ottar of roſes.

Our catalogue of ſpecies thus amounts to 18 more than Willdenow's, notwithſtanding ſome retrenchments. The drawings of the Chineſe afford reaſon to ſuppoſe we are not yet acquainted with all their ſpecies, and we have already hinted that ſome Iriſh ones are ſtill waiting for more complete elucidation than they have hitherto received. The diſtribution of the ſpecies in general requires reviſion; nor have botaniſts ſufficiently adverted to ſome characters, that appear to us more important than ſeveral they have depended upon. The number, and preciſe ſituation, of the ſubſtipulary prickles, the form of the ſtipulas, and the ſtructure of the calyx, appear to us more conſtant, than the abſence or preſence of glands, or of pubeſcence, in certain parts. The nature of the ſerratures of the leaves, whether ſimple or double, glandular or not, is likewiſe occaſionally worthy of notice.

Rosa, in *Gardening*, contains plants of the deciduous flowering, ſhrub, and evergreen kind, of which the ſpecies cultivated are: the ſingle yellow roſe (R. lutea); the double yellow roſe (R. ſulphurea); the Hudſon's-bay roſe (R. blanda); the cinnamon roſe (R. cinnamomea); the white dog roſe (R. arvenſis); the ſmall burnet-leaved roſe (R. pimpinellifolia); the Scotch roſe (R. ſpinoſiſſima); the ſmall-flowered American roſe (R. parviflora); the ſhining-leaved American roſe (R. lucida); the Carolina roſe (R. carolina); the apple roſe (R. villoſa); the Provence roſe (R. provincialis); the hundred-leaved roſe (R. centifolia); the red roſe (R. gallica); the damaſk roſe (R. damaſcena); the evergreen roſe (R. ſempervirens); the dwarf Auſtrian roſe (R. pumila); the Frankfort roſe (R. turbinata); the ſweet-briar roſe (R. rubiginoſa); the moſs Provence roſe (R. muſcoſa); the muſk roſe (R. moſchata); the Alpine roſe (R. alpina); the deep red China roſe (R. ſemperflorens); and the white roſe (R. alba).

Of the firſt there is a variety termed the Auſtrian roſe, which has the ſtalks, branches, and leaves, like thoſe of the ſingle yellow roſe, but the leaves are rounder. The flowers are alſo larger; the petals have deep indentures at their points; are of a pale yellow on the outſide, and of a reddiſh copper colour, orange ſcarlet, or barré colour within; are ſingle, have no ſcent, or a diſagreeable one, and ſoon fall away.

away. It has ſometimes flowers entirely yellow on one branch, and copper-coloured on another.

In the fourth ſpecies there is a double variety, in which the ſhoots are redder; the flowers ſmall, ſhort, thick, and double, of a pale red colour at the end of the leaves (petals), ſomewhat redder and brighter towards the middle. It is the ſmalleſt and earlieſt of the double garden roſes, flowering in May.

In the ſeventh ſort there are ſeveral varieties, as the ſtriped-flowered, or with variegated flowers, red ſtriped with white. The red Scotch roſe, which ſeldom riſes more than a foot high; the ſtalks are covered with a brown bark, and are cloſely armed with ſmall ſpines; the leaves are very ſmall; the flowers are alſo ſmall, ſeſſile, and of a livid red colour; the fruit is round, of a deep purple colour, inclining to black when ripe. And according to Withering, there is alſo a variety with prickly peduncles, and cream-coloured flowers, changing to white. Lawrance likewiſe mentions a double Scotch roſe.

In the eighth kind there is a variety with a double flower.

Of the twelfth ſpecies there are ſeveral varieties, as the red Provence roſe; the ſtem and branches are not ſo great as thoſe of the other, but greener, the bark not being ſo red; the flowers are not ſo large, thick and double, but of a little deeper damaſk or bluſh colour, turning to red, but not coming near the full colour of the beſt red roſe; nor is the ſcent ſo ſweet as that of the damaſk Provence, but coming near that of the ordinary red roſe. It is not ſo plentiful in bearing as the damaſk Provence. The bluſh Provence roſe, in which the ſtalks riſe from three to four feet high, and are unarmed; the leaves are hairy on their under ſide; the peduncles have ſome ſmall ſpines; the ſegments of the calyx are ſemi-pinnate; the corolla has five or ſix rows of petals, which are large, and ſpread open; they are of a pale bluſh colour, and have a muſky ſcent. The white Provence roſe, which differs only in the colour of the flowers. The great and ſmall dwarf Provence roſes, called roſe de Meaux, differ from each other in little except ſize; the ſmaller of the two is generally known by the nurſery-men and gardeners by the name of Pompone roſe. It throws out numerous ſtems, which rarely exceed a foot, or a foot and half, in height; uſually ſtraight, rigid, and very prickly; the flowers very ſmall, and diſtinguiſhed by the brilliant colour of the central petals, appearing in June. All the ſorts flower from July to Auguſt.

In the thirteenth ſpecies the varieties are very numerous; as the Dutch hundred-leaved roſe; the bluſh hundred-leaved roſe; the Singleton's hundred-leaved roſe.

The ſingle and double velvet roſe, which, according to Parkinſon, has the old ſtem covered with dark-coloured bark, but the young ſhoots of a ſad green, with few or no thorns; the leaves are of a ſadder green than in moſt roſes, and very often ſeven on a ſtalk; the flower is ſingle; or double, with two rows of petals, the outer larger, of a deep red, like crimſon velvet; or more double, with ſixteen petals or more in a flower, moſt of them equal: they have all leſs ſcent than the ordinary red roſe. The Burgundy roſe, which is an elegant little plant, not more than a foot or eighteen inches in height. The ſultan roſe, the Stepney roſe, the gurnet roſe, the biſhop roſe, and the Liſbon roſe.

In the fourteenth ſort there are ſeveral varieties; as the red official roſe, the Mundi roſe, which has the flowers very elegantly ſtriped or variegated with red and white: in other circumſtances it ſo perfectly reſembles the red roſe, that there can be no doubt of its being a variety of that: indeed it frequently happens that a red roſe or two appears on the ſame plant with the variegated flowers. The Childing roſe, the marbled roſe, and the double virgin roſe, which have great affinity with each other, according to Miller.

Of the fifteenth ſort there are alſo ſeveral varieties, as the red damaſk roſe, the bluſh damaſk roſe, which differ only in the ſhade and colour. The York and Lancaſter roſe, which agrees with the damaſk in ſtalk, leaf, &c. differing only in the flower being variegated with white ſtripes. Mr. Hart's roſe has the white ſtripes more diſtinct; the flowers in theſe being leſs double than in ſeveral others, are frequently ſucceeded by fruit, and have ripe ſeeds, from which other varieties may be obtained. According to Parkinſon, ſometimes one half of the petal is of a pale whitiſh colour, and the other half of a paler damaſk than common; or one petal is white or ſtriped with white, and the other half bluſh or ſtriped with bluſh; ſometimes alſo ſtriped or ſpotted over, and at other times little or no ſtripes or marks, and the longer it remains blown open in the ſun, the paler and the fewer ſtripes, marks, or ſpots will be ſeen in it. The ſmell is of a ſweet damaſk roſe ſcent. The red monthly roſe, the white monthly roſe, which are ſo called from their continuing to blow in ſucceſſion during the greater part of the ſummer; not that they blow in every month, as the name implies. They are, in every reſpect, like the damaſk roſe, unleſs it be that they are more full of prickles than that. The bluſh Belgic roſe, which riſes about three feet high, with prickly ſtalks; the leaves are compoſed of five or ſeven leaflets, which are oval, hairy on their under ſide, and ſlightly ſerrate; the peduncles and calyxes are large and ſemi-pinnate; the flowers very double, of a pale fleſh colour, with little ſcent, generally in great quantities. The red Belgic roſe, which differs only in having the colour of the flower a deep red. The great royal roſe, and the imperial bluſh damaſk roſe.

In the nineteenth ſort the cultivated plant grows larger and more erect; the leaves are bigger and much ſweeter than in the wild one, the ruſty colour of them diſappears, and the whole puts on a more vigorous appearance; the ſweet ſcent is ſuppoſed to proceed from the gland. There are varieties with double flowers; as the common double ſweet-briar, the moſſy double ſweet-briar, the evergreen double ſweet-briar, the red double ſweet-briar, the royal ſweet-briar, and the yellow ſweet-briar.

Of the twenty-firſt kind there is a variety with double flowers. And the editor of Miller's dictionary conſiders the evergreen muſk roſe of Miller to be the ſame with this.

Of the twenty-fourth ſort, according to Parkinſon, there are two varieties of the white garden roſe; one attaining ſometimes the height of eight or ten feet, with a ſtock of a great bigneſs, the other ſeldom higher than a damaſk roſe. Both have ſomewhat ſmaller and whiter-green leaves than in many other roſes, five moſt uſually on a ſtalk, and paler underneath; as alſo a whiter-green bark, armed with ſhort prickles. The flowers in the one are whitiſh, with an eye of bluſh, eſpecially towards the bottom, very double, and for the moſt part not opening ſo fully as the red or damaſk roſe. In the other more white, leſs double, and opening more. Some have only two or three rows of petals; and all have little or no ſmell.

Method of Culture.—In all the ſorts the increaſe may be effected by ſuckers, layers, or by budding upon ſtocks of other ſorts of roſes; but this laſt method is only practiſed for ſome peculiar ſorts, which do not grow well upon their own ſtocks, and ſend forth ſuckers ſparingly. Where more ſorts than one are to be had upon the ſame plant, ſuch ſorts only ſhould be budded upon the ſame ſtock as are nearly equal in their manner of growth, otherwiſe the ſtrong one will draw all the nouriſhment from the weaker.

The ſuckers ſhould be taken off in October, and planted out either in nurſery-rows, or in the places where they are to remain; as where they are permitted to ſtand upon the roots of the old plants more than one year, they grow woody, and do not form ſo good roots as if planted out the firſt year. The beſt method to obtain good-rooted plants is to lay down the young branches in autumn, which will take good root by the autumn following; eſpecially when watered in dry weather; when they may be taken off from the old plants, and be planted out where they are to remain. The ſeeds are ſometimes ſown in the autumn, to produce new varieties, in beds of light mellow earth, or in drills, eſpecially for the common ſweet-briar kinds, and for raiſing hedges of them.

But although new varieties and ſome particular permanent ſorts, ſuch as continue the ſame by ſeeds, may occaſionally be raiſed in this way; all the double kinds and peculiar varieties, are by no means, in general, to be produced in this manner, as they cannot be continued, with certainty, the ſame by ſeeds, but conſtantly require, in this intention, to be raiſed from layers or ſuckers.

The moſt proper ſeaſon for planting all the ſorts is the autumn or winter, when the weather is mild and open, when they will, for the moſt part, flower in full perfection during the ſucceeding ſummer, but, ſhould there be a neceſſity, they may be replanted out even ſo late as the beginning of the ſpring months without much danger. And it is often an uſeful practice to ſet out a few plants in this late manner for the ſake of a late long continued blow in the autumnal ſeaſon. In general, however, the ſooner the work of planting them out is performed, the ſtronger and more fully will the plants afford their flowers.

In planting them out in the common or ſhrubbery borders, it ſhould moſtly be done in a ſingle manner; and they may be trained with ſingle ſtems to the height of one, two, or more feet, and then managed ſo as to branch out into buſhy heads; and it is commonly adviſeable to have them in this form; though ſome, for the ſake of a more buſhy growth, ſuffer them to branch away immediately from the bottom, as they will flower well in any mode of training.

Some, for curioſity, may alſo be run up with ſingle ſtems to the height of from five or ſix to ten feet, and be kept in erect poſitions by means of proper ſupports, being made to form branchy heads at theſe heights, ſome running up more or leſs for the ſake of greater variety. The large growing ſorts may likewiſe, in ſome caſes, be planted out againſt walls, pales, &c. and be trained laterally as well as in an upright manner to ſome conſiderable extent.

Some plants of the early ſorts, as the monthly, &c. may alſo be ſet out in warm ſituations for more early blowing, and be treated in the ſame way.

But in the gardens about the metropolis, where large quantities of flowers of this kind are wanted for ſale, the plants are generally ſet out in cloſe rows, being put into the ground, in a ſort of trench planting manner, at the diſtance of about a foot from each other, and afterwards kept down to the height of from not more than one to three feet, according to the ſorts and circumſtances by cutting them over, or clipping them, every autumn or winter, at the top and on the ſides, by which lateral branches are ſent off in greater abundance for future flowering.

All good gardens ſhould moſtly be poſſeſſed of the different ſorts of theſe flowers, as they are eaſily procured, and multiply in an expeditious manner.

Some of the beſt ſorts of theſe plants may further alſo occaſionally be put in pots for the purpoſe of being ſet out conveniently in different parts for the ſake of ornament.

And where there are the conveniencies of hot-houſes and forcing-frames, it may, in many caſes, be deſirable and proper to place ſome of the prime ſorts in pots for the purpoſe of being forced in ſuch places for an early blow by means of artificial heat. In this way they may be made to flower either in the winter or early ſpring months. In which intention ſome potted plants of the monthly, common, or moſs Provence, or other choice ſorts of roſes, muſt, in the winter, be ſet in the above ſort of frame, wrought by dung, bark, or fire heat, or in a hot-houſe, which is by much the beſt, and be, by ſuch means properly applied, forced into blow in the beginning of the new year and in ſucceſſion for the two following months, and until the plants in the natural open ground begin to flower, different ſucceſſional ſupplies of plants being ſo placed at the diſtance of every two or three weeks.

For this uſe a quantity of plants ſhould, in general, be annually potted, which, if they have had a ſummer's growth in the pots, plunged in the ground, before they are employed in this way, it will be the better, as they will be more firmly rooted, and conſequently blow in greater perfection and beauty. See Forcing, and Forcing-*Frame*.

It is not unuſual for the gardeners in the vicinity of the metropolis to form conveniencies of the above kinds in order to force flower-plants of this nature, as there is almoſt conſtantly a great demand and ready ſale for them, at an early ſeaſon, while they are in flower in the pots, as well as when the flowers are gathered in noſegays and other ways. They often pay extremely well in this manner of cultivating them.

Almoſt all the open ground ſorts delight in a rich moiſt ſoil and an open ſituation, in which they produce a greater quantity of flowers, and thoſe much fairer, than when they are upon a dry ſoil, or in a ſhady ſituation. The pruning which they afterwards require, is only to cut out their dead wood, and take off all their ſuckers, which ſhould be done every autumn; and if there are any very luxuriant branches, which draw the nouriſhment from the other parts of the plant, they ſhould be taken out, or ſhortened, to cauſe them to produce more branches, if there be occaſion for them to ſupply a vacancy; but it is beſt to avoid crowding them with branches, which is as injurious to theſe plants as to fruit-trees; for if the branches have not equal benefit from the ſun and air, they will not produce their flowers ſo ſtrong, or in ſo great plenty, as when they are more open, and better expoſed to the ſun, ſo as to have a more free circulation of air. As the moſs Provence roſe ſeldom ſends out ſuckers, and does not ſtrike very freely by layers, it is often increaſed by budding it upon ſtocks of the other ſorts; but the plants are beſt when raiſed from layers.

In general the beſt ſort for flowering early and late is the monthly, next to which in flowering in the open air is the cinnamon, which is immediately followed by the damaſk roſe, then the bluſh, York, and Lancaſter; after which, the Provence, Dutch hundred-leaved, white, and moſt other ſorts; and the lateſt ſorts are the Virginian and muſk roſes, which, if planted in a ſhady ſituation, ſeldom flower until September, and if the autumn proves mild, continue often till the middle of October. And the plants of the two ſorts of muſk roſes ſhould be placed againſt a wall, pale, or other building, that their branches may be ſupported, otherwiſe they are ſo ſlender and weak as to trail

upon

upon the ground. Thefe plants fhould not be pruned until fpring, becaufe their branches are fomewhat tender; fo that when they are cut in winter, they often die after the knife; thefe produce their flowers at the extremity of the fame year's fhoots in large bunches, fo that their branches muft not be fhortened in the fummer, left the flowers fhould be cut off. The fhrubs will grow to be ten or twelve feet high, and muft not be checked in their growth, if intended to flower well. They are all highly ornamental plants, moftly for the fhrubbery borders and clumps, being planted according to their habits of growth.

Rosa, Salvator, in *Biography*, fo well known among the cognofcenti as the author of fpirited and extravagant pictures of banditti, &c., was born at Naples in 1614, and received his firft knowledge of defign from his kinfman, F. Francazano; but by the death of his father, being reduced to extreme poverty, he was conftrained to provide himfelf a maintenance by fketching defigns upon paper, and felling them at any price he could obtain.

In that wretched fituation he laboured for fome time, till one of his defigns, an hiftorical fubject of Hagar and Ifhmael, accidentally happened to fall into the hands of Lanfranc. Pleafed with the ability it difplayed, he eagerly enquired for the artift; and as foon as he became acquainted with him, took him under his protection, and provided for him generoufly. This unexpected and happy change in his circumftances, enabled Salvator to purfue his ftudies with more effect; and he foon acquired confiderable eminence, and his works were eagerly fought after.

The ftyle which he formed is peculiarly his own, and his beft productions are beautiful imitations of nature; but in general his works are artificial combinations, and wrought with extravagance; the fpirit and fire with which they are executed, too frequently giving them a confequence and a name they do not deferve. This, indeed, may perhaps be faid, that half the pictures which go under his name, are fpurious or heavy imitations, and he pays the tax which all mannerifts, like him, muft fubmit to.

He certainly poffeffed a comprehenfive genius; and was an excellent fatirical poet, as well as an ingenious painter. In landfcape painting he was entirely original, delighting in fcenes of defolation and terror; thefe he peopled with banditti repofing, or lurking for their prey, or dividing their fpoils; lonely fhepherds, or forlorn travellers. Sometimes he attempted to create an intereft by filling the fcene he drew with fome facred or hiftoric fubject, but in this he feldom fucceeded; his figures being ill proportioned, falfely attired, and void of expreffion. In colour he fometimes attained excellence. The dull, low, or lurid tone, which fo juftly becomes the character of lonelinefs, of forefts almoft impenetrable, or dreadful to fee, and conveying ideas of danger in their afpect, he frequently prefented moft perfectly; and wrought the various parts with the greateft freedom of touch, and the utmoft readinefs of invention. His pictures are not unfrequent in our collections in this country; and genuine ones of the firft quality are fold at extravagant prices. He died at the age of 59, in the year 1673.

Among mufical MSS. purchafed at Rome in 1770, was the mufic-book of Salvator Rofa, the painter, in which are contained, not only airs and cantatas fet by Cariffimi, Cefti, Luigi, Cavalli, Legrenzi, Capellini, Pafqualini, and Bandini, of which the words of feveral are by Salvator Rofa; but eight entire cantatas written, fet, and tranfcribed by this celebrated painter himfelf. The book was purchafed of his great grand-daughter, who inhabited the houfe in which her anceftor lived and died. The hand-writing was afcertained by collation with his letters and fatires, of which the originals are ftill preferved by his defcendants. The hiftorians of Italian poetry, though they often mention Salvator as a fatirift, feem never to have heard of his lyrical productions; and as this book is not only curious for the mufic it contains, but the poetry, we fhall be fomewhat minute in our account of its contents.

The firft compofition in this MS. was luckily a fcene in Cefti's opera of Orontea, which it would have been difficult to have found elfewhere; for of the many hundred operas that were compofed for the different theatres of Italy, during the laft century, except two or three that have been printed, an entire copy, in fcore, it would be difficult to find, if not impoffible.

II. Is a cantata by Capellini, a compofer of no great eminence; yet there is in it a very pleafing air in triple time of $\frac{3}{2}$, in which the crotchets are expreffed by minims hooked or tied like quavers.

III. Is an elegant fimple air, by Legrenzi, fung to two different ftanzas. See Legrenzi.

IV. Is a beautiful Siciliana by Cavalli, the compofer of Erifmena. See Cavalli.

V. Is a cantata written by Salvator Rofa, and fet by Cefti. Recitative had not, as yet, banifhed formal clofes, or regular modulation, which encroached too much upon air, and deftroyed its narrative and declamatory plainnefs and fimplicity.

Salvator was either the moft miferable or the moft difcontented of men. Moft of his cantatas are filled with the bittereft complaints, either againft his miftrefs, or mankind in general. In this he fays, that he has had more misfortunes than there are ftars in the firmament, and that he has lived fix luftres (thirty years) without the enjoyment of one happy day.

VI. Is a cantata fet by Luigi, almoft wholly in recitative, which, but for the formality of the clofes, would be admirable. See Luigi.

VII. Another cantata by the fame compofer, of which the words are very beautiful.

VIII. A cantata fet by Cariffimi, in which the melody is impaffioned, and the recitative admirable. See Cariffimi.

IX. Is a pleafing and natural air by Marc Antonio Pafqualini, which is repeated to different ftanzas. The compofer of this air was admitted into the Papal chapel in 1630; and from the year 1643 to 1670, he was a favourite ftage-finger, with a foprano voice. Many of his compofitions are preferved in the collections of the time, in which more grace and facility appear than force and learning.

X. A cantata, of which the words are by Salvator Rofa, and the mufic by Cefti. There are great ftrength and imagination in this poetry.

In the church of Santa Maria degli Angeli de' PP. Certofini, at Rome, where Salvator Rofa was buried, there is an infcription on his tomb, at which Crefcimbeni, a Florentine, is angry; as it gives him *il primato fopra tutti i Rimatori Tofcani.* This, like almoft all monumental praife, is certainly hyperbolical; but Salvator's poetry feems to have great merit for its boldnefs and originality; it is indeed fomewhat rough, even in his lyrics; and his fatires are often coarfe; but he appears to us always more pithy than his contemporaries, whom Marini's affectation had perhaps enervated and corrupted.

Salvator's cantata, of which we are now fpeaking, is the incantation of a female, diftracted with love, difappointment, and revenge. This lyric poem feems to have furnifhed ideas to the author of Purcell's Mad Befs.—" By the

the croaking of the toad," &c. And in Salvator all the charms and spells of the witches in Macbeth are invoked.

XI. Is a gloomy, grumbling history of this painter and poet-musician's life, in which the comic exaggeration is not unpleasant; but it is rather a satire on the times in which he lived, than a lyric composition. However, it is set by Bandini; but being chiefly narrative, the music is almost wholly recitative; scarcely any measured melody being introduced, except to the first line, which serves as a refrein, or burden.

XII. Is an excellent cantata on the torments of *jealousy*, set by Luigi, in which there is more air and less recitative than usual at this period.

XIII. Is a single air by Alessandro Scarlatti, which must have been produced early in that great composer's life; as Salvator, in whose hand-writing it is entered in his book, died in 1675 (Orlandi Abcdario Pittorico); some writers say in 1673. See SCARLATTI.

XIV. and XV. Are two single airs by Legrenzi, of which the melody is pleasing; they were perhaps sung in operas. The music of all the rest of the cantatas and songs in this book, amounting to eight, is of Salvator's own composition, and is not only admirable for a dilettante, but in point of melody superior to that of most of the masters of his time.

The two first are cantatas, but so ill written as to be difficult to read. The third begins with a pleasing air; and the fourth with such a spirited movement as the seventeenth century seldom produced. Two other airs in the same cantata are well accented, and pleasing. In the recitative of the fifth cantata, some of the first true closes occur that we have met with in narrative melody. There are several airs in this and the rest of Salvator's cantatas on pleasing subjects, and treated in a manner above mediocrity. The last of his airs is chiefly remarkable for its moving base: and if we only suppose this cantata to have been composed just before the author's death, it will be of a higher date than the publication, or perhaps the existence of any of Corelli's works, who is supposed to have been the inventor of this kind of pendulum base; which, however, frequently occurs in the cantatas of Cesti.

Whoever is curious to see specimens of Salvator Rosa's musical compositions, may find in the fourth volume of Burney's Gen. Hist. Mus. fragments, not only of his own productions, but of his contemporary composers of eminence, whose works he thought worth entering in his music-book. Signorelli, tom. v. p. 338.

ROSA DA TIVOLI. See ROOS.

ROSA, in *Geography*, a small island near the E. coast of Sardinia. N. lat. 39° 5′. E. long. 9° 3′.—Also, a town of Germany, in the county of Henneberg; five miles S. of Saltzungen.—Also, a town of Spain, in the province of Seville; eight miles S. of San Lucar.

ROSA. See ST. *Rosa*.

ROSA, *Cape*, a cape on the coast of Algiers. N. lat. 37° 2′. E. long. 8° 5′.

ROSA, *Mount*, an eminence of the Alps, reckoned the second mountain of that famous ridge, lying about midway between Great St. Bernard and the lake of Locarno. M. Saussure visited this mountain, which has been reckoned only 60 feet inferior in height to Mont Blanc, this being estimated about 14,700 feet above the level of the sea. But in sir George Shuckburgh's table of heights taken by the barometer, &c. (Phil. Trans. vol. lxvii. p. 592.) Mont Blanc is elevated 14,432 feet above the lake of Geneva, and 15,662 feet above the Mediterranean; and mount Rosa, as measured geometrically by Father Beccaria, is 15,084 feet above the same sea.

ROSA *Crucis*, in *Church History*. See ROSYCRUCIANS.

ROSA *Fatuina*, in *Botany*, a name given by some authors to the piony.

ROSA *Junonis*, a name given by some authors to the lily.

ROSACEÆ, the 92d natural order in Jussieu's system, the 10th of his 14th class. See FICOIDEÆ, for the distinctions of that class. The characters of this large and important order, named from the Rose, and rose-like flowers, which compose it, are the following.

Calyx either superior, and tubular; or inferior, pitcher or wheel-shaped; its limb mostly divided, and generally permanent. *Petals* definite, usually five, inserted into the upper part of the calyx and alternate with its divisions; sometimes wanting. *Stamens* indefinite, rarely definite, inserted into the same part below the petals; anthers often roundish. *Germen* in some cases simple, inferior, the styles and stigmas mostly numerous; in others superior, simple, with one style, or manifold with many styles; the styles in every instance lateral, or proceeding from the side of each germen. Structure of the *fruit* various; in some an inferior apple, of many cells, or a sort of cup or urn, apparently inferior, bearing many seeds, over which it closes; in others the seeds, or seed-vessels, each of one cell, and mostly single-seeded, indefinite or definite, are superior, standing on a common receptacle; in others, again, there is either a solitary superior capsule of one cell; or a superior nut, with one or two seeds, which is either naked, or invested with a drupaceous coat. The scar of each *seed* is lateral, just below the summit, connected by a thread, or umbilical cord, with the lower part of the seed-vessel. *Corculum* straight, without an *albumen*. *Stem* herbaceous, shrubby, or arboreous. *Leaves* either simple or compound, alternate, accompanied by *stipulas*.

Section 1. POMACEÆ. *Germen simple, inferior, with many styles. Apple umbilicated, or bordered, with the limb of the calyx, of many cells.* Trees or shrubs.—This section contains the Linnæan genera of *Pyrus*, (from which Jussieu distinguishes *Malus* and *Cydonia*,) *Mespilus*, *Cratægus*, and *Sorbus*.

Sect. 2. ROSÆ properly so called. *Germens several, indefinite, invested with the urn-like calyx contracted at the top, so that they seem inferior; each accompanied by one style. Seeds as many.* Shrubs.—*Rosa* here stands alone.

Sect. 3. SANGUISORBÆ. *Germens several, definite, rarely solitary, invested with cup-like calyx contracted at the top, so that they seem inferior; each with one style. Seeds as many.* Mostly herbaceous, many of them without petals, many with a definite number of stamens, some with stamens and pistils in separate flowers.

Poterium, *Sanguisorba*, *Ancistrum*, *Acæna*, *Agrimonia*, *Neurada*, *Cliffortia*, *Aphanes*, *Alchimilla*, and *Sibbaldia*.

Sect. 4. POTENTILLÆ. *Germens several, indefinite, truly superior, standing on a common receptacle, each with one style. Seeds as many, naked, rarely pulpy.*—Herbs, rarely shrubs.

Tormentilla, *Potentilla*, *Fragaria*, *Comarum*, *Geum*, *Dryas*, *Rubus*; to which is to be added our *Duchesnea*, (see FRAGARIA, at the conclusion) now described in Tr. of Linn. Soc. v. 10. 372.

Sect. 5. SPIRÆÆ. *Germens several, definite, superior, each with one style. Capsules as many, with one or more seeds.*—Shrubs, rarely herbs.

Spiræa, *Suriana*, and *Tetracera*.

Sect. 6. PROCKIÆ. *Germen single, superior, with one style.*

ſtyle. Fruit of one cell, with one or more ſeeds.—Trees or ſhrubs, ſometimes deſtitute of petals.

Tigarea of Aublet; *Delima*, *Prockia*, and *Hirtella* of Linnæus.

Sect. 7. Amygdaleæ. *Germen ſingle, ſuperior, with one ſtyle. Nut either naked, or more uſually inveſted with a pulpy coat, and containing one or two ſeeds.*

Hedycrea of Schreber, which is Aublet's *Licania; Grangeria* of Commerſon; *Chryſobalanus* of Linnæus; *Ceraſus*, *Prunus* and *Armeniaca* of Tournefort, all three included in the Linnæan *Prunus; Amygdalus* of Tournefort and Linnæus, including *Perſica* of the former; *Moquilea*, *Couepia*, and *Acioa* of Aublet, (the latter Schreber's *Acia*); and *Parinari* of Aublet, which is Schreber's *Petrocarya.*

Sect. 8. *Genera akin to the Roſaceæ.*

Plinia of Plumier and Linnæus, the uncertainty of whoſe hiſtory we have fully explained; ſee Plinia.

Calycanthus, allied by its fruit to *Roſa*, but the leaves are oppoſite and ſimple, and the flower in a manner apetalous.

Ludia of Commerſon; *Blackwellia* of the ſame author; *Homalium* of Jacquin and Linnæus; and *Napimoga* of Aublet. The three laſt appear to conſtitute one genus; ſee Homalium.

ROSACEOUS Corolla, is one which conſiſts of ſeveral petals ranged in a circle; ſo that, according to Tournefort's acceptation of the word, it includes, not only the natural order of Rosaceæ, (ſee that article,) and other flowers agreeing therewith in having moſtly five petals, as *Ranunculus;* but even ſuch as have only two, like *Circæa.* The author is obliged to exclude the Cruciform and Umbelliferous plants from this order by a particular and arbitrary exception; for according to his primary idea, it would admit every polypetalous regular flower, as well as ſome that are irregular, as *Caſſia*, &c. See Corolla.

ROSACLORUM, or, according to ſome authors, *Roſichiero*, a fine red uſed to enamel on gold with. It is prepared in this manner: take ten pounds of cryſtal-glaſs, put it into a pot, and when it is well melted, add to it, at twice, a pound of the beſt red-lead; ſtir the maſs well together, and afterwards caſt it into water. Repeat this proceſs three times, then when the matter is again in fuſion, mix with it five ounces of calcined braſs, and the ſame quantity of the deepeſt cinnabar; ſtir the whole well together, and let it ſettle three hours; then add of glaſs of tin three ounces, mix the whole, and it will be of a fine roſe-colour. Merret's Notes on Neri, p. 350.

ROSADE, a kind of liquor, prepared of pounded almonds and milk, mixed with clarified ſugar.

ROSALBA, Carriera, in *Biography*, was of Chiozza, and carried crayon painting to a high degree of perfection. Orlandi celebrates her miniatures. Her crayon painting arrives, not ſeldom, at the ſtrength of painting in oil. Her portraits ſpread all over Europe, are as elegant and graceful in conception and attitude, as freſh, neat, and alluring in colour. Her Madonnas, and other ſacred ſubjects, riſe from grace to dignity, and even majeſty. Equal and inceſſant application deprived her of ſight during the laſt ten years of her life. She died in 1757, at the age of 82.

Roſalba is celebrated by Walther for her muſical talents and exquiſite taſte in ſinging.

ROSALE, in *Geography*, a town of Perſia, in the province of Fars, or Farſiſtan; 15 miles W. of Kazeron.

ROSALGATE, Cape. See Rasalgata.

ROSALIA, a name uſed by authors for the meaſles, or a diſeaſe very like the meaſles, conſiſting of a number of aſperities and protuberances of the ſkin, which ſoon die away.

Rosalia, in *Muſic.* See Repetitions.

ROSALIND, a maſk, written by Lockman, ſet by Smith for Hickford's rooms, and performed there in ſtill life, oratorio wiſe, in 1740. This little drama would not be mentioned here, as the poetry is upon a level with Mr. Lockman's other productions; and of the muſic we know nothing, as it was never publiſhed. But as, "to raiſe the pamphlet price a ſhilling," the poetry is preceded by "inquiries into the origin of operas."

ROSAMARINA, in *Geography*, a town of Sicily, in the valley of Demona, at the mouth of a river of the ſame name, which runs into the ſea, 10 miles N.E. of Miſtretta.

ROSAMOND, in *Biography*, daughter of lord Clifford, was a young lady of great beauty, fine accompliſhments, and endowed with the moſt engaging wit and ſweetneſs of temper. She had been educated, according to the cuſtom of the times, in the nunnery of Godſtow, and the popular hiſtory of her is as follows. Henry II. of England ſaw her, was ſmitten with her beauty, and triumphed over her honour. To avoid the jealouſy of his queen, Eleanor, he kept her in a labyrinth at Woodſtock, and by his connection with her had two children, who were afterwards William Longſword, earl of Saliſbury, and Geoffrey, biſhop of Lincoln. On Henry's abſence in France, the queen found means to diſcover her, and, jealous of her great beauty, cauſed her to be poiſoned. This ſtory is not well ſupported by hiſtorical documents. Several writers mention no more of her, than that the queen cauſed her to be ſo haraſſed, that ſhe did not long ſurvive after ſhe was diſcovered. Other writers aſſert, that ſhe died a natural death, and the ſtory of her being poiſoned is ſuppoſed to have ariſen from the figure of a cup being placed on her tomb. She was buried in the church of Godſtow, oppoſite to the high altar, where her body remained till it was ordered to be removed with every mark of diſgrace by Hugh, biſhop of Lincoln, in 1191. By many, however, ſhe has been regarded as a ſaint, but her hiſtory is in every reſpect very uncertain. See Groſe's Antiq. of Eng. and Wales.

Rosamond, an Engliſh opera, written by Addiſon on the Italian model. After the great ſucceſs of Arſinoe and Camilla in 1705 and 1706, in which the dialogue was wholly ſpoken in recitative, and the performers all Engliſh ſingers; in 1707, notwithſtanding the deficiencies of thoſe dramas in poetry, muſic, and performance (for as yet no foreign compoſer or captivating ſinger was arrived) this kind of exhibition became ſo formidable to our own actors, that a ſubſcription was opened the beginning of this year, "for the encouragement of the comedians acting in the Haymarket, and to enable them to keep the diverſion of plays under a ſeparate intereſt from operas." Daily Courant, January 14th, Cibber gives a circumſtantial account of this humiliating tranſaction, and ſpeaks of its ſucceſs with conſiderable triumph. See Clayton.

The verſes of Roſamond are highly poliſhed, and more lyrical perhaps than in any poem of the ſame kind in our language. And yet this drama is not wholly free from opera abſurdities, on which Addiſon was afterwards ſo ſeverely pleaſant. For inſtance, the king's approach to the ſecret bower of bliſs, where his fair Roſamond was treaſured up from the reſentment of his jealous queen, is always announced and publiſhed by a loud concert of military inſtruments: Act i. ſc. 1.

"Hark,

"Hark, hark! what found invades my ear?
The conqueror's approach I hear.
He comes, victorious Henry comes!
Hautbois, trumpets, fifes, and drums,
In dreadful concert join'd,
Send from afar the found of war,
And fill with horror ev'ry wind."

It was the fashion in almoft all the ferious operas that were written in Italy, before the time of Apoftolo Zeno and Metaftafio, to mix comic and buffoon characters with the tragic, even in *dramme facri*, notwithftanding the feverity of fome Italian critics upon our Shakfpeare for the fame practice.

And Mr. Addifon has fully complied with this cuftom, in the characters of fir Trufty and Grideline, which are of the loweft fpecies of comic.

If it can be proved that gunpowder was invented, and in military ufe in the time of Henry II. Mr. Addifon was guilty of an anachronifm in making him afk,

"Why did I not in battle fall
Crufh'd by the *thunder* of the Gaul?"

The lofs of Rofamond in the fecond act of this drama is not compenfated by a fingle interefting event in the third, which drags and languifhes for want of her fo much, that neither the flat and forced humour of fir Trufty and Grideline, nor the elegant compliments made to the duke of Marlborough and Blenheim, ever kept the audience awake in the performance.

In 1733, Rofamond was fet by Mr. (afterwards Dr.) Arne, his firft attempt at dramatic mufic, in the performance of which his fifter, Mifs Arne, afterwards the juftly celebrated actrefs Mrs. Cibber, performed the part of Rofamond. The airs in this *coup d'effai* of Arne, were extremely pleafing, and far fuperior to thofe of any Englifh compofer of that period. Many of them were afterwards fung at Vauxhall by Mrs. Arne and Low with great applaufe. "Was ever Nymph like Rofamond," was long in univerfal favour all over the kingdom.

ROSAN, in *Geography*, a town of the duchy of Warfaw, on the Narew; 110 miles E. of Thorn.

ROSANA, a river of Germany, which runs into the Inn, near Landeck, in the county of Tyrol.

ROSANI, Cape, a cape on the coaft of Romania, in the Grecian Archipelago. N. lat. 40° 35′. E. long. 24° 14′.

ROSANNA, a town of Lithuania, in the palatinate of Novogrodek; 36 miles W. of Novogrodek.

ROSARBA, in *Botany*, the name of an imaginary plant, which has given great trouble to the commentators on the works of the ancients.

The Arabian writers, Avicenna, Serapion, and others, have mentioned two kinds of carob or ceration; the one efculent, and endowed with the virtue of a gentle purgative, the other an aftringent.

This laft they have diftinguifhed from the other by the name of the nabathæan pod or aljembut. They fay in their defcriptions, that the aljembut is like the rofarba; fo run the old tranflations, but the true meaning of the original is *rofa vineæ*. This was a name given to the common wild acacia-tree, and the tree which produced the nabathæan pod, might be very well likened to this; it being, in reality, only a fpecies of the acacia, and the fuccus acaciæ, or infpiffated acacia juice of the fhops, being, according to Ifidore, made oftentimes from the unripe fruit of this very fpecies.

ROSARIA, among the Romans, a kind of perfumes, fo called either from their being chiefly made of rofes, or becaufe they had a moft exquifite odour.

ROSARIO, in *Geography*, a fmall ifland in the Spanifh main, near the coaft of Carthagena. N. lat. 10° 5′. W. long. 75° 56′.—Alfo, a town of New Navarre; 30 miles S.W. of Cafa Grande.—Alfo, a town of South America, in the province of Tucuman; 78 miles N. of St. Miguel de Tucuman.—Alfo, a town of Brazil, in the government of Minas Geraes; 220 miles N. of Villa Rica.—Alfo, a town of North America, in the county of California; 30 miles S.W. of Loreto.—Alfo, a town of the ifland of Cuba; 45 miles S. of Havannah.

Rosario, *El*, a town of Mexico, in the province of Chiapa; 140 miles S.E. of Chiapa dos Efpagnols.

Rosario, or *Neuftra Senhora del Rofario*, a canal of a ftrait in the gulf of Georgia, which feparates the ifland of Florida from America; about 30 miles in length. At the S.E. extremity the canal is fix miles broad; but towards the N.W. its breadth is gradually diminifhed to two miles, in its narroweft part.

ROSARUM Acetum. See Acetum.

ROSARUOLO, in *Geography*, a town of Iftria; 8 miles E. of Capo d'Iftria.

ROSARY, in the *Romifh Church*, a chaplet confifting of five or fifteen decads of beads, to direct the recitation of fo many Ave Maria's, in honour of the Virgin.

Rosary alfo denotes a particular mafs or form of devotion addreffed to the Virgin, to which the chaplet of that name is accommodated. It confifts of fifteen repetitions of the Lord's prayer, and an hundred and fifty falutations of the bleffed Virgin; whilft the *crown*, as it is called, according to the different opinions of the learned concerning the age of the Virgin, confifts of fix or feven repetitions of the Lord's prayer, and fix or feven times ten falutations or Ave Maria's.

Some attribute the inftitution of the rofary to St. Dominic; but F. d'Achery fhews it was in ufe the year 1100; fo that St. Dominic could only make it more celebrated. Others attribute it to Paulus Libycus, and others to St. Benedict; others to the Chartreux; others to Venerable Bede; and, finally, others to Peter the Hermit. Thofe who afcribe it to St. Dominic, differ as to the particular time of its inftitution; fome referring it to the year 1208, when he preached againft the Albigenfes; others will have him to have fet it on foot in the courfe of his miffions in Spain, before he paffed into France.

Rosary, *Order of the*, or of *our Lady of the Rofary*, is an order of knights, fuppofed by Schoonebeck, and the Jefuit Bonanni, to have been inftituted by St. Dominic, but by miftake; for that faint never inftituted any order under this name, and thefe authors apparently make a military order of an army of croifes, who, under the command of the count de Montfort, fought againft the Albigenfes.

The abbot Juftiniani, and M. Hermant, will have this order to have been eftablifhed by an archbifhop of Toledo, named Frederic, after St. Dominic's death; and to have borne for a badge a black and white crofs, in the middle of which was reprefented our Lady, holding her little fon in one hand, and in the other a rofary. F. Mendo adds, that they were obliged to rehearfe the rofary on certain days. After all, F. Helyot doubts whether or no fuch an order in reality ever exifted. Edmondfon refers the inftitution of this order to the year 1212; and he fays, the badge of the order was a crofs patonce per crofs countercharged argent and fable, furmounted on the centre with a medal or, enamelled

melled with the image of the Virgin, ſupporting the infant in one hand, and holding a roſary in the other, all proper. The order of the "Celeſtial Collar of the Holy Roſary" is a religious order for ladies, inſtituted at the requeſt of father Francis Arnoul, a Dominican, by queen Anne of Auſtria, widow of the French king Lewis XIII., and mother of Lewis XIV., for fifty young ladies of the firſt families in France. The collar of the order was compoſed of a blue ribbon, enriched with white, red, and maiden's bluſh roſes, interlaced with the capital letters A. V. in cypher affixed to it; and pendent at the breaſt by a ſilk cordon, a croſs of eight points pomettée, and in each angle a fleur-de-lis: on the centre the image of the Virgin Mary, and on the reverſe the image of St. Dominic, enamelled.

ROSARY is a word frequently met with in the ancient hiſtories of Ireland, and uſed to expreſs a peculiar ſort of baſe money coined abroad, in the form of the penny, current in that kingdom; but of ſo much baſer an alloy, that it was not worth quite half the real value of the penny. This and many other ſuch coins were decried, and it was made death to import any of them, by Edward I., in 1300.

ROSARY, *Perſian*, a beautiful compendium of oriental ethics, written by a Perſian poet, whoſe name was Eddin Sadi; who, about the middle of the 13th century, when the Turks invaded Perſia, withdrew from his own country, and ſettled at Bagdad, for the purpoſe of proſecuting his ſtudies. After experiencing much viciſſitude of fortune, he returned home, and compiled the book juſt mentioned, which he completed in the year 1257. This book, we are informed, has been univerſally read in the Eaſt; and has been tranſlated into Latin, and into ſeveral modern languages. As our readers in general may not have acceſs to the original work, which is divided into eight chapters, nor to extracts from it, we ſhall here ſubjoin, both for their information and amuſement, the following citations.

1. Paradiſe will be the reward of thoſe kings who reſtrain their reſentment, and know how to forgive. A king, who inſtitutes unjuſt laws, undermines the foundation of his kingdom. Let him, who neglects to raiſe the fallen, fear, leſt when he himſelf falls, no one will ſtretch out his hand to lift him up. Adminiſter juſtice to your people, for a day of judgment is at hand. The diſhoneſt ſteward's hand will ſhake, when he comes to render an account of his truſt. Be juſt, and fear not. Oppreſs not thy ſubjects, leſt the ſighing of the oppreſſed ſhould aſcend to heaven. If you wiſh to be great, be liberal; for, unleſs you ſow the ſeed, there can be no increaſe. Aſſiſt and relieve the wretched, for misfortunes may happen to yourſelf. Wound no man unneceſſarily; there are thorns enough in the path of human life. If a king take an apple from the garden of a ſubject, his ſervants will ſoon cut down the tree. The flock is not made for the ſhepherd, but the ſhepherd for the flock.

2. Excel in good works, and wear what you pleaſe: innocence and piety do not conſiſt in wearing an old or coarſe garment. Learn virtue from the vicious; and what offends you in their conduct, avoid in your own. If you have received an injury, bear it patiently: by pardoning the offences of others, you will waſh away your own. Him, who has been every day conferring upon you new favours, pardon, if, in the ſpace of a long life, he ſhould have once done you an injury. Reſpect the memory of the good, that your good name may live for ever.

3. In your adverſity, do not viſit your friend with a ſad countenance; for you will embitter his cup: relate even your misfortunes with a ſmile; for wretchedneſs will never reach the heart of a cheerful man. He who lives upon the fruits of his own labour, eſcapes the contempt of haughty benefactors. Always encounter petulance with gentleneſs, and perverſeneſs with kindneſs: a gentle hand will lead the elephant itſelf by a hair. When once you have offended a man, do not preſume that a hundred benefits will ſecure you from revenge: an arrow may be drawn out of a wound, but an injury is never forgotten. Worſe than the venom of a ſerpent is the tongue of an enemy, who pretends to be your friend.

4. It is better to be ſilent upon points we underſtand, than to be put to ſhame by being queſtioned upon things of which we are ignorant. A wiſe man will not contend with a fool. It is a certain mark of folly, as well as rudeneſs, to ſpeak whilſt another is ſpeaking. If you are wiſe, you will ſpeak leſs than you know.

5. Although you can repeat every word of the Koran, if you ſuffer yourſelf to be enſlaved by love, you have not yet learned your alphabet. The immature grape is ſour; wait a few days, and it will become ſweet. If you reſiſt temptation, do not aſſure yourſelf that you ſhall eſcape ſlander. The reputation, which has been fifty years in building, may be thrown down by one blaſt of calumny. Liſten not to the tale of friendſhip, from the man who has been capable of forgetting his friend in adverſity.

6. Perſeverance accompliſhes more than precipitation; the patient mule, which travels ſlowly night and day, will in the end go further than an Arabian courſer. If you are old, leave ſports and jeſts to the young: the ſtream, which has paſſed away, will not return into its channel.

7. Inſtruction is only profitable to thoſe who are capable of receiving it: bring an aſs to Mecca, and it will ſtill return an aſs. If you would be your father's heir, learn his wiſdom: his wealth you may expend in ten days. He who is tinctured with good principles while he is young, when he is grown old will not be deſtitute of virtue. If a man be deſtitute of knowledge, prudence, and virtue, his doorkeeper may ſay, Nobody is at home. Give advice where you ought; if it be not regarded, the fault is not yours.

8. Two kinds of men labour in vain: they who get riches, and do not enjoy them; and they who learn wiſdom, and do not apply it to the conduct of life. A wiſe man, who is not at the ſame time virtuous, is a blind man carrying a lamp: he gives light to others, whilſt he himſelf remains in darkneſs. If you wiſh to ſleep ſoundly, provide for to-morrow. Truſt no man, even your beſt friend, with a ſecret; you will never find a more faithful guardian of the truſt than yourſelf. Let your misfortunes teach you compaſſion: he knows the condition of the wretched, who has himſelf been wretched. Exceſſive vehemence creates enmity; exceſſive gentleneſs, contempt: be neither ſo ſevere, as to be hated; nor ſo mild, as to be inſulted. He who throws away advice upon a conceited man, himſelf wants an adviſer. In a ſingle hour you may diſcover, whether a man has good ſenſe; but it will require many years to diſcover whether he has good temper. Three things are unattainable; riches without trouble, ſcience without controverſy, and government without puniſhment. Clemency to the wicked is an injury to the good. If learning were baniſhed from the earth, there would, notwithſtanding, be no one who would think himſelf ignorant. Brucker's Hiſt. of Philoſ. by Enfield, vol. ii.

ROSAS, in *Geography*, a ſea-port town of Spain, in Catalonia, on the north ſide of a gulf of the Mediterranean, to which it gives name, with a good harbour, defended by a fort. It was anciently called "Rhoda," and "Rhode;" 22 miles N.E. of Gerona. N. lat. 42° 17′. E. long. 3° 0′.

ROSATA Aloe. See Aloe.

ROSATE, in *Geography*, a town of Italy, in the department of the Olona; 9 miles S.W. of Milan.

ROSATUM Acetum. See Acetum.

Rosatum *Vinum*. See Vinum.

ROSAZZO, in *Geography*, a town of Italy, in Friuli; 6 miles S. of Friuli.

ROSBACH, a town of Germany, in the county of Sayn; 8 miles E. of Hachenburg. See Rossbach.

ROSBEGH Point, a cape on the weſt coaſt of Ireland. N. lat. 52° 6′. W. long. 9° 52′.

ROSBOTH, a word uſed by ſome authors to expreſs a ſoft excreſcence from any part.

ROSCHINTZE, in *Geography*, a town of Pruſſia, in Natangen; 12 miles S. of Lick.

ROSCHITZ, a town of Auſtria; 2 miles S.W. of Schrattentaal.—Alſo, a town of Moravia, in the circle of Brunn; 8 miles W. of Brunn.

ROSCIUS, Quintus, in *Biography*, a Roman actor of great celebrity, was a native of Gaul. He was contemporary at Rome with the celebrated actor Eſopus. So great were his talents for the ſtage, and ſuch was the degree of perfection to which he carried his art, that, according to Cicero, a complete maſter in any other art was popularly called the Roscius of it. Roſcius was not leſs eſteemed for his morals and good conduct, than admired for his profeſſional talents. The greateſt men in the ſtate were his intimate friends, and the loſs of him was univerſally lamented. "Which of us," ſays Cicero, alluding to Roſcius in his oration for the poet Archias, "was ſo rude and unfeeling as not to be affected by the recent death of Roſcius, who, though he died at an advanced age, appeared, on account of his excellence in his art, worthy of immortal life." His death took place in the year 61 B.C. He compoſed a parallel between theatrical and oratorical action, which is loſt.

There are ſeveral paſſages in Cicero concerning Roſcius, which, if the ancient actors, Romans as well as Greeks, did not declaim in muſical notes, would be wholly unintelligible. He tells us (de Orat.), that Roſcius had always ſaid, when age ſhould diminiſh his force, he would not abandon the ſtage, but would proportion his performance to his powers, and make muſic conform to the weakneſs of his voice; which really happened: for the ſame author informs us (de Leg.), that in his old age he ſung in a lower pitch of voice, and made the tibicines play ſlower.

As there were combats, or conteſts, eſtabliſhed by the ancients for the voice, as well as for other parts of the *Gymnaſtice*, thoſe who taught the management of the voice were called φωνασκοι, *phonaſci;* and under their inſtructions were put all thoſe who were deſtined to be orators, ſingers, and comedians. Roſcius had an academy for declamation, at which he taught ſeveral perſons, preparatory to their ſpeaking in public, or going on the ſtage. He had a law-ſuit with one of them, in which Cicero pleaded his cauſe.

Theſe are proofs ſufficient of the dramatic declamation of the ancients being uttered in muſical tones, agreeing with thoſe of the muſical inſtruments by which they were accompanied. See Declamation and Recitative.

ROSCOEA, in *Botany*, being a new and very diſtinct genus of the natural order of *Scitamineæ*, was dedicated, by the writer of the preſent article, to his diſtinguiſhed friend William Roſcoe, eſq. F.L.S., whoſe papers in the Linnæan Society's Tranſactions, and eſpecially his New Arrangement of the order in queſtion, printed in their eighth volume, richly entitle him to this botanical honour. Of his particular obſervations and diſcoveries reſpecting this order, by which he has reduced to clear ſcientific principles, what had hitherto been an indigeſted chaos, we ſhall ſpeak under the article Scitamineæ, in its proper place.—Sm. Exot. Bot. v. 2. 97.—Claſs and order, *Monandria Monogynia*. Nat. Ord. *Scitamineæ*, Linn. *Cannæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, tubular, cylindrical, its limb ſheathing, erect, undivided, membranous at the edge. *Cor.* of one petal, irregular; tube ſcarcely longer than the calyx, erect, ſtraight, triangular upwards: outer limb ringent, two-lipped; its upper lip broadeſt, erect, obovate, acute, concave; lower about as long, in two deep, linear-lanceolate, acute, reflexed lobes: inner limb ringent, two-lipped; the upper lip erect, ſhorter than the outer limb, of two cohering, half-ovate lobes, tapering at the baſe, and embracing the organs of fructification; lower much longer and broader, ſpreading, cloven. *Stam.* Filament one, inſerted into the top of the tube, ſhort, linear, channelled, erect; anther much longer than the filament, linear, channelled, greatly incurved, bearing pollen in the upper part only, its baſe extended in the form of two lanceolate, horizontal, aſcending, acute, membranous, lobes. *Piſt.* Germen inferior, oval, very ſmall; ſtyle thread-ſhaped, lodged in the groove of the filament, and of the anther, to whoſe curvature it conforms; ſtigma obtuſe, concave, downy, juſt projecting beyond the anther. *Peric.* Capſule? we preſume it to be analogous to that of other *Scitamineæ*.

Eſſ. Ch. Anther two-lobed, incurved, terminal, embracing the ſtyle, with a cloven appendage at its baſe. Outer limb of the corolla irregular; upper lip vaulted; lower deeply divided: inner limb in three parts, two-lipped.

1. R. *purpurea*. Purple Roſcoea. Sm. Exot. Bot. v. 2. 97. t. 108. (Hatucon Swa of the Nawars of Nepaul.)—This plant was found at Narainhetty, in the mountains of Upper Nepaul, by Dr. Francis Buchanan, flowering in April 1802. It is the only ſpecies, hitherto diſcovered, of this very well-defined genus, which ſhould be arranged near Hedychium and Kæmpferia, (ſee thoſe articles,) to both of which genera it has ſome points of affinity; but *Roſcoea* is diſtinguiſhed from every other known plant of the *Scitamineæ*, by the irregularity of its two-lipped outer limb, and the peculiar appendages to the baſe of the anther.

The *root* is perennial, of ſeveral, cluſtered, ſpreading, oblong, tapering knobs, producing branched fibres. No aromatic or pungent flavour is perceptible in our ſpecimens. *Stem* ſolitary, erect, a foot or more in height, ſimple, leafy, compreſſed. *Leaves* ſpreading in two ranks, alternate, oblong, pointed, folded, wavy, entire, ſmooth, with many oblique parallel veins; pale at the under ſide; ſomewhat rounded and heart-ſhaped at the baſe, running down into broad, ſheathing, compreſſed, furrowed, purpliſh *footſtalks*, which embrace and conceal the ſtem. *Stipula* crowning the inſide of the footſtalk, very ſhort, entire. *Flowers* ſeveral, opening in ſucceſſion, terminal, cluſtered, ſeſſile, erect, large, and handſome, of a violet-purple, with whitiſh organs of impregnation; the tube of the calyx of each concealed by the ſheaths of the upper leaves.

ROSCOFF, or Roscou, in *Geography*, a ſea-port town of France, in the department of Finiſterre; 4 miles N. of St. Pol de Leon. As a ſea-port it is much frequented by thoſe who carry on a contraband trade with England, eſpecially in wine and brandy. The inhabitants uſed formerly to import linſeed, and export linen manufactured in the country annually to the amount of 500,000 livres. Since the

the revolution this trade has been interrupted, but with the return of peace may be eafily revived. The harbour, however, without timely precaution, is in danger of being choaked up with fand. In the neighbourhood of the town, and throughout the department of Finifterre, the fields are manured with fea-weed. Wood is very fcarce, and their fruit-trees occafionally ferve for fuel. In the ifland of Bas they burn cow-dung and fea-weed. Rofcoff contains 1000 inhabitants; neverthelefs, the depopulation from its lofs of trade, the arid fandy ground on which it is built, and the defolated ruins of former eftablifhments, give the place a melancholy appearance of defolation. In this place there is not a fingle fountain, nor any inftitution for the inftruction of youth, nor any regulation for preferving the health of the inhabitants. This is faid to be the place where the chevalier St. George landed, after his unfuccefsful attempt in 1745.

ROSCOLÆ, a name given by fome medical writers to the meafles.

ROSCOMMON, *Earl of*, in *Biography*. See Dillon.

Roscommon, in *Geography*, a county of Ireland, in the province of Connaught, is bounded on the eaft by the river Shannon, which feparates it from the King's county, Weft-Meath, Longford, and Leitrim; and on the weft by Galway, Mayo, and Sligo. Towards the north and fouth it is contracted into narrow necks of land, between the eaft and weft confines. According to Dr. Beaufort, its length from north to fouth is 47 miles (60 Englifh), and its breadth about the middle of the county 29 (37 Englifh) miles. The latter varies confiderably, being in fome parts lefs than 10 miles. The area meafures 346,650 acres, or 541 fquare miles, equal to 556,847 acres, or 869 fquare miles, Englifh meafure. This county contains 56 parifhes, 22 of which have churches. Of thefe the greater part are under the fee of Elphin. When Dr. Beaufort wrote, the population was eftimated at 86,000; what it is at prefent cannot be afcertained. Rofcommon is a flat open country, in fome places fprinkled with rocks, in many interrupted by extenfive bogs, and but little diverfified with hills. The only mountains within the county are in a narrow part between Lough Arrow and Lough Allen; and thefe are become valuable, on account of the coal and iron which they are found to contain. The lofty Curlew mountains, which join Lough Arrow, feparate this county from Sligo. The Shannon beautifully delineates the eaftern confines, branching in a courfe of 50 miles into feveral fine lakes, of which Lough Ree, Lough Baffin, and Lough Allen, are the largeft. The Suck divides it from Galway for a great length of way, till it lofes its name and waters in the Shannon. A number of fmall ftreams from the interior interfect the county, fertilizing and enlivening the fields. The largeft of the lakes is Lough Key, in the north of the county, which is rendered delightful by wooded iflands and furrounding groves. The foil is fertile; lime-ftone and marle are abundant, and the climate not fevere. The county has long been famed for its paftures; but as population increafes, wants and cares are augmented, and pafturage gives way to tillage, as a more abundant fource of fupply. Hence we find, that although pafturage is calculated to cramp population, yet, by the introduction of manufactures, it may be fo increafed, that paftures muft be broken up and tilled. This natural courfe of events has operated very powerfully in Rofcommon. The manufacture of linen and woollen ftuffs has been diffufed; bounties have alfo been offered for farinaceous produce; and under thefe neceffities and incitements, pafturage has confiderably decreafed. It has been contended, that converting fuch rich paftures to tillage muft prove a great lofs to the country; but although the land cannot, for a confiderable time, fo fully repay the labours of the hufbandman, as when in the zenith of their paftoral utility, yet in the end there cannot furely be a doubt of their more amply remunerating the country. In the paftoral economy of this diftrict we find fheep the largeft proportion of the farm-ftock: bullocks and cows form a leffer fhare. Mr. Wakefield commends the quality of both. The farms are generally divided by ftone-walls. Agriculture is in its infancy, but the abundance of lime-ftone has contributed, in a great degree, to promote the extenfion of tillage. This is conducted on the fame plan as in other parts of Connaught, and is thus defcribed by Dr. M'Parlan. "The mode of culture is with a long narrow fpade, commonly called a loy. This machine they prefer to ploughs, and affign many reafons for doing fo. The hills are very fteep, (fpeaking of Leitrim,) befet with ftones; and notwithftanding the foil being generally gravelly, fo tough and retentive of wet, as to render ploughing objectionable. They alfo complain of a fcarcity of horfes: but, above all, they affign, as a peculiar inducement, the abundance of crop produced by the loy culture compared to that of the plough. In fome of the more level parts, ploughing is in practice; and in fome others they unite both, firft ploughing, then mincing and dreffing with the loy. The foil being in general of the ftiff argillaceous kind, wherever it is fo, the potatoes are planted by dibbling with the *fleveen*. In a few places they plant, by fpreading the cuts on the dung or green turf, and then digging up the furrows; and in ftill fewer, where the foil is light and friable, they plant potatoes by drilling with a one-horfe plough, particularly in ftubble and old potatoe ground." Mr. Wakefield calls this a faithful picture of the cultivation of this diftrict. Rofcommon is the fhire-town, but Boyle is more thriving. None of the towns are large. The county is reprefented in parliament by two members only. Beaufort. Wakefield. Robertfon.

Roscommon, a poft-town of Ireland, and the fhire-town of the county of the fame name, where the affizes are held. It is fituated about three miles from the Shannon, where it expands into Lough Ree. It is a fmall place, agreeably fituated, but has little trade. The ruins of a Dominican friary exhibit fome remains of elegant architecture, efpecially a tomb of Felim O'Connor, king of Connaught, adorned with a number of emblematical devices. Rofcommon is 69 miles W.N.W. from Dublin.

ROSCOTTY, a town of Thibet; 18 miles W. of Sirinagur.

ROSCREA, a poft-town of the county of Tipperary, Ireland, on the border of the King's county. It is a neat and thriving town. The church is very ancient, and has a curious frontifpiece at the weft end. Near it ftands one of the largeft round towers in Ireland, all built with fquare ftone, which is unufual in thefe edifices. Rofcrea was once a bifhopric, but was united with Killaloe in the twelfth century. The large old caftle was built by the Ormond family. It is 59 miles S.W. from Dublin.

ROSE, in *Botany* and *Gardening*. See Rosa.

It is a tradition among the ancients, that the god of love made a prefent to Harpocrates, the god of filence, of a beautiful rofe, the firft that had been known, to engage him not to difcover any of the private practices of his mother Venus. And hence it became a cuftom to have a rofe placed in their rooms of mirth and entertainment, that under the affurance thereof they might be induced to lay afide all conftraint, and fpeak what they pleafed. Thus did the rofe become a fymbol of filence; fo that to be *fub rofa, under the rofe,* *rose*, denotes as much as to be out of danger of having any converſation divulged.

Rose *Bay*. See Nerium.

Rose, *Campion*. See Agrostemma.

Rose, *China*, the name by which ſome call the ketmia of botaniſts. See Hibiscus.

Rose, *Chriſtmas*. See Helleborus.

Rose, *Corn*. See Papaver.

Rose, *Mountain-bay*, or *Dwarf-bay*, a name by which the chamærhodendros of botaniſts is ſometimes called. See Kalmia, and Rhododendrum.

Rose, *Guelder*, a name ſometimes given to the opulus, or water-elder. See Viburnum.

Rose, *Virginian Guelder*. See Spiræa.

Rose, *Martinico*. See Hibiscus.

Rose *of Jericho*, a name by which ſome call the heſperis. See Anastatica.

Rose *Mallow*. See Aliza.

Rose, *South Sea*, a name ſometimes given to the *Nerium* of botaniſts; which ſee.

Rose, *Rock*. See Cistus.

Rose-*Root*. See Rhodiola.

Rose, in the *Materia Medica*. The flowers of the *Roſa canina*, dog-roſe, or hep, are ſaid by ſome botaniſts to be inodorous, and yet their fragrance is often very perceptible. The fruit called heps, or hips, has a pleaſant acidulous taſte, depending on the uncombined citric acid and ſugar which it contains. This pulpy fruit is cooling, but poſſeſſes no ſpecific medicinal virtue. It is uſed in the preparation of a conſerve or confection. For this purpoſe the London pharmacopeia directs a pound of the pulp and 20 ounces of refined ſugar, in powder, to be rubbed together until they be well incorporated; and in the Edinburgh Diſpenſatory, it is ordered, that the freſh fruit of the dog-roſe, carefully freed from the ſeeds and incloſed ſpiculæ, be beaten into a pulp, and, while beating, that three times its weight of double refined ſugar be gradually added. (See Conserve). Formerly, ſays Woodville, it was eſteemed uſeful in many diſorders, as dropſies, calculous complaints, dyſenteries, hæmorrhages, &c. A moſs-like excreſcence, called "Badeguar," "Roſe-ſponge," and by the French "Galle chevelue," is frequently found upon the branches of this tree, and is the habitation of the inſect called "cynips roſæ." This excreſcence was formerly in great repute as a remedy for various diſeaſes.

The *Roſa centifolia*, or hundred-leaved roſe, of which there are many varieties, is improperly confounded in the Dublin pharmacopeia with the damaſk roſe, *Roſa damaſcena*, which is altogether a different ſpecies. The petals of this ſpecies are directed for medicinal uſe. They are of a pale red colour, and of a very fragrant odour, which is to many people very agreeable, and therefore this as well as moſt of the other roſes, are made up into noſegays: and theſe, in ſome circumſtances, have produced alarming ſymptoms, ſuch as ſneezing, inflammation of the eyes, faintings, hyſterical affections, abortion, &c.: and perſons confined in a cloſe room, with a large quantity of roſes, have been in danger of immediate extinction of life. The petals impart their odorous matter to watery liquors, both by infuſion and diſtillation. Six pounds of freſh roots impregnate, by diſtillation, a gallon or more of water ſtrongly with their fine flavour. On diſtilling large quantities, there ſeparates from the watery fluid a ſmall portion of a fragrant butyraceous oil, which liquefies by heat, and appears yellow, but concretes in the cold into a white maſs: 100 pounds of the flowers, according to the experiments of Tachenius and Hoffman, afforded ſcarcely half an ounce of oil. The ſmell of this oil exactly reſembles that of the roſes, and is therefore much uſed as a perfume.

The oil of roſes poſſeſſes very little pungency, and has been highly recommended for its cordial and analeptic qualities. The flower alſo contains a bitteriſh ſubſtance, which is extracted by water along with the odorous principle, and remains entire in the decoction after the latter has been ſeparated by diſtillation or evaporation. This fixed ſapid matter of the petals manifeſts a purgative quality, and it is on this account that the flowers are received in the materia medica. The pharmacopeias direct a ſyrup to be prepared of this roſe, which is ordered as an adjunct to oil and other purgatives in the diſeaſes of infants; but they are chiefly employed for the diſtillation of roſe-water. The London pharmacopeia directs ſeven ounces of the petals of the hundred-leaved roſe dried to be macerated in four pints of boiling water for 12 hours, and to ſtrain it; and then to evaporate the ſtrained liquor in a water-bath down to $2\frac{1}{2}$ pounds, and to add ſix pounds of refined ſugar, ſo as to make a ſyrup. This ſyrup is prepared, according to the Edin. Pharm. by macerating one pound of the freſh petals of the *roſa centifolia*, or, as it is erroneouſly denominated, damaſk roſe, in four pounds of boiling water for 12 hours, and adding three pounds of refined ſugar to the ſtrained liquor, and boiling ſo as to form a ſyrup. This ſyrup, in doſes of a ſpoonful, or from f ℨij to f ℨxij or more, is found to be pleaſant and uſeful as a laxative for children, or to obviate coſtiveneſs in adults.

The Rose-*Water*, *Aqua roſæ*, (Lond. and Dub. Ph.), *Aqua roſæ centifoliæ* (Edin.) is prepared by taking 8lbs. (Lond.), 6lbs. (Edin. and Dub.), of the petals, and pouring over them as much water as will prevent empyreuma during the diſtillation; and then diſtilling a gallon (Lond. and Dub.), or 10 pounds (Edin.) This water has the agreeable odour of the roſe in great perfection, when properly prepared; but it is very apt to ſpoil, unleſs it be rectified by a ſecond diſtillation. As it is free from acrimony, and, except in point of odour, does not differ from diſtilled water, it is generally employed in collyria, with acetate and ſuperacetate of lead, and acetate and ſulphate of zinc. The oil and water, obtained by diſtillation, and uſed chiefly in perfumes and flavouring materials, are recommended by Hoffman as excellent cordials for raiſing the ſtrength and ſpirits, and allaying pain. They appear to be of a mild nature, and not liable to heat or irritate the conſtitution. Roſe-water is, however, in great eſteem throughout the Eaſt, particularly in China and Perſia, where the trade of it is very conſiderable. The roſe-leaves, remaining at the bottom of the ſtill, are kept under the name of roſe cakes for a perfume.

The flowers of the *Roſa gallica*, or red officinal roſe, give out their virtue both to water and rectified ſpirit, and tinge the former of a fine red colour, but the latter of a very pale one. The extract obtained by inſpiſſating the watery infuſion is moderately auſtere, bitteriſh, and ſubſaline. The ſpirituous extract is conſiderably ſtronger both in aſtringency and bitterneſs. Water at 212° extracts both its odour and taſte; and the infuſion ſtrikes a black with ſulphate of iron; and alſo forms a precipitate of a dark colour with ſulphate of zinc. The red roſe is aſtringent and tonic. It forms an uſeful and elegant vehicle for the exhibition of mineral acids, nitrate of potaſs, and other neutral ſalts, in hæmorrhages and ſome other diſeaſes. It has been ſaid, that the flowers of this ſpecies poſſeſs neither the fragrance nor the laxative power of thoſe of the *centifolia*; but Poterius, cited by Lewis, relates, that he found a drachm of powdered red roſes occaſion three or four ſtools, and this not in a few inſtances, inftances, but conftantly in feveral. Its fragrance is improved by drying; and both the aftringency and the colour of the petals are beft preferved by hafty exficcation. Its flowers are chiefly valued for their aftringent qualities, which are moft confiderable before the petals expand, and, therefore, in this ftate they are chofen for medicinal ufe, and ordered by the pharmacopeias in different preparations, as thofe of a conferve, a honey, an infufion, and a fyrup. Thefe preparations, efpecially the firft and fecond, have been highly efteemed in phthifical cafes, particularly by the Arabian phyficians; who mention fome in which they were effectual remedies. The cafe of Kruger, related in the German Ephemerides, has been thought a more evident proof of the efficacy of the conferve of rofes in phthifis pulmonalis; but as the ufe of the conferve was commonly joined with that of milk and farinacea, together with proper exercife in the open air, it has been doubted if thefe recoveries could be wholly imputed to the rofes, though their mild aftringent and corroborant virtues certainly contributed much. In fome of the cafes above alluded to, 20 or 30 pounds of the conferve were taken in the courfe of a month.

The *Confectio rofæ gallicæ*, confection of the red rofes of the Lond. Pharm. is prepared by beating a pound of the unblown petals of the red rofe, freed from the claws, in a ftone mortar, and adding three pounds of refined fugar, and then beating again until the whole be thoroughly incorporated. The Edin. Pharm. directs the unblown petals of the red rofe to be beaten to a pulp, and during the beating to add three times their weight of refined fugar. The *Conferva rofæ*, or conferve of rofes of the Dubl. Pharm. is prepared by beating the unblown petals of the red rofe, freed from their claws, and adding gradually three times their weight of refined fugar. The confection of the red rofe poffeffes a fmall degree of aftringency, and is fometimes given diffolved in new milk as a tonic in early convalefcence from acute difeafes; but its chief ufe is to form a pleafant vehicle for more active medicines.

Mel Rofæ, or rofe honey. See HONEY.

Infufion of Rofes. See INFUSION.

Syrup of red rofes, Syrupus rofæ gallicæ, is prepared, according to the Edin. Pharm. by macerating feven ounces of the dried petals of the red rofe in five pounds of boiling water for 12 hours, then boiling a little and ftraining; and adding fix pounds of refined fugar to the ftrained liquor, and again boiling a little fo as to form a fyrup. This fyrup is a weak aftringent; and as fuch is added to aftringent and ftomachic infufions and gargles: it is ufeful in hæmoptyfis and fome other hæmorrhagic complaints as a gargle, and its efficacy chiefly depends on the acid; but it is principaly valued on account of its flavour and colour. Lewis Mat. Med. Woodville Med. Bot. Thomfon Lond. Difp.

ROSES, *Effence of.* There is fcarcely a more valuable perfume in the world, than the effence of damafk rofes, and fcarcely any thing is obtained from its fubject with more difficulty, and in lefs quantity. All effences or effential oils are, while in the plant, contained in certain veficles lodged in different parts, and of different ftructure; thefe veficles are in the rofe particularly fmall and tender, and are placed very fuperficially; the confequence of this is, that there is originally but a very little of this effence in the flower, and this is the very fubject that will be diffipated and loft when the flowers are gathered and thrown in a heap together, as they are fucculent, and very quickly heat in lying together. To avoid all diffipation and wafte of this choice effence, the rofes fhould be thrown into the ftill as foon as gathered, and diftilled with very little water, and that in a balneum Mariæ; then the fire is to be continued fo long as the flowers float feparate about in the water; but as foon as ever they form themfelves into a cake, and ftick to the bottom, the diftillation fhould be finifhed, as they then yield no more effence. With all thefe precautions, however, it is with great difficulty we can procure any effence of rofes. What we obtain by this diftillation being chiefly a very odoriferous and fragrant water. In the warmer countries the fame caution affords a larger quantity of oil, which may be feparated and preferved under the name of the effence. In Italy, they make fome quantity of it, but there it is very dear; a vaft quantity of the flowers yielding only a very little effence, and that being thick and troublefome in the procuring, as it every where fticks to the veffels.

It is to be obferved, that the feafon of the year as to wet or dry, makes a very great difference in the effential oils of all plants; they are always much finer in dry and hot feafons, than in cold and moift; we find our rofe-water in England much finer, and more fragrant, though diftilled in the fame proportion, in hot and dry fummers, than in cold and rainy ones; and Mr. Geoffroy gives an account that he fucceeded, one very hot and dry year, in the making effence of rofes in France in the following manner.

As the rofes were brought to him frefh gathered, he turned them immediately into the ftill; and drawing over the water into a glafs matrafs, when it had ftood by fome time, and was perfectly cold, he difcovered fome of the effence fixed to the fides of the matrafs, and the furface of the water covered with a thin reticular pellicle. All the contents of the matrafs were put to filter through a paper, fupported by a fine linen cloth; and the filtrated water was added to new rofes for many fucceeding diftillations, the produce of which was all filtered through the fame paper. After a long courfe of diftillations, with frefh flowers every time, but ftill with the fame veffels and the fame water, there was found in the paper of the filtre a quantity of thick effence; this being carefully wafhed out of the paper, with a fmall quantity of the moft fragrant of the water, and afterwards feparated pure from its furface, was very white and extremely fragrant, and as thick as fine butter. This is not the only effential oil which naturally concretes into this firm ftate; oil of anifeed, though fluid when diftilled, always concretes in the fame manner on the firft approach of cold; and another oil of this kind is that of the laurel, which is ufed in fome places, though very improperly, to give the fcent and tafte of bitter almonds, or apricot kernels, to foods of different kinds.

Monfieur Homberg has taught us how to gain a larger quantity of the effential oil of rofes than in the ufual diftillation, by the previous addition of mineral acids, as the fpirit of falt, vitriol, &c. thereto; which increafe the fermentation, and joining with the oil, render it more liquid, and eafier to be raifed by heat. He advifes a perfumer (who before fcarcely obtained an ounce of oil from a hundred weight of rofes) to fteep his flowers, for fifteen days, in water made fharp with the fpirit of vitriol; by which means the perfumer, upon diftillation, found his quantity of oil increafed almoft a third.

The perfumers keep the ftructure of the veffel they employ in this diftillation a great fecret. M. Homberg tells us, it is a large convenient ftill, that opens in a tube at the top to receive the water, which muft often be poured upon the rofes, to bring over the oil with it; this it does but very flowly, and fo requires that its quantity be large; the ftill alfo opens below, that the flowers, when they will yield no more oil, may be eafily taken out; but the principal contrivance

contrivance is the figure of the veſſel which receives the oil; this is made like an ordinary matraſs, from the lower part of the belly of which comes a tube, as from an old-faſhioned cruet, and riſing to the bottom of the neck of the receiver, it bends outward; ſo that though the veſſel uſually contains but two or three French pints, it conveniently receives and lets paſs many hundred pints of the roſe-water, without any neceſſity of being changed; for a change would loſe the ſmall quantity of the oil obtained. The water diſtilled runs through a pipe into a ſecond receiver; the oil, being lighter than the water, floats upon its ſurface, and adheres to the neck of the veſſel, as high as the aperture of the little pipe, while the water runs from the bottom of the firſt receiver into the ſecond. See Mém. de l'Acad. des Sciences, 1700.

M. Homberg obſerves, that this ſtill may be uſeful to draw off any kind of precious eſſential oils.

The proceſs for making attar, or eſſential oil of roſes, ſo much eſteemed as a perfume, is related in the "Aſiatic Reſearches," (vol. i. p. 332.) by lieutenant-colonel Polier, and is as follows. "Forty pounds of freſh roſes, with their calyces, but the ſtems cut cloſe, are put in a ſtill with 60 pounds of water. The maſs is then well mixed together with the hands, and a gentle fire is made under the ſtill. When the water begins to grow hot, and fumes to riſe, the cap of the ſtill is put on, and the pipe fixed; the chinks are then well luted with paſte, and cold water put on the refrigeratory at the top. The receiver is alſo adapted at the end of the pipe; and the fire is continued under the ſtill, neither too violent nor too weak. When the impregnated water begins to come over, and the ſtill is very hot, the fire is leſſened by gentle degrees, and the diſtillation continued till thirty pounds of water are come over, which is generally done in about four or five hours. This roſe-water is to be poured again on a freſh quantity (forty pounds) of roſes; and from fifteen to twenty pounds of water are to be drawn by diſtillation, following the ſame proceſs as before. The roſe-water thus made and cohobated, will be found, if the roſes were good and freſh, and the diſtillation carefully performed, highly ſcented with the roſes. It is then poured into pans either of earthen-ware or of tinned metal, and left expoſed to the freſh air for the night. The *attar*, or *eſſence*, will be found in the morning congealed, and ſwimming on the top of the water. This is to be carefully ſeparated, and collected, either with a thin ſhell or a ſkimmer, and poured into a vial. When a certain quantity has thus been obtained, the water and feces muſt be ſeparated from the clear eſſence, which, with reſpect to the firſt, will not be difficult to do, as the eſſence congeals with a ſlight cold, and the water may then be made to run off. If, after that, the eſſence is kept fluid by heat, the feces will ſubſide, and may be ſeparated; but if the operation has been neatly performed, theſe will be little or none. The feces are as highly perfumed as the eſſence, and muſt be kept after as much of the eſſence has been ſkimmed from the roſe-water as could be. The remaining water ſhould be uſed for freſh diſtillations, inſtead of common water; at leaſt as far as it will go.

"The above is the whole proceſs of making genuine attar of roſes. But, as the roſes of this country give but a very ſmall quantity of eſſence, and it is in high eſteem, various ways have been thought of to augment the quantity, though at the expence of the quality. In this country it is uſual to add to the roſes, when put in the ſtill, a quantity of ſandal-wood raſpings, ſome more, ſome leſs, from one to five tolahs, or half ounces. The ſandal contains a deal of eſſential oil, which comes over freely in the common diſtillation, and mixing with the roſe-water and eſſence, becomes ſtrongly impregnated with their perfume. The impoſition, however, cannot be concealed; the eſſential oil of ſandal will not congeal in common cold; and its ſmell cannot be kept under, but will be apparent and predominate, in ſpite of every art. In Caſhemire they ſeldom uſe ſandal to adulterate the attar; but I have been informed, to increaſe the quantity, they diſtil with the roſes a ſweet-ſcented graſs, which does not communicate any unpleaſant ſcent, and gives the attar a high clear green colour. This eſſence alſo does not congeal in a ſlight cold, as that of roſes."

The quantity of eſſential oil to be obtained from the roſes is very precarious, as it depends not only on the ſkill of the diſtiller, but alſo on the quality of the roſes, and the favourableneſs of the ſeaſon. In order to obtain 4 maſhas (about $1\frac{1}{2}$ drachm) from 80 pounds, which, deducting the calyces, amounts to ſomething leſs than 3 drachms *per* 100 pounds of roſe-leaves, the ſeaſon muſt be very favourable, and the operation carefully performed. The colour of the attar of roſes is no criterion of its goodneſs, quality, or country. In the year 1787, Col. Polier had attar of a fine emerald green, of a bright yellow, and of a reddiſh hue, from the ſame ground, and obtained by the ſame proceſs, only of roſes collected at different days. The calyces, he obſerves, do not in any degree diminiſh the quality of the attar, nor impart any green colour to it; though perhaps they may augment the quantity; but the trouble neceſſary for ſtripping them muſt, and ought, to prevent its being ever put in practice.

Roses, *Oil of.* See Rose, and the preceding article.

Rose-*Fly*, in *Natural Hiſtory*, the name given by authors to a peculiar ſpecies of fly, found very frequent on roſe-buſhes, and produced out of a baſtard caterpillar, which feeds on the leaves of that tree. See Cynips.

The male of this fly has a long body, the female a ſhort and thick one; ſhe depoſits her eggs in ſmall holes, which ſhe makes in the bark of the young branches, and for this purpoſe is furniſhed with a very remarkable inſtrument, placed at the hinder part of the body, which is a kind of ſaw.

This is a four-winged fly, and is ſo common on roſe-buſhes, that it is ſcarcely poſſible to miſs it in any of the ſummer months; and the parts of the branches where it has depoſited its eggs are ſo vitiated by it, that they alſo are eaſily known. They are uſually ſwelled to a greater bigneſs than either the part above or below them, and are uſually ſomewhat bent; they are often black on the under ſide, and among this blackneſs the holes made for the eggs, and often the eggs in them, may be ſeen. The head and breaſt of this fly are black; its wings alſo are edged with black, its body is yellow, and its legs yellow, with a few black ſpots.

If theſe flies be obſerved in a ſummer morning, as they are crawling on the branches of a roſe-tree, they will ſoon be found at work for the depoſiting of their eggs. Theſe creatures give us a very good opportunity of obſerving the manner in which they perform this, as they are of a very ſluggiſh diſpoſition, and will ſtand ſtill even to be taken between the fingers; ſo that when one of them is in a proper ſituation, it may be examined by bringing the eye near it, and by uſing the common magnifying glaſſes, without quitting its place or its work; and if there be leaves of the tree, or ſmall branches of it in the way, they may be removed without diſturbing the creature. Reaumur's Hiſt. Inſ. vol. ix. p. 145.

There is, beſides this ſpecies, another fly of the ſame genus, produced from a baſtard caterpillar of the roſe-tree, and of the ſame ſhape and ſtructure of parts with this, but different

different in colour. The head and breaſt of this fly are of a deep violet colour, the body is yellow, and the legs and wings are of a ſomewhat paler violet tinge. This creature alſo depoſits its eggs in holes made in the branches of the roſe-tree, by means of a double ſaw, placed at the hinder part of the body; but, as the former ſpecies lays them in a ſingle ſtraight line, this diſpoſes them in a very beautiful and very regular manner in two rows.

Rose-*Galls*, a name given by authors to certain unnatural productions of the *roſa ſylveſtris*, or dog-roſe, occaſioned by the bites of inſects. There are two kinds of theſe, the one very common, the other more rare.

The ſcarcer kind is uſually found on the young ſhoots, and on the heps, or fruit, and is of a woody ſubſtance; the other is hairy and ſpongy, and is found on the old branches. The woody kind uſually appears in the months of June and July, and is always found in cluſters. Theſe are compoſed of ten, twelve, or more galls of different ſizes and figures, ſome round, others oblong, ſome of the ſize of an olive, and others not larger than a pea. They are of the common ſubſtance of the white wood, or blea, of trees, and when ſituated on the fruit, they prevent its ripening, and make a very ſingular figure. They are of a reddiſh colour, and are uſually ſmooth and gloſſy, but ſometimes they are beſet with ſhort and fine prickles.

The hairy roſe-gall is too common, and too ſingular a figure to have eſcaped the obſervation of perſons in all ages; it has been introduced into medicine in many parts of the world, and is at this time preſcribed in Germany, when reduced to powder, in diarrhœas, dyſenteries, and other diſorders of the bowels, and to promote urine and break the ſtone.

Theſe roſe-galls, though they appear at firſt ſight compoſed of tufts of hair, are, however, in reality, made up of ſeveral ſmall galls, growing from a bud on the branch, and forming a cluſter on the part. They are of an oblong figure, and reſemble the ſhape of a plum-ſtone. Each of them is the habitation of a ſingle worm, each having one cell in the centre.

All theſe galls of the roſe-tree afford the ſame ſpecies of worms and flies. The proper inhabitants, however, are hardly to be diſtinguiſhed by the moſt curious obſerver from the great variety of ſpecies which are found in them, all produced of the eggs of other flies, whoſe worms are of the carnivorous kind, and are lodged in the gall, not to feed on the juices of the tree, but on the fleſh of the proper inhabitant. When the parent-fly, who gives origin to the galls, has depoſited her eggs, and the tumour, in conſequence, begins to be formed, an enemy of this kind pierces the covering, and ſends in her offſpring to feed on the inhabitant. Theſe are flies of the ichneumon kind, and ſeveral ſpecies of them are of great beauty. All the flies deſcribed by authors as iſſuing out of this gall ſeem to have been of this kind; the proper inhabitant, being a ſmall black fly of no great beauty, is diſregarded, while the others have been particularly deſcribed.

Mentzelius has given an elegant account of a ſpecies whoſe back is of a fine blue, and its belly purple; and others have figured and deſcribed greeniſh and gold-coloured ones; but theſe are all ichneumons, all bred of devouring enemies which have fed on the proper inhabitants of the galls, and lived and transformed themſelves in their cells.

Rose-*Wood*, *lignum rhodium*, or *aſpalathum*. See Aspalath.

Rose *Pink*. See Pink.

Rose, *Golden*, is a roſe which the pope bleſſes at maſs, on the firſt Sunday in Lent, while they ſing Lætare Jeruſalem; and which, after maſs, he carries in proceſſion; and then ſends as a preſent to ſome ſovereign prince.

Rose, *the factions of the red and white*, are famous in our Engliſh hiſtories. They had their riſe in 1454, under Henry VI. between the houſes of York and Lancaſter, and ended in Henry VII. who united the two branches. The houſe of Lancaſter had for its badge a *red* roſe; that of York a *white* one.

Rose, in *Architecture* and *Sculpture*, an ornament cut in reſemblance of a roſe.

It is chiefly uſed in friezes, corniches, and vaults of churches, and particularly in the middle of each face of the Corinthian abacus. And in the ſpaces between the modillions, under the plafonds of corniches.

Roses, in *Heraldry*, is a difference denoting the ſeventh ſon of a family.

Rose-*Nails*. See Nail.

Rose-*Diamond*. See Diamond.

Rose-*Noble*, an ancient Engliſh gold coin, firſt ſtruck in the reign of Edward III. when the ſeries of gold coinage commences, and then called the *penny of gold*; ſince called *roſe-noble*, becauſe ſtamped with a roſe. It was current at 6*s*. 8*d*., and conſequently formed half a "mark," ſo called as being a grand limited ſum in account (Marc, *limes*, Goth.), 8 oz. in weight, and ⅔ds of the money pound. This, as one half of the commercial pound of 16 ounces, is ſometimes called "ſelibra." The *noble* (which ſee) was ſo called from the nobility of the metal, being of the fineſt gold then, or now, uſed in the world for coinage; and it was attended by its half and quarter; the proportion of ſilver to gold being then 1 to 11. This coin was ſometimes called the "roſe-noble," from both ſides being impaled in an undulating circle, reſembling the outline of an expanded roſe, together with its half and quarter; and theſe continued the only gold coins till the angels of Edward IV. 1465, ſtamped with the angel Michael and the dragon, and the angelets, equal to half the angel, or 3*s*. 4*d*. were ſubſtituted in their place. Antiquaries likewiſe aſſert, that gold being ſcarce in Henry Vth's time, that prince diminiſhed the noble, retaining its former value; but that Henry VI. reſtored it to its ſize, and cauſed it to paſs for 10*s*. under the new name of ryal. Accordingly, the noble of Henry V. weighs only 108 grains now, while thoſe preceding his reign weigh 120. This ſpeaks gold to have increaſed in value about 10 *per cent*. The old noble of Edward III. and Richard II. at 120 grains, paſſed but for 6*s*. 8*d*.; but in the fifth year of Edward IV. 1465, the angel was of equal value, though but 80 grains in weight; which ſhews gold to have increaſed in value then no leſs than 30 *per cent*. Certain it is that the ryal of 10*s*. and the angel of 6*s*. 8*d*. with their diviſions of half and quarter, were the ſole gold coins till, in 1485, Henry VII. publiſhed the double ryal, or ſovereign, of 20*s*. accompanied by the double ſovereign, of 40*s*. See Money.

Rose *Engine*, *Roſe lathe*, or *Figure lathe*, in the *Mechanic Arts*, is a machine uſed for turning any articles in wood, ivory, or metal, in the ſame manner as a common lathe, but it has additional parts, by which the ſurface of the ſubject which has been turned, can afterwards be engraved with a great variety of patterns of curved lines, which, in general, are denominated from the French *roſette*, from a ſlight general reſemblance which they have to a full-blown roſe, and hence the machine is called a roſe engine.

This machine, as we have ſaid, contains all the parts of the *lathe*, (ſee that article,) and in the ſame manner as in turning, the work is cauſed to revolve, whilſt the cutting tool is kept ſtationary; but the difference between the roſe

lathe

lathe and the common lathe is, that in the former the centre of the circle, in which the work revolves, is not a ſtationary point, but a ſlight motion is given to the centre whilſt the work is revolving upon it, the tool being all the while ſtationary; the ſurface of the figure which it forms will be, of courſe, out of round, *i. e.* it will deviate from the circular figure as much, and as often, as the motion is given to the centre.

The art of turning curioſities in wood or ivory, is one of thoſe which is beſt adapted, of any of the mechanic arts, as an amuſement for perſons who either have leiſure to apply to ſuch ſubjects, or who require relaxation from mental ſtudies: it has long been a favourite purſuit of many gentlemen, and the machines they employ are very ingeniouſly conſtructed. The curious in this art reckon two points of perfection in their works, one where the extreme delicacy, or elegance, of the object renders it admirable, and the other is conſidered from the difficulties of the execution; the former may be judged by all perſons poſſeſſed of good taſte, but to judge of the latter requires ſome knowledge of the art, or, at leaſt, ſo far as to know that the lathe will form only ſuch articles as are perfectly circular, all the parts having a common axis; therefore the ſpecimens of turning are to be more or leſs eſteemed, in proportion as they are more oppoſed to the circular figure. This art was more cultivated a hundred years ago than at preſent, and more curious ſpecimens were then produced, ſuch as hollow balls of ivory, containing many excentric figures, formed within each other, all being cut from the ſame ſolid piece, and every one beautifully ornamented upon the ſurface, although only ſmall holes were left through them to gain acceſs to the interior ones: this was carried ſo far as to form twelve balls of ivory one within the other. A great collection of curioſities of this kind will be found in a French work entitled "Récueil d'Ouvrages Curieux dans le Cabinet de M. Grollier de Servir," 4to. Lyons, 1719. This contains drawings of ſome very curious articles; but although the art is not ſo generally practiſed at the preſent day as formerly, the machines which are now invented are vaſtly ſuperior, and, with the ſame attention, would doubtleſs admit of the curioſities being equally extended. Meſſrs. Holtzapffel and Deyerlien, of Cockſpur-ſtreet, London, have made many improvements in the conſtruction of roſe engines, which they execute, as well as all other tools, for ornamental turning, in the moſt finiſhed ſtyle. We have obtained drawings of one of theſe, ſee *Plate* III. *Engines*, in which *fig.* 6. is an elevation in front of the machine. A A B B is the wooden frame; D, the large foot-wheel, to give motion to the mandrel, or ſpindle, T T, by the band and pulley F. The work is fixed in a chuck I, at the extremity of the mandrel; and the tool is held by the ſlide-reſt K, which, though it has the means of moving the tool a ſmall quantity, to adjuſt it to the radius of the roſe, or figure intended to be cut, ſtill it will firmly retain the poſition in which it is placed. The upper part, A, of the frame of the machine is made of mahogany, but has within it a caſt-iron frame, conſiſting of two bars, or bearers, which being placed parallel, and at a ſmall diſtance aſunder, leave a groove or opening between them, in the ſame manner as the cheeks of any other lathe, for the reception of the tenon, at the lower end of the back puppet (ſhewn by the dotted lines) L, which is uſed to ſupport the end of a long piece of work; though this is ſeldom uſed, becauſe the work can only be turned circular, when the back centre ſupports it. All work which is to be figure-turned muſt be held in a chuck, ſcrewed on to the end of the mandrel T; becauſe it is only the mandrel which is moveable, to give thoſe deviations from the circular figure, which are neceſſary to form the figured work. For this purpoſe, the two ſtandards, G and H, which ſupport the mandrel, are not firmly fixed to the bed, A, of the machine, as in other turning-lathes; but they deſcend between the cheeks or caſt-iron bed, almoſt as low as the bottom of the mahogany bed A, and have there an axis P (dotted), which is parallel to the mandrel, and ſupported on pivots at its ends; theſe pivots being received in pieces of caſt-iron, deſcending from the cheeks, and ſtrengthened by the iron bar, Q, extended between them. The two ſtandards, G, H, are formed of one piece, and have a ſtrong bracing of iron between them, in addition to the axis P; but this cannot be ſeen in the figure, becauſe it is concealed between the cheeks of the bed O. The oſcillating motion is given to the mandrel by means of metal roſettes M: theſe are wheels, fixed upon the mandrel, each having its periphery indented and curved with a waving line, as ſhewn at M, *fig.* 7. The roſettes are acted upon by a ſmall roller, placed at the end of a piece *n*, which is ſupported by a triangular bar *m*, fixed parallel to the mandrel, upon the upper ends of curved arms, as ſhewn in both figures. Now it is evident that when the mandrel revolves, the eminences and depreſſions of the roſette, applying themſelves to the roller of the piece *n*, which is ſtationary, will cauſe a vibrating or oſcillating motion of the mandrel, and the frame, G H, which contains it. A ſtrong ſpring is placed within the cavity of the bed A, and applied to the frame of the mandrel; ſo that it inclines the latter always towards the central or vertical poſition, that is, the poſition, when the line of the mandrel is produced, would paſs exactly through the point of the ſcrew of the back puppet L; therefore, when the protuberant or waved parts of the roſette cauſes the mandrel to depart from this ſituation, the ſpring will be bent, and ready to force it back, the inſtant the curvature of the roſette will permit. The ſpring is ſlightly curved, and placed in the ſpace between the inſides of the iron cheeks of the bed and the frame of the mandrel, ſo that the middle of the curved part acts thereupon, and the two ends bear againſt the inſide of the frame, to give the re-action. Seventeen different roſettes are placed upon the mandrel, as ſhewn in a cluſter at M, each being of a different pattern. Several are of the kind ſhewn in *fig.* 7, that is, ſcolloped out with waves or concave depreſſions, but differing in the number of waves from 12, as in the figure, to 144, which will, therefore, be very minute. The ſocket for the piece *n* can be fixed, by its clamp ſcrew, upon any part of the triangular bar *m*, to bring it oppoſite any one of the roſettes which is required to be uſed. Other roſettes, inſtead of having waves or concave depreſſions, as ſhewn in *fig.* 7, have convex protuberances. In either caſe, when the pattern is very fine, the roller upon the end of the bearing-piece, *n*, cannot be admitted, becauſe its curvature would not be ſufficiently rapid to ſuffer it to fall into the depreſſions. In theſe caſes, therefore, the end of the piece *n* is uſed for the contact, being rounded, and well hardened and poliſhed, to diminiſh as much as poſſible the friction of the roſette revolving, whilſt in contact with it.

The ſlide-reſt, which ſupports the tool, is next to be deſcribed: the manner in which it applies to a piece of work, when fixed in a chuck at the end of the mandrel, is ſhewn in *fig.* 6, whilſt *figs.* 11 and 12 are on a larger ſcale to deſcribe it minutely. The reſt can be faſtened at any part of the bed, by the lower part of the foot, which is ſupported on the bed, A, of the lathe, and is divided with a dove-tailed groove in the under ſide, to receive the head of a ſcrew-bolt, going down through the lathe-bed, and fixing it at any place by a thumb-nut, as ſhewn at *k*, *fig.* 6; the groove in the foot is for the purpoſe of allowing the reſt to be moved to and from the centre

centre of the lathe, to adjuſt it to the diameter of the work which is turning. The foot has a ſtrong cylindrical pin fixed upright in the end of it, and this is fitted into a correſponding ſocket S, formed out of a ſolid piece, with the lower ſlider K of the reſt; a clamp-ſcrew in the ſide fixes the ſocket faſt upon the pin, and there is a wheel *s*, cut with notches, at the bottom of the ſocket, with a catch *t*, fixed upon the foot R, to engage its teeth and hold it faſt; by which means the ſliders, K, can be fixed, and held faſt at any required angle with the mandrel, for purpoſes we ſhall hereafter mention.

The upper part of the ſlide-reſt conſiſts of two horizontal ſliders, K and *g*, placed in directions perpendicular to each other; to one of theſe the tool is firmly attached, and by means of ſcrews with handles, the ſliders and the tool can be moved in any direction, to follow the tool to the work; K, in both figures, is a frame of metal, formed from the ſame piece as the ſocket S; its upper ſurface is made flat, and upon this a ſlider, or flat plate, *e e*, is fitted, to move with freedom and preciſion. A ſcrew is mounted in the opening of the frame, and is tapped into a piece of metal, projecting from the lower ſide of the ſlider, ſo that the ſcrew, when turned round by a handle *d*, fitted on its ſquare end, advances, or draws back the ſlider, which is guided in a right line by two pieces of braſs, ſcrewed to the under ſide of it, to form a dove-tailed groove, to which the edges of the frame K are fitted very accurately: upon this ſlider a frame, or two rulers, are ſcrewed, having a ſecond ſteel ſlider *g*, fitted in the dove-tailed groove formed between them, and provided with a ſcrew *i*, as the former, to move it. This upper ſlider carries a piece of metal, with a ſquare hole through it, in the direction of its length, to receive the tool *k*, and a ſcrew at top to faſten it in. The ſlide-reſt being mounted in the manner of *fig.* 6, upon the bed of the lathe, the upper ſlider, *g*, is parallel with the mandrel, and the lower one perpendicular thereto. For turning flat or face work, the tool is put as there ſhewn. Now, by turning the ſcrew, *i*, of the upper ſlider, the tool advances to a contact with the work, which is mounted in a chuck, as in the figure; then by the other ſcrew, *d*, it is moved acroſs the face of the work, turning it as it proceeds to a perfectly flat ſurface. For turning a cylinder, mounted between centers, the ſlide-reſt is to be turned one quarter round upon the pin in the ſocket S, ſo that the upper ſlider will be perpendicular to the mandrel, and the lower one parallel thereto; in this caſe, the upper ſlider muſt be moved, to adjuſt the tool to the diameter of the intended work, and the lower ſlider is moved by its handle *d*, to carry the tool along the length of the cylinder, and cut it as it goes. The whole reſt can be fixed at any part of the bed, and can be moved inſtantly if required. The ſlide-reſt will alſo turn cones by the following contrivance: the plate, or dove-tailed groove ſupporting the upper ſlider, *g*, may be turned round upon the plate *e e*, and faſtened at any inclination by a ſcrew paſſing through a circular groove in the plate. By this means, the upper ſlider is inclined, in any required angle, to the mandrel, and will then turn a cone, either hollow or ſolid. The ſlide-reſt preſents the tool ſo firmly to the work, that it will not retreat in the leaſt when any protuberance comes by, but cuts it away, if the ſtrain is not ſo great as to break the tool: but of this there is no danger if it be properly managed, becauſe the ſcrews advance the tool ſo ſlowly, that there is no need to puſh it forwards ſuddenly, as it is often unavoidable in turning by hand. The ſliders are often divided into inches and ſubdiviſions, by which the work can be made exactly to any dimenſions without trouble, or two things may be fitted exactly together. The upper ſlider, *g*, has a graduated arc to ſhew the angle of inclination which it makes with the lower one, when ſet for turning cones, ſo that a hollow cone being bored out in a chuck, a ſolid plug may at once be turned to fit it, without trial, the reſt making it certainly of the true angle.

The lathe is put in motion either by the hand, or by the foot of the turner. The latter, when the work is to be turned or reduced to the circular figure, as in any common lathe; and the former, when the work, after being turned, is to be ornamented, an operation which, from its delicacy, requires a very regular motion.

When the machine is turned by the foot, it is done by the preſſure upon the treadle E, which acts upon the crank C, on the axis of the foot-wheel, or fly-wheel, D. The motion is communicated from the treadle by a crank-hook, or connecting rod, *a*, faſtened to the crank of the wheel, by a collar embracing and turning round at the upper end. When the foot puſhes down the treadle, it gives the wheel a rotative motion; and when the crank has been drawn to the loweſt point, the momentum which the wheel has thus acquired, draws up the treadle, and thus, by the alternate preſſure of the foot, and the momentum of the wheel, the motion is regularly continued. The wheel is made of caſt iron, and fixed on the extreme end of the axis; it has two rims of different ſizes, and the ſurface of each is made conical, and cut with three annular grooves, which are receſſed, with an angle at the bottom, ſo as not to have a flat bottom. This form is advantageous, on account of the band having more power to turn the wheel F. Theſe different grooves are made, in order to give different degrees of velocity to the lathe, or to increaſe the power. The axle of the wheel is made of wrought-iron, except the pivots or centers, and it is bent in the middle to form the crank C: the pivots at the ends are made of hard ſteel, welded to the iron parts of the axle. The band which connects the fly and mandrel is made of catgut, of ſuch thickneſs as the nature of the work may require, and is either ſpliced at the joining of the two ends, or they are faſtened together by a ſteel hook and eye. The band may be either tightened, by ſhifting it to other grooves in the great wheel, or in the pulley F, of the mandrel; or otherwiſe by a ſliding-piece in the leg B, which is regulated by a ſcrew *x*.

The motion for the hand is given by a ſmall handle O, *fig.* 6; this is fixed upon the end of a ſpindle, which at the other end carries a ſmall wheel N, communicating by a band with the great wheel D. The ſpindle is ſupported in a frame, which is attached to the lathe-frame, by a centre or joint, on which it can be raiſed up, and fixed by a toothed ſector, to tighten the band when it is required.

The pulley F has three or four grooves, of different ſizes, to receive the band, and by this means the mandrel may be turned with different degrees of velocity, and made to accommodate itſelf to the length of the band. The wheel N is made in the ſame manner.

When a piece of work is to be made in the roſe engine, it is firſt turned true to the ſize and figure, and then poliſhed, before it is ornamented: therefore the machine is firſt ſet to turn circular. For this purpoſe, the piece *n*, *fig.* 7, is withdrawn, ſo as to be beyond the reach of the roſette, and a head at 2, *fig.* 6, being turned, it ſhoots a double bolt, which locks the frame G H faſt in its perpendicular poſition; that is, when the point of the back centre-ſcrew L will be exactly in the line of the mandrel, the frame being thus rendered immoveable, the machine will turn the ſame as any common lathe. If the work is of conſiderable length, it muſt be ſupported at the end by the back centre L, at leaſt whilſt it is turned circular, previous to being ornamented.

The back puppet, L, is made of caſt-iron, and is fitted upon the caſt-iron bearers, on which it can be fixed at the required diſtance from the mandrel by a vertical ſcrew underneath, and a nut, which comes in contact with a horizontal plate or waſher below the ſaid bearers. Its centre-ſcrew has a ſharp conical point to ſupport the work, and there is a clamp-ſcrew at top to faſten the centre-ſcrew, to prevent it from running baek.

The methods of fixing the work to the end of the mandrel whilſt it is turned are very numerous, and vary in almoſt every inſtance: in general, it is held in a piece of wood, I, called a chuck, which is ſcrewed upon the noſe of the mandrel T, and being bored, or turned out in the manner of a cup, the piece of wood or ivory which is to be turned is driven into it by a mallet till it is firmly fixed: the wood is, of courſe, cut nearly to a circular figure, before it is fixed in the chuck; it is then wrought with a ſharp triangular pointed tool, *h*, which being fixed in the reſt, and advanced to the work by the ſcrew *i*, cuts ſmall contiguous grooves on the ſurface, till it has broken the grain of the wood, and removed all exuberances. The tool being gradually advanced by its ſcrews *d* and *i*, as is required, the work is reduced at length nearly to its intended ſize and figure, but will be wholly covered with ſmall grooves: to remove theſe, and render the work even, another tool is next uſed; this is formed like a narrow chiſſel, but made very thick, and with an obtuſe edge, which is only bevelled on the under ſide: its edge will remove the eminences between the grooves left by the firſt tool. The work is then ſmoothed, by applying to it the edge of a piece of the blade of a broken knife bevelled away; this is held in the hand, and the work is followed up with it, that its ſharp edge may ſcrape away any roughneſs left by the tools. To poliſh the wood, a piece of ſeal-ſkin, Dutch reed, or glaſs paper, is held by the hand upon the work as it runs round, and it cuts away a fine powder, making the work ſmooth enough to receive a poliſh. This is raiſed by firſt applying a piece of bees-wax, till the work is ſlightly covered with it, then afterwards burniſhing or poliſhing it, by holding a flat piece of hard wood upon it. The finiſh can be given by the friction of a coarſe woollen rag, lightly ſmeared with olive oil.

Ivory is turned nearly in the ſame manner, but is poliſhed with chalk and water, and afterwards by the friction of a woollen cloth; or, if it is firſt touched with an oily rag, and rubbed off with a dry woollen cloth, it will have a very fine ſurface.

This is only the ſame proceſs as is uſed for ordinary turning; but when the work is finiſhed in this manner, the ornamenting is began by releaſing the bolt, 2, of the mandrel-frame G H, and chuſing the roſette beſt adapted to the pattern which is required. The piece, *n*, is ſet upon the triangular bar, to be in contact with its wave, and will thus give the oſcillating motion, as before deſcribed; ſo that when the tool is applied to the work, it will produce a waved or indented ſurface, or outline, correſponding with the figure of the roſette, inſtead of the circular figure produced by the common lathe.

If the ornamenting is to be performed upon a flat ſurface, ſuch, for inſtance, as the lid or top of a box, it is chucked, as ſhewn in *fig.* 6, and the point of the tool being applied to it, will cut a waved line. To do this more conveniently, the ſlider, *g*, is advanced to the work, by preſſing it with the hand inſtead of the ſcrew *i*; for, by lifting up a ſmall ſpring catch, of which the tail is ſeen plainly at 3, *fig.* 6, the ſlider is releaſed from the nut of the ſcrew *i*, which has no other attachment to the ſlider than by a tooth on this catch entering into a notch in the nut, and it is preſſed into the notch by a ſcrew *l*. Now, by releaſing the ſcrew *l*, lifting up the catch 3, and drawing back the ſlider, the tooth of the catch falls behind the nut of the ſcrew, inſtead of being in the notch; it will, therefore, form a ſtop, to check the advance of the tool, though it allows it to be drawn back to clear the work, and alſo to be puſhed up towards it by the hand, to cut the line, the ſtop regulating the depth of the line, as the hand can advance the ſlider no farther when it meets the nut.

In this manner, a waved line is engraved round the edge of it, ſuch as is ſhewn in *fig.* 9, the breadth of the line being determined by the depth to which the point of the tool is regulated to penetrate, by turning the ſcrew *i*. The outer line being thus finiſhed, the tool is now withdrawn to clear the work, and the ſcrew, *d*, of the great ſlider being turned a ſmall quantity, the point of the tool is brought nearer to the centre of the work; here, by puſhing up the tool, another line is deſcribed; then a third within the ſecond, and ſo on, at equal diſtances, until they reach the centre: this makes a very pretty ornament, as in *fig.* 9. It ſhould be obſerved, that as each line has the ſame number of waves, or indentations, they will neceſſarily grow very fine as they approach towards the centre; but at the ſame time as the deviation from the circular figure is equal in the ſmalleſt as well as the largeſt rings, it follows, that the curves of the waves of each ring, or line, will vary in a very gradual and pleaſing manner, being ſlightly curved at the circumference, and more rapidly towards the centre. This pattern admits of great variety, by employing different roſettes, fine or coarſe, concave or convex; but it will always have the waves included in ſtraight lines directed to the centre. A very pretty variation is made by turning the roſette round upon the mandrel a very ſmall quantity every time before a freſh line is deſcribed. For this purpoſe, the roſettes are not fixed faſt upon the mandrel, but are fitted thereupon, ſo as to admit of turning round, being moved by a ſmall ſcrew at the end towards H. As an example of the uſe of this movement, *fig.* 10. is given, which conſiſts of a roſe of twenty-four waves. In this, after drawing the exterior line, in the ſame manner as the former, when the ſlider is ſet for the ſecond, the roſette is turned round upon the mandrel a quantity equal to one-fourth of a wave, or one-ninty-ſixth part of the whole circle: the circle is now deſcribed, and its waves will not fall exactly within thoſe of the former, but a little advanced therefrom. The next time a circle is to be drawn, the roſette is again ſhifted, and ſo on. As this is a quantity equal to one-fourth of the ſpace between the waves, it is plain that at every fourth line the waves will fall in lines drawn towards the centre. Still this will not affect the appearance, which will be totally different from the former, (*fig.* 9.) and very ſuperior to it. The concentric lines, in either of theſe patterns, are made exactly at equal diſtances, by means of the diviſions before-mentioned, upon the ſlider K, or otherwiſe by diviſions made upon a head, which is fitted upon the end of the ſcrew *d*; and the roſettes are ſet exactly to the quantity they are intended to be turned round, by means of diviſions made upon the edge of a circular plate, which is fixed faſt upon the mandrel, towards the end H, and a line or mark upon the laſt roſette applies to it. The ſcrew which effects the movement is ſupported in bearings upon this plate, and acts in the teeth of a wheel, fixed within the hollow of the laſt roſette. By this means, when the ſcrew is turned round by a key, it cauſes all the roſettes to turn round together any quantity which the diviſions on the circle indicate. On this principle, great varieties of patterns may be made, and they may be greatly diverſified by ſhifting the roſettes alter-

 nately

nately in contrary directions: thus, after eight, twelve, or any other number of rings have been drawn, by gradually shifting them each time, as before defcribed. By reverfing the fhifting movement to the oppofite direction, a total change will be produced; and continuing in this manner for eight or twelve more circles, the rofettes are again to be advanced in the firft-mentioned direction, and continued for eight or twelve. This method produces a curious effect, and admits of much variety in the patterns.

After having drawn a waved line, the rofette may be advanced half a divifion, and then another line drawn, without altering the flide-reft. By this means, the two waved lines will interfect each other, and make a number of loops like a chain of beads. A number of concentric lines of this fort, drawn upon a circle, is very handfome.

We have now fhewn the principal diftinctions of the patterns which can be defcribed upon a flat furface; but it is evident, that from the number of the rofettes, a very numerous fuit of curious combinations can be made. An elliptical and an excentric chuck are adapted to this machine, to fcrew on at T: a new field is thus opened, which is fo extenfive as to exercife conftantly the tafte and fancy of the operator, in producing new combinations, and renders the machine a fource of the moft interefting amufement. The elliptical and excentric chucks, when applied to a common lathe, will form a great many interefting patterns, but are vaftly more extenfive with the rofe engine. Their conftruction will be defcribed under TURNING. It is fufficient here to fay, that by the elliptical chuck, the waved lines may be drawn in ellipfes, inftead of circles; and by the excentric, feveral fmall waved circles, or ellipfes, can be arranged round the circumference of a larger circle, and their interfections produce a very pretty effect.

Another fpecies of rofe-turning is performed upon the furface of a cylinder, globe, or cone; whereas that which we have defcribed is only upon the flat furface of a circular piece, or end of the cylinder. To ornament the furface of the cylinder, the flide-reft is turned round one-fourth of a circle, as before defcribed, for forming the cylinder; fo that the long flider becomes parallel to the mandrel. In this way the whole furface of the cylinder may be waved; but great care muft be taken to advance the tool very gradually, becaufe it will not cut fo readily as when turning circular work. By dividing the length of the cylinder into fmall equal portions, and by fhifting the rofettes every time one of thefe is finifhed, the waves may be made to follow each other in a fpiral direction round the cylinder; or, by a proper rofette ufed in this manner, very elegant patterns of bafket-work may be formed.

There is another movement of the rofe lathe, which we have not yet defcribed: this is called the pumping. It is principally ufed for defcribing waved lines upon the furface of a cylinder; that is, the furface is left cylindrical, but the lines are waved in the direction of the length of the cylinder, or alternately towards its ends. This is effected by making the mandrel move end-ways in its bearings: for which purpofe, the necks upon which it turns are made exactly cylindrical, and fitted very correctly to fteel collars, which are fixed into the ftandards, G, H. It has, therefore, liberty to flide end-ways in its collars, when the pumping motion is required. This is given by rofettes waved upon the edge or fide, and acting againft the fide of a piece of fteel, fuch as *n*, *fig*. 7. A fpring, *p*, *fig*. 6, is fixed at the end of the frame, and acts againft the fhoulder of the mandrel, to force it end-ways, and keep the rofette always in contact with the piece of fteel. The rofettes, M, are cut in a waved manner upon their fides, as well as upon their circumferences; and thus a variety of pumping rofettes are obtained. By this means, curious waving lines may be drawn round a cylinder; or, if the motions firft defcribed are ufed in combination with the pumping, the furface of the cylinder may be waved, at the fame time that waved lines are drawn upon it. In this cafe, the two rofettes employed muft have the fame number of waves. When the pumping motion is ufed upon face or flat work, fuch as is fhewn in *fig*. 6, it produces very agreeable effects, by rendering the waves of the line, which the tool cuts, alternately deeper and fhallower, fo as to give fine and ftrong ftrokes alternately, in the manner of fine writing; or, if the tool is not fet fo deep, they will only be cut on one fide of the wave, and diminifhing gradually, will not be feen on the other, and thus produce a number of new patterns; as the waved lines will confift of detached ftrokes, cut fine at each end, and deep in the middle.

Many patterns may be cut very expeditioufly in the rofe engine by means of fcrew tools: thefe tools are formed like a broad chiffel, but the edge is cut with notches, fo as to prefent a number of points inftead of one continued edge. Thefe points are very exactly equidiftant, being intended to cut fcrews; and therefore the teeth are of the proper figure to form the threads thereof. By a tool of this kind fix or eight lines may be cut at one operation, inftead of the trouble of altering the flide-reft, and cutting each feparately; and there will be a greater certainty of cutting them all to the fame depth, and exactly equidiftant. The mode of cutting fcrews by this tool is called cutting flying, and is thus performed in the rofe, or in any common lathe, without a flide-reft. The intended fcrew being turned cylindrical, the points of the tool are applied to its furface, fo that they will cut, and the tool is regularly advanced up towards the mandrel as it turns round: its teeth will, therefore, inftead of defcribing circles, trace the fpirals of a fcrew on the work; and if the advancement is timed fo exactly that in one revolution the tool is advanced the exact quantity of a fpace between two adjacent teeth, then the fecond tooth will, at the end of a revolution, fall into the fpiral cut by the firft tooth, and one complete fpiral being thus obtained, it guides the whole tool, by means of the fecond tooth, regularly along, the firft tooth continuing to cut the fpiral forwards till a third tooth lays hold, then a fourth, and fo on, till the required length of a fcrew is cut. The trace of a fcrew being thus made, the tool is preffed deeper, till the threads are fully formed, the turner taking care, every time, that the end-tooth of the tool gets to the end of the fcrew, to difengage it, and draw it back, for as it could not advance any further than the fhoulder, it would fpoil all the threads by cutting them to circular rings.

This method requires great habit and dexterity to give the motion fo exactly that it will caufe the teeth to fall properly into the fpirals cut by their predeceffors, and that without any fudden advance at the place, for the fcrew would then be what is called drunken, that is, its threads would be more inclined at one part of its revolution than at another, and fuch a fcrew can never be fitted exactly with its fellow. The habit of cutting fcrews accurately with the fcrew-tool, can only be acquired by practice and experience, the only precaution which is taken being to get the lathe-wheel into a regular motion, and at fuch a rate as has been found, by experience, will be proper for the fize of the thread intended to be cut. The rofe engine before us has a very complete apparatus for cutting fcrews, which deferves a particular defcription. A tube is fitted on the end of the mandrel at *o*, its circumference being cut with a fpiral, or fcrew-thread of the degree of finenefs required: this is called the regulator fcrew.

H is a ſlider, fitted to the ſtandard H, and moved by a ſcrew: *r* is a wheel fixed to this ſlider, and having ſeveral half-circle cavities cut in it, which embrace the ſcrew, as ſhewn in *fig.* 10: each cavity or ſocket has a thread in it, correſponding with the regulator ſcrew. The mandrel being made, as before-mentioned, with cylindrical collars at each end, is at liberty to ſlide endways by the movement of the regulator, when the ſcrew H draws up the ſocket *r*; therefore, every thing being prepared for cutting the thread, the ſcrew H is turned; this raiſes up the ſlider, and ſocket *r*, to touch the regulator; the tool is then applied by the ſlide-reſt, and the lathe being put in motion, the mandrel will move along endways, and alſo the work with it, ſo that the tool will cut a ſcrew, although it is held faſt by the reſt. In this caſe the ſcrew may be cut by a ſingle pointed tool, but it will be better to uſe a ſcrew tool which is of exactly the ſame thread as the regulator. The turner ſhould be provided with a variety of ſets of ſcrew tools, and as many regulators, *o*, correſponding to them, which are made like a tube, and fitted on the mandrel, being held by a nut. The ſocket *r*, which is made like a wheel, *fig.* 10, can be turned round on its centre, and has ſix different half-circle notches cut in it, each adapted to a particular regulator; therefore, by turning this wheel, *r*, any of the notches can be applied to the regulator *o*, when the ſlider is raiſed up by the ſcrew H. This ſcrew regulator may be ſometimes uſed to advantage when ornamenting the circumference of a cylinder of wood or ivory, as contiguous circles, or waved lines, may then be cut in a ſpiral direction, without moving the ſlide-reſt to cut each one ſeparately.

Another part of the roſe engine is for the purpoſe of turning ſwaſh work; this is circular work, but the mouldings or other lines traced round the cylinder are inclined to the axis. An inſtance is ſeen in the baluſtrades of old-faſhioned ſtair-caſes, where the mouldings are made to ſuit the inclination of the ſtairs. To turn this kind of work, a ſteel circle, or hoop, V, is fitted on the end roſette of the mandrel, ſo that it can be inclined from the perpendicular thereto at pleaſure: by this means it forms a guide for the pumping motion, which will ſo regulate it as to turn any work of this kind, *viz.* with the mouldings, or other ornaments, arranged in lines round the cylinder, but theſe lines will incline to the axis of the cylinder inſtead of being perpendicular to it.

Rose, in *Geography*, a town of Naples, in Calabria Citra; nine miles N.N.E. of Coſenza.—Alſo, a town of Virginia; 20 miles S.W. of Charlotteville.

Rose *Iſlands, Great* and *Little*, two ſmall iſlands among the Bahamas; 12 miles N. of Providence.

Rose *Iſland*, an iſland in the North Pacific ocean, near the W. coaſt of America. N. lat. 59° 35′. W. long. 146° 30′.

ROSEA, a name given by ſome authors to the eryſipelas, or St. Anthony's fire.

ROSEAU, in *Geography*, now "Charlotte-town," the capital of the iſland of Dominica, ſituated in St. George's pariſh; about ſeven leagues from Prince Rupert's bay; on a point of land on the S.W. ſide of the iſland, which forms two bays, *viz.* Woodbridge's bay N., and Charlotteville bay S. Roſeau is about half a mile in length from Charlotteville to Roſeau, and moſtly two furlongs in length, but of an irregular ſhape. It contains more than 500 houſes, beſides cottages occupied by negroes. N. lat. 15° 25′. W. long. 61° 27′.

ROSECK, a town of the duchy of Carniola; eight miles E. of Gottſchee.

ROSEHEARTY, a fiſhing town and ſea-port of Scotland, in Aberdeenſhire, with a tolerable harbour; for the improvement of which lord Gardenſtone bequeathed by will a conſiderable ſum of money; four miles W. of Fraſerburgh. N. lat. 57° 38′. W. long. 2°.

ROSEINGRAVE, Thomas, in *Biography*, an enthuſiaſtic, ingenious, and worthy muſician, of conſiderable eminence in his youth for his performance on the harpſichord and organ, both as a ſightſman and voluntary player. His intellects, in the latter part of his life, being ſomewhat deranged, rendered his character ſo ſingular, that he merits ſome notice for his eccentricities, as well as profeſſional abilities.

He was the ſon of Daniel Roſeingrave, who having been brought up in the king's chapel at the ſame time with Purcell, was firſt promoted to the place of organiſt of Saliſbury cathedral, and afterwards of St. Patrick's, Dublin. Daniel had two ſons, both muſicians: one of them, Ralph, ſucceeded his father at St. Patrick's; the other, Thomas, being regarded as a young man of uncommon diſpoſitions for the ſtudy of his art, was honoured by the chapter of St. Patrick's with a penſion, to enable him to travel for improvement; and about the year 1710 he ſet off for Italy. Being arrived at Venice in his way to Rome, as he himſelf ſays, he was invited, as a ſtranger and a virtuoſo, to an academia at the houſe of a nobleman, where, among others, he was requeſted to ſit down to the harpſichord, and favour the company with a toccata, as a ſpecimen *della ſua virtù*. And, ſays he, "finding myſelf rather better in courage and finger than uſual, I exerted myſelf, my dear friend, and fancied, by the applauſe I received, that my performance had made ſome impreſſion on the company." After a cantata had been ſung by a ſcholar of Fr. Gaſparini, who was there to accompany her, a grave young man dreſſed in black, and in a black wig, who had ſtood in one corner of the room, very quiet and attentive while Roſeingrave played, being aſked to ſit down to the harpſichord, when he began to play, Roſy ſaid, he thought ten hundred d—ls had been at the inſtrument; he never had heard ſuch paſſages of execution and effect before. The performance ſo far ſurpaſſed his own, and every degree of perfection to which he thought it poſſible he ſhould ever arrive, that, if he had been in ſight of any inſtrument with which to have done the deed, he ſhould have cut off his own fingers. Upon inquiring the name of this extraordinary performer, he was told that it was Domenico Scarlatti, ſon of the celebrated cavalier Aleſſandro Scarlatti. Roſeingrave declared, he did not touch an inſtrument himſelf for a month. After this rencontre, however, he became very intimate with the young Scarlatti, followed him to Rome and Naples, and hardly ever quitted him while he remained in Italy, which was not till after the peace of Utrecht, as appears by an anthem which he compoſed at Venice in 1713, and which Dr. Tudway has inſerted in the fifth volume of his Manuſcript Collection of Engliſh Muſic, p. 149: "Ariſe, ſhine, for thy light is come," Iſaiah, chap. lx. There is much fire and ſpirit in the introductory ſymphony of a very modern caſt. Roſeingrave is here erroneouſly called a ſtudent of Chriſt-church, Oxford, inſtead of Dublin, whence he had his exhibition.

On his return from Italy in 1720, he ſettled in London, and brought on the ſtage and conducted the performance of the opera of "Narciſo," or "Narciſſus," ſet by his friend Domenico Scarlatti; being the third opera that was performed in our lyric theatre, after the eſtabliſhment of the Royal Academy of Muſic. He compoſed ſeveral additional ſongs for this opera, in which the ſingers were ſignor Benedetto Baldaſſarri, Mr. Gordon, ſignora Duraſtanti, Mrs. Anaſtaſia Robinſon, Mrs. Turner Robinſon, daughter of Dr. Turner, and wife of Mr. Robinſon, organiſt of

Weſt minſter-Abbey. Roſeingrave's additional ſongs were compoſed in the ſtyle of his friend Mimo Scarlatti, in whoſe muſic of Narciſſus, though there were many new and pleaſing paſſages and effects, yet thoſe acquainted with the original and happy freaks of this compoſer in his harpſichord pieces, would be ſurpriſed at the ſobriety and almoſt dulneſs of his ſongs. His genius was not yet expanded, and he was was not ſo much uſed to write for the voice as his father, who was the greateſt vocal compoſer of his time, as the ſon afterwards became the moſt original and wonderful performer on the harpſichord, as well as compoſer for that inſtrument. But it ſeems impoſſible for any individual to be equally great in any two things of difficult attainment.

Roſeingrave was likewiſe the editor of the firſt edition of Scarlatti's Harpſichord Leſſons, in 2 vols. long 4to.

His election to the place of organiſt of St. George's, Hanover-ſquare, was attended with very honourable circumſtances. The pariſhioners, conſiſting chiefly of perſons of rank and fortune, being very deſirous of having a good organiſt, and unwilling to truſt to their own judgment, or be teazed by the ſolicitations of candidates of mean abilities, requeſted Mr. Handel, Dr. Pepuſch, Dr. Greene, and Mr. Galliard, to hear the competitors play, and determine their degree of merit.

The candidates were allowed half an hour each to manifeſt their abilities on the organ, in whatever way they pleaſed, and then were ſeverally required to play *extempore* on ſubjects given by the judges. Mr. Handel did not attend in perſon, but ſent his ſubject. Among the numerous candidates for this place there were ſeveral who acquitted themſelves very well, during the half-hour of free-agency, by playing with great neatneſs pieces they had probably ſtudied for the occaſion; but when ſubjects of fugue were preſented to them for extemporaneous treatment, they neither knew how nor when to bring in the anſwer, or even to find harmony for the themes with either hand when they were brought in. Roſeingrave, on the contrary, whoſe ſtyle, though too crude and learned for the generality of hearers, when left to himſelf, treated the ſubjects given with ſuch ſcienee and dexterity, inverting the order of notes, augmenting and diminiſhing their value, introducing counter-ſubjects, and turning the themes to ſo many ingenious purpoſes, that the judges were unanimous in declaring him the victorious candidate. The late Dr. Arne and Mr. Mich. Chriſt. Feſting, who were both preſent at this contention, informed us of theſe particulars, which happened in the year 1726, and ſpoke with wonder of Roſeingrave as an extempore fughiſt; but confirmed the general cenſure of his crude harmony and extravagant modulation, which indeed his printed compoſitions imply.

Roſeingrave having, a few years after this election, fixed his affections on a lady of no dove-like conſtancy, was rejected by her at the time he thought himſelf moſt ſecure of being united to her for ever. This diſappointment was ſo ſeverely felt by the unfortunate lover, as to occaſion a temporary and whimſical inſanity. He uſed to ſay, that the lady's cruelty had ſo literally and completely broke his heart, that he heard the ſtrings of it *crack* at the time he received his ſentence; and on that account ever after called the diſorder of his intellects his *crepation*, from the Italian verb *crepare, to crack*. After this misfortune, poor Roſeingrave was never able to bear any kind of noiſe, without great emotion. If, during his performance on the organ at church, any one near him coughed, ſneezed, or blew his noſe with violence, he would inſtantly quit the inſtrument, and run out of church, ſeemingly in the greateſt pain and terror, crying out that it was *old ſcratch* who tormented him, and played on his *crepation*.

About the year 1737, on account of his occaſional inſanity, he was ſuperſeded at St. George's church by the late Mr. Keeble, an excellent organiſt, intelligent teacher, and a worthy man, who, during the life of Roſeingrave, divided with him the ſalary. We prevailed on him once to touch an organ at Byfield's, the organ-builder; but his nerves were then ſo unſtrung, that he could execute but few of the learned ideas which his mental diſorder had left him. His ſweetneſs of temper and willingneſs to inſtruct young perſons, who were eager in the purſuit of knowledge, tempted us frequently to viſit him at Mrs. Bray's, Hampſtead, where he reſided. His converſation was very entertaining and inſtructive, particularly on muſical ſubjects. Indeed, his paſſion for the art never quitted him to the time of his death, which happened in Ireland about the year 1750. The inſtrument on which he had exerciſed himſelf, in the moſt enthuſiaſtic part of his life, bore very uncommon marks of diligence and perſeverance; for he had worn the ivory covering of many of the keys quite through to the wood. In his younger days, when he enjoyed the *mens ſana in corpore ſano*, he was regarded as having a power of ſeizing the parts and ſpirit of a ſcore, and executing the moſt difficult muſic at ſight beyond any muſician in Europe. Indeed, it was ſaid that he could read a muſic-book, if turned topſy-turvy; but this ſeems exaggeration of praiſe. which few can believe, who know the difficulty, without ocular and auricular demonſtration. The harmony in the voluntaries, which Roſeingrave publiſhed, is rendered intolerably harſh and ungrateful by a licentious and extravagant modulation, and a more frequent uſe of the ſharp third and flat ſixth than any compoſer with whoſe works we are at all acquainted, not excepting Dr. Blow; and his double fugues are ſo confuſed by the too cloſe ſucceſſion of unmarked ſubjects, that it is impoſſible, at the end of the performance, to remember what they are. His cantatas, which he publiſhed by ſubſcription, being compoſed on the model of the elder Scarlatti, are the moſt pleaſing of his works; but they were ſtill-born, and never lived to ſpeak in public.

ROSELLE, in *Geography*, a town of Etruria; two miles N. of Groſſeto.

ROSEMARKIE, a royal borough town in a pariſh of the ſame name, in the county of Roſs, Scotland, is ſituated on the northern ſhore of the Moray-frith, nearly oppoſite to fort George. It was conſtituted a royal burgh by Alexander II. king of Scotland; but in the reign of king James II. it was united with the town of Chanonry, (ſo called from its having been the chanonry of Roſs, and the reſidence of the biſhop,) and re-incorporated by charter under the name of Fortroſs, ſince ſoftened to Fortroſe. For ſome further particulars reſpecting this town, ſee FORTROSE. Carliſle's Topographical Dictionary of Scotland, 4to. 1813.

ROSEMARY, in *Botany*. See ROSMARINUS.

ROSEMARY, *Poet's*. See OSYRIS.

ROSEMARY, *Wild, Marſh Ciſtus*. See LEDUM.

ROSEMARY, in the *Materia Medica*. Roſemary has a fragrant aromatic ſmell, and a bitteriſh pungent taſte. The leaves and tops of this plant are the ſtrongeſt with regard to their ſenſible qualities; the flowers are not to be ſeparated from their calyces or cups, as the active matter principally, if not wholly, reſides in the latter.

Roſemary gives out its virtues completely to rectified ſpirit, but only partially to water. The leaves and tops, diſtilled with water, yield a thin, light, pale-coloured eſſential oil

oil of great fragrancy, though not quite ſo agreeable as the roſemary itſelf; from one hundred pounds of the herb in flower were obtained eight ounces of oil; the decoction, thus diveſted of the aromatic part of the plant, yields, on being inſpiſſated, an unpleaſant bitteriſh extract. Rectified ſpirit likewiſe, diſtilled from roſemary leaves, becomes conſiderably impregnated with their fragrance, leaving, however, in the extract the greateſt ſhare both of their flavour and pungency. The active matter of the flowers is ſomewhat more volatile than that of the leaves, the greateſt part of it ariſing with ſpirit. Tournefort obſerves, that thoſe ſorts of roſemary, which produce neither flowers nor ſeeds, and which have very hard ſhrubby ſtalks, and long narrow leaves, ſmell ſtrongly like camphor, and yield on diſtilling a large quantity, for the purpoſe of obtaining their oil, a portion alſo of real camphor.

Roſemary is reckoned one of the moſt powerful of thoſe plants which ſtimulate and corroborate the nervous ſyſtem; it has, therefore, been recommended in various affections, ſuppoſed to proceed from debilities, or defective excitement of the brain and nerves; as in certain head-aches, deafneſſes, giddineſſes, palſies, &c. and in ſome hyſterical and dyſpeptic ſymptoms. Dr. Cullen ſuppoſes the ſtimulant power of roſemary inſufficient to reach the ſanguiferous ſyſtem; it has however the character of being an emmenagogue, and the only diſeaſe, in which Bergius ſtates it to be uſeful, is the chloroſis. In diſorders of this kind it has been given in the form of infuſion; but it is now ſcarcely ever preſcribed, unleſs as an odorous additament to ſternutatory powders. The doſe in ſubſtance may be from grs. x to ℈ij, and from ʒj to ʒiſs in infuſion. The officinal preparations are the "oleum roſmarini," and "ſpiritus roſmarini." It is alſo a principal ingredient in what is known by the name of HUNGARY *Water;* which ſee.

ROSEMARY, *Oil of*, Oleum roſmarini, Lond.; Oleum ſummitatum florentium roriſmarini officinalis, Edinb.; Oleum herbæ floreſcentis roris marini, Dub., is prepared by diſtilling twenty-four pounds of the plant, which yield one ounce of a fluid colourleſs oil, the odour of which is leſs agreeable than that of the plant. It depoſits cryſtals of camphor when long kept. Its ſpecific gravity is .934. (See OIL.) This oil is ſtimulant; and frequently enters into the compoſition of liniments. The doſe, as an internal remedy, may be from ♏ij to ♏vi; but it is ſcarcely ever ordered.

ROSEMARY, *Spirit of*, Spiritus roſmarini (Lond.) is obtained by macerating two pounds of freſh roſemary tops in a gallon of proof ſpirit, with water ſufficient for preventing empyreuma, for twenty-four hours, and then diſtilling a gallon in a gentle heat. Spiritus roriſmarini officinalis (Edinb.) is prepared by taking two pounds of freſh roſemary tops and eight pounds of alcohol (ſpec. grav. .335), and drawing off ſeven pounds by diſtillation in a water bath. Spiritus roriſmarini (Dub.) is obtained by diſtilling with a moderate fire five pints from a pound and a half of freſh roſemary tops and a gallon of proof ſpirit. Oil of roſemary is ſufficiently volatile to riſe in diſtillation with rectified ſpirit, which the Edinb. college has, therefore, directed to be uſed. It is a fragrant perfume; and is chiefly uſed in the compound ſoap liniment or the compound ſpirit of lavender. Lewis Mat. Med. Woodv. Med. Bot. Thomſon's Diſp.

ROSEMBERG, in *Geography*, a town of Pomerelia; 10 miles S. of Dantzic.

ROSENAU, a town of Pruſſia, in Oberland; 16 miles E. of Marienwerder.—Alſo, a town of Moravia, in the circle of Prerau; eight miles E. of Meſeritſch.—Alſo, a town of Hungary, near which are mines of gold, copper, quickſilver, and cinnabar; 24 miles W. of Caſchau.

ROSENBERG, a town of Pruſſia, in the province of Oberland; 17 miles E. of Marienwerder. N. lat. 53° 39′. E. long. 19° 10′.—Alſo, a town of Hungary, on the Waag, trading chiefly in ſalt; 18 miles N. of Libeten.—Alſo, a town of Bohemia, in the circle of Bechin; 37 miles S. of Bechin. N. lat. 48° 40′. E. long. 14° 18′.

ROSENBERG, or *Oleſno*, a town of Sileſia, in the principality of Oppeln; 26 miles N.E. of Oppeln. N. lat. 50° 52′. E. long. 18° 28′.

ROSENBURG, a town of the duchy of Magdeburg; 24 miles S. of Magdeburg.—Alſo, a ſmall Dutch iſland, at the mouth of the Meuſe; three miles E. of Briel.

ROSENDAL, a town of Brabant; 15 miles W. of Breda.

ROSENDORF, a town of Bohemia, in the circle of Leitmeritz; ſix miles W. of Kamnitz.

ROSENEATH, a town of Scotland, in Dumbartonſhire; nine miles W.N.W. of Dumbarton.

ROSENESS, a cape on the S. coaſt of the iſland of Pomona. N. lat. 58° 45′. W. long. 2° 42′.

ROSENFELD, a town of Wurtemberg; eight miles S.E. of Sulz. N. lat. 48° 14′. E. long. 8° 43′.

ROSENGAT, a town of Germany, oppoſite to Worms.

ROSENHEIM, a town of Bavaria, at the conflux of the Inn and the Manguald; 38 miles W. of Salzburg.

ROSENHOF, a town of the duchy of Holſtein; five miles N. of Ciſmar.

ROSENIA, in *Botany*, ſo called by Thunberg, in honour of two brothers of the name of Roſen, both eminent as phyſicians and botaniſts, one of whom is well known as the determined and jealous rival of the early fame of Linnæus, though afterwards his friend. (See LINNÆUS.) This gentleman, who died in 1773, aged 67, was profeſſor of Medicine at Upſal: the other at Lund. They were natives of Sweden, and knights of the Polar Star.—Thunb. Prodr. præf. n. 59. Nov. Gen. diſſ. 12. 161. Willd. Sp. Pl. v. 3. 2134.—Claſs and order, *Syngeneſia Polygamia Superflua*. Nat. Ord. *Compoſitæ Diſcoideæ*, Linn. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common calyx* of many leaves, imbricated; ſcales ovate, obtuſe, undivided, ſmooth, tranſparent, with a brown, opaque, longitudinal line. *Cor.* compound, radiated; *florets* of the diſk perfect, tubular, five-cleft; thoſe of the radius female, ligulate, convolute, arched. *Stam.* (in the perfect florets) Filaments five, very ſhort; anthers united into a cylindrical tube. *Piſt.* (both in the diſk and radius) Germen ſmall, ſtyle thread-ſhaped; ſtigma cloven. *Peric.* none, except the unchanged calyx. *Seed* (in both kinds of florets) angular, ſmooth; down, of two kinds of capillary ſcales; the two innermoſt of the radius generally ſetaceous and longeſt; the outermoſt capillary, united at the baſe into ſeveral parcels. *Recept.* compoſed of lanceolate, membranaceous ſcales.

Eſſ. Ch. Receptacle chaffy. Seed-down of two kinds, chaffy. Corolla radiated. Calyx ſcarioſe.

1. R. *glanduloſa*. Thunb. and Willd.—Native of the interior of the Cape of Good Hope. For all that is known of this ſolitary ſpecies of *Roſenia*, we are indebted to the following deſcription of Thunberg. "*Stem* ſhrubby, round, ſmooth, wavy, erect, much branched, generally more than two feet high. *Branches* and *branchlets* alternate, three or four together, in a cluſter, ſpreading, ſtriated: the branchlets lateral, very ſhort, leafy. *Leaves* ſomewhat cluſtered, approximating, ſeſſile, ovate, obtuſe, undivided, ſlightly concave,

cave, chiefly glandular at the margin, downy, thickifh, imbricated, half as long as the nail. *Flowers* capitate, terminal."

ROSENOU, in *Geography*, a town of Pomerania; eight miles S.S.E. of Cofslin.

ROSENTHAL, a town of the principality of Heffe; eight miles N.N.W. of Marburg.—Alfo, a town of Weftphalia, in the bifhopric of Hildefheim; three miles S.W. of Peina.—Alfo, a town of Pruffia, in the palatinate of Culm; eight miles N.E. of Bretchen.—Alfo, a town of Bohemia, in the circle of Bechin; three miles N. of Rofenberg.

ROSEOLA, in *Medicine*, a term appropriated, in the nomenclature of cutaneous difeafes devifed by the late Dr. Willan, to a rofe-coloured rafh or efflorefcence upon the fkin, which is varioufly figured, without any elevation of the furface, and not communicable by contagion.

This rafh is of little importance in a practical view, becaufe it is moftly a mere concomitant of different febrile complaints, and requires no deviation from the treatment adapted to their relief; but as it is fometimes miftaken both for fcarlet fever and meafles, which are contagious and often dangerous difeafes, fo it ought to be known, and its varieties difcriminated. The appellation of rofeola is to be found in the works of fome of the early modern writers; but it was applied fomewhat indifcriminately to every red rafh, to fcarlet fever, meafles, &c. Fuller, in his Exanthematologia, p. 128, fpeaks of a fort of rofe-rafh, as a flufhing all over the body, like fine crimfon, which, he fays, is void of danger, and "rather a ludicrous fpectacle, than an ill fymptom."

Seven varieties of rofeola were diftinguifhed by Dr. Willan under the following appellations.

1. The rofeola *æftiva*, fo called from its ufual occurrence in fummer, is fometimes preceded for a few days by flight feverifh fymptoms, fuch as pains in the head and limbs, laffitude, and liftlefsnefs. The rafh appears firft on the face and neck, and, in the courfe of a day or two, is diftributed over the reft of the body, producing a confiderable degree of itching and tingling. The mode of diftribution is into feparate fmall patches of various figure, but of larger and more irregular forms than in the meafles, with numerous interftices of the natural fkin. It is at firft red, but foon affumes the deep rofeate hue peculiar to it. The fauces are tinged with the fame colour, and a flight roughnefs of the tonfils is felt in fwallowing. The rafh continues vivid through the fecond day; after which it declines in brightnefs, flight fpecks only of a dark red hue remaining on the fourth day, which, together with the conftitutional affection, wholly difappear on the fifth.

Not unfrequently, however, the rafh is partial, extending only over portions of the face, neck, and upper part of the breaft and fhoulders, in patches, very flightly elevated, and itching confiderably. In this form the complaint continues a week or longer, the rafh appearing and difappearing feveral times; fometimes without any apparent caufe, and fometimes from fudden mental emotions, or from taking wine, fpices, or warm liquors. The retroceffion of the rafh is ufually accompanied with diforder of the ftomach, head-ache, and faintnefs, which are immediately relieved on its re-appearance.

This fpecies of rofeola ufually occurs in the fummer feafon, and particularly in females of an irritable conftitution. The patients commonly afcribe it to fudden alternations of heat and cold, and efpecially to having drank cold liquors, when perfpiring after exercife. Sometimes it occurs in connection with bilious diarrhœa, cholera, dyfentery, or other bowel complaints of the hot feafon; and fometimes it appears after much fatigue.

Very little medical treatment is required for this eruption, which is generally alleviated by moderate diet, from which every thing heating is excluded; and by the ufe of acidulated drinks, with occafional laxative medicines. The complaint is never dangerous, except from the fudden repulfion of the eruption, in confequence of expofure to very chill air, or of the application of cold water; in which cafe violent diforder has taken place in the head, ftomach, or bowels of the patient, as happens under fimilar circumftances in other eruptive difeafes, fuch as meafles, the red gum, &c.

2. The rofeola *autumnalis* is not uncommon in children of five, or from that to ten years of age, in the autumn. It occurs in diftinct patches, of an oval or circular fhape, which occafion no elevation of the cuticle, and gradually increafe to about the fize of a fhilling. Their hue is of a dark damafk red; fo that at a diftance the fkin appears as if ftained with the juice of black cherries or mulberries. They are ufually diffufed over the arms, feldom on the face and body; and they continue about a week, being fometimes, but not always, fucceeded by defquamation. This eruption is not accompanied by much itching or tingling, nor is there any fymptom of general diforder, except a whitenefs of the tongue. It is generally removed in a fhort time by the exhibition of the diluted fulphuric acid internally.

3. The rofeola *annulata* appears on almoft every part of the furface of the body in rofe-coloured rings, which have central areas of the ufual colour of the fkin; and it likewife flightly affects the throat. The rings are at firft from a line to two lines in diameter; but they gradually dilate, leaving a larger central fpace, fometimes to the diameter of half an inch; and excite, efpecially in the night, a troublefome fenfation of heat, and of itching or prickling. The duration of the eruption is very uncertain; in fome cafes it commences with fhivering fucceeded by heat, and is attended with head-ache, flufhing of the face, ficknefs at the ftomach, and pains in the limbs; it then continues four or five days, and difappears as the febrile fymptoms decline. In other cafes, which are without fever, the complaint is of long duration; the efflorefcence ufually fades in the morning, and returns in the evening or night, the rings becoming vivid, and fometimes a little elevated. If the rings fhould difappear, or be very faint in colour for feveral fucceffive days, the patient becomes affected with pain in the ftomach, ficknefs, vomiting of bile, great languor, giddinefs and aching in the limbs. Thefe fymptoms are alleviated or removed by the ufe of the warm bath, after which the efflorefcence generally returns. Sea-bathing and the mineral acids afford much relief to the more chronic forms of this fpecies of rofeola.

The annular rofeola appears to be fometimes connected with an irregular ftate of the catamenia in women, and with gouty and rheumatic complaints in both fexes. It fometimes fucceeds to a fit of the gout, and we have feen it appear as the precurfor of a fit, which immediately followed its difappearance.

4. The rofeola *infantilis* affects children during the period of teething, in fevers, and in diforders of the bowels, and the rafh is ufually fo clofe and full as to leave very fmall interftices of the natural hue of the fkin. It is very irregular, however, in its appearance and progrefs, fometimes continuing only for a night; fometimes appearing and difappearing for feveral fucceffive days, being attended with fymptoms of violent irritation; and fometimes arifing in fingle,

fingle, but numerous and coalefcing, patches, of about the fize of a fixpence, which continue for feveral days, and terminate in fcurf. This rafh, where it is pretty generally diffufed, is often miftaken, as Dr. Underwood has remarked, for meafles and fcarlet fever. Whence it is neceffary, that its character fhould be well known to medical practitioners; although it requires no fpecific treatment, but ufually difappears under the employment of remedies calculated to relieve the bowel complaints, painful dentition, and other febrile affections, with which it is fo frequently connected.

5. The rofeola *variolofa* occurs previous to the eruption of the fmall-pox, when produced by an inoculation, in the proportion of about *one* cafe in *fifteen*, according to obfervations made at the Small-Pox Hofpital. It ufually appears on the fecond day of the eruptive fever, which is generally the ninth or tenth after inoculation, and is deemed by inoculators a certain prognoftic of a fmall and favourable eruption of the fmall-pox. It does alfo occafionally occur in the natural fmall-pox, on the third or fourth day, and with a moderate and favourable eruption of puftules; but it is much more rare than in the inoculated difeafe.

This rafh is firft obfervable on the arms, breaft, and face: on the following day it extends over the trunk of the body and the extremities. Its diftribution is various; fometimes in contiguous femicircles; fometimes in longitudinal irregular patches, with fmall diftinct dots intermixed; and in a few cafes, all thefe appearances being combined, it forms an almoft continuous rednefs over the body, and is in feveral parts flightly elevated above the furface, as in the meafles. It is not eafily repelled by cold air, or cold drinks, as the early inoculators apprehended; and is aggravated by the confinement and fudorific medicines which they recommended.

Thefe rofeolous efflorefcences, antecedent to the eruption of fmall-pox, were occafionally obferved by the firft writers on the difeafe; and both by them and fubfequent authors were deemed to be meafles, which were faid to be converted into fmall-pox.

6. Rofeola *vaccina*. An efflorefcence which is fomewhat diffufe, like the variolous rafh, but appears generally in congeries of dots and fmall patches, a little elevated, takes place in fome children on the ninth and tenth day of *vaccination*, at the place of inoculation, and at the fame time with the areola that is formed round the veficle; and from thence it fpreads irregularly over the whole furface of the body. But this does not occur nearly fo often as after variolous inoculation. It does not continue vivid above forty-eight hours; and is ufually attended with a very quick pulfe, a white tongue, and great reftlefsnefs. Some vaccinators attach little importance to it; others think it a favourable circumftance, as denoting that the fkin and conftitution have been fully affected by the cow-pock.

7. Rofeola *miliaris*. This rafh often accompanies an eruption of miliary veficles, with fever, where much heat and fweating have been excited. (See Miliary *Fever.*) It occurs occafionally, however, in the continued fevers of this country, where neither a miliary eruption nor profufe fweating had preceded it, and does not appear to be an unfavourable fymptom. See Willan on Cutaneous Difeafes, p. 433, et feq., and Bateman's Pract. Synopfis of Cutan. Dif. p. 96. 3d edit. See alfo Underwood, on the Dif. of Children, vol. i. p. 87.

ROSES, *Iflands of Two,* in *Geography*, two fmall iflands in the Indian fea, near the coaft of Africa. S. lat. 17°.

Roses. See Rosas.

ROSETO, a river of Naples, which runs into the gulf of Tarento, N. lat. 40° 2′. E. long. 16° 40′.

ROSETTA, Rossetta, or *Rafchid*, a town of Egypt, of confiderable fize and population, founded in the eighth century, as fome have faid; though Elmacin informs us, that it was built during the reign of Elmetouakkel, caliph of Bagdad, towards the year 870 of our era, and under the pontificate of Cofma, patriarch of the Jacobites at Alexandria. Others date its foundation at a much later period; and Belon, who travelled in Egypt in 1530, fays that this town was much fmaller than Faoüé, but at prefent it is much larger. It has borne the Arabic name Rafchid ever fince the time of Edriffi the geographer, in 1153, and of this the Europeans have made Rofetta or Roffetta. Some have erroneoufly afferted, that it was built on the fpot where Canopus was fituated; whereas the Canopic branch of the Nile is the lagoon of Maadié, and the ruins of Canopus are at Aboukir. Rofetta affords no trace of antiquity; neverthelefs it is certain, fays Sonnini, that it cannot be far from the place where ftood Metelis or Metilis, of which Strabo and Ptolemy make mention, and which was on the weftern bank, and near the mouth of the Bolbitic branch of the Nile. The heaps of fand, which this river is continually accumulating, no longer permit veffels to reach as far as Faoué. Although Rofetta was built at the mouth of the river, it is already two leagues from it. According to Abulfeda it was very inconfiderable in the 13th century; nor was it much increafed for 200 years after this time. But when the Ottomans added Egypt to their conquefts, they neglected the fupport of the canals. Thus, the canal of Faoué ceafing to be navigable, Rofetta became the emporium of the merchandize of Alexandria and Cairo. Commerce foon made it flourifh, and it is at this day one of the handfomeft towns in Egypt. It extends along the weftern bank of the Nile, and is above a league in length, by a quarter of a mile in breadth. Although it has no remarkable place, nor any one ftreet quite regular, yet all the houfes, being built with terraces, and well difpofed, have, by Savary's defcription of it, an air of cleanlinefs and elegance, which is very agreeable; to which Sonnini adds, that here are feen long ftreets formed by two rows of fhops, in which are found all forts of goods; the neceffaries of life being very plentiful, and procured at a low price. Within the houfes are fpacious apartments, well ventilated by a great number of windows, which are always open. The blinds and tranfparent linen, which they ftretch over them, keep out the rays of the fun, afford a moderate light, and mitigate the exceffive heats. The only public buildings worthy of notice are the mofques, with their lofty minarets, of light architecture, and conftructed with much boldnefs. They thus produce a very picturefque effect in a town where all the roofs are flat, and throw great variety into the picture. The houfes in general have a view of the Nile, and of the Delta, which form a moft magnificent fpectacle. The river is always covered with veffels, mounting and defcending with oars, or under fail. The tumult of the harbour, the joy of the mariners, their noify mufic, exhibit a moving and animated fcene. The Delta, that immenfe garden, where the earth is never weary of production, furnifhes the whole year a fucceffion of harvefts, of vegetables, of flowers, and of fruits; various fpecies of cucumbers and delicious melons, the fig, the orange, the banana, the pomegranate, of the moft exquifite flavour. To the north of the town are gardens, where lemon and orange trees, date trees, and fycamore trees, are planted at random; by their foliage affording an arch impenetrable to the rays of of the ſun, and by their flowers rendering the ſhade of theſe groves delightful. The houſes of Roſetta, ſays Sonnini, are much better built, in general, than thoſe of Cairo: its ſituation upon the banks of the river; the view of the Delta, which preſents, as Savary deſcribes it, the delightful proſpect of the moſt beautiful culture, the perfumed groves in its neighbourhood, and its pure and wholeſome air, have moſt deſervedly procured for it the name of the "garden of Egypt." Commerce conſtitutes the principal wealth of the inhabitants of Roſetta. The importation of foreign merchandize to Cairo, and of the productions of Egypt into the port of Alexandria, employs a great number of mariners. (See Boghass and Scherm.) The bar of the Nile is totally ſhut during two months of the year, and the commerce of Alexandria is interrupted. But if all the ſhips in Egypt were to periſh, the Ottoman government, ſays Savary, would not remove one inch of ground of the canal of Faoué to render it navigable. It ſuffers every thing to go to ruin, and repairs nothing.

In the town of Roſetta a profound ſilence reigns, uninterrupted by the noiſe of any carriage. The inhabitants move with gravity through the ſtreets, clad in long robes which hang down to their heels. Their heads are covered with heavy turbans, or bound round with a ſchale or ſhawl, which is a long piece of ſtuff made of ſilk or wool. The girdle is made uſe of by both ſexes. The citizen is armed with a knife, the ſoldier with a ſabre, and a pair of piſtols. The women of the lower claſs, whoſe dreſs conſiſts of a large blue ſhift, and a long pair of drawers, have their faces covered with a piece of linen, with holes oppoſite to the eyes. The rich wear a large white veil, with a cloak of black ſilk, that wraps up their whole body. But though they are thus maſked, they are not ſcrupulous in making ſigns, nor in ogling.

The moſt ordinary paſtime here is ſmoking and drinking coffee. From morning to night the inhabitants have their pipes in their mouths; at home, in each other's houſes, in the ſtreets, on horſeback, they keep their pipe lighted, and the tobacco-bag is hung at their waiſt. If the inhabitants of Roſetta be leſs barbarous, ſays Sonnini, than thoſe of the other parts of Egypt, they are not leſs ignorant, leſs ſuperſtitious, nor leſs intolerant. We find among them, although with ſhades more ſoftened down, the ſame roughneſs of character, the ſame implacable averſion towards the nations of Europe, and diſpoſition to inſult both Chriſtians and Jews, the ſame revengeful diſpoſition, in a word, the ſame treachery; and they are addicted to the ſame ſhameful vices, ſome of which we cannot name.

The country round Roſetta is an immenſe ſurface, without a mountain or hill, interſected by innumerable canals, covered with harveſt and a variety of trees, which winter never ſtrips of their leaves. The ſoil is a black mould, the fertility of which is inexhauſtible. The chief article of cultivation is rice, called in the vicinity of Roſetta "ſultani," which is ſown from the month of March to that of May, tranſplanted on the banks of the Nile, and on the borders of the canals at the end of July, and cut in November. (See Egypt.) Rice forms a principal article of exportation, which they dry by ſpreading upon the terraces of the houſes and in the public ſquares; and to this operation is attributed the multitude of gnats, with which the town and the inſide of the houſes are filled at the time when it is performed.

Roſetta, beſides being the great emporium of the trade that is carried on between Cairo and Alexandria, has ſome branches of commerce peculiar to itſelf; ſuch as ſpun cotton, dyed red, which is drawn from the adjacent diſtricts; dreſſed flax, linen cloths, ſilk dyes for the eaſtern dreſſes, &c. The flax of the country, which is long, ſoft, and ſilky, would make beautiful linen, if they knew how to employ it; but the ſpinſters are very inexpert, and the thread they make is clumſy, hard, and uneven. The linens they bleach ſerve for the table; the reſt, dyed blue, is employed for the clothing of the people. In Roſetta there are ſtore-houſes of natron, and manufactories where it is uſed. (See Natron.) Moſt of the merchants of this town are Turks or Syrians, and ſome from Barbary. The Copts are numerous, together with ſome Arabs. The command of the town is veſted in an officer of the Mamlouks, who bears the title of Aga. About a league from the ſea, northward of Roſetta, are two caſtles, one on the weſtern bank of the Nile, and the other on the oppoſite bank of the river, conſtructed to defend the entrance of the river. The former, which is aſcribed to St. Lewis in the time of the cruſades, is almoſt entirely demoliſhed; and the few cannon which remain in it are unfit for ſervice. Theſe two forts, though inconſiderable, and in a ruinous ſtate, would be ſufficient to ſtop veſſels from entering the river, if the Turks knew how to make uſe of cannon; but here they have no occaſion for it; as nature has guarded the mouth of the Nile, by raiſing a dangerous bar, called the *Boghaſs* or *Bogaz*, which is the terror of mariners. About half a league to the ſouth of Roſetta is a tower, called the tower of Canopus, from the erroneous ſuppoſition that Roſetta is on the ſcite of the ancient Canopus. This tower has been built, in modern times, upon a hillock of ſand, which at this place forms the W. bank of the Nile. It is ſquare, and partly demoliſhed. In the lower part the inhabitants of this diſtrict ſhew the opening of a ſubterraneous paſſage, which, as they ſay, led to Alexandria. Near the top of the ſame is preſented a general view of the country, having no bounds except thoſe which nature has preſcribed; and near its foot, cloſe to the edge of the Nile, ſtands a moſque, conſecrated to a holy Muſſulman, called "Abou-Mandour," which ſignifies father of the light. This ſaint, if he be the father of the light, is alſo the terror of the ſands, as, but for him, they would long ago have overwhelmed Roſetta, and added it to their dreary domain. Oppoſite to this moſque, upon the E. bank of the Nile, are two or three houſes, called Maadée, becauſe they ſtand at the place facing the uſual paſſage to the Delta. On the weſt bank, at a ſhort diſtance above Abou-Mandour, is Dgeddiè, a conſiderable village, in the environs of which a great number of vine-plants grow in the ſand; from hence Roſetta and Alexandria are ſupplied with grapes.

At the foot of the tower above-mentioned, a large ſemicircular baſon announces a port, which has been choaked up by the ſand. In digging at the bottom of this hillock, twenty beautiful marble pillars were diſcovered by a Turkiſh merchant, who was ſtripped of his fortune by the Beys, from an imagination that he had carried off a treaſure from this place. M. d'Anville ſuſpects that the ancient Bolbitina muſt have been at a very ſmall diſtance from the ſpot on which Roſetta now ſtands. The ruins now mentioned ſeem to confirm his conjecture; as they are at the extremity of a town, and can only belong to the Bolbitina ſpoken of by Steph. Byz. and which gives its name to one of the branches of the Nile. This place is very pictureſque; the tower, falling into ruins, is ſurrounded by tombs, and to the weſtward is a deſart plain, whoſe burning extent the eye cannot look over without horror; but on the E. the contraſt is very ſtriking, preſenting a majeſtic river, and the Delta, uniting moſt profuſely the graces of the ſpring, the beauty of the ſummer, and the rich luxuriance of the autumn.

Sir R. Wilſon has given us a picture of Roſetta, very different from that which we have above exhibited. He ſays, it is built of a dingy red brick, and that a great part of the town is in ruins, many of the houſes having been pulled down by the French for fuel. The ſtreets are not more than two yards wide, and full of wretches, which the pride of civilization revolts at acknowledging to be human. The number of blind perſons is prodigious; nearly every fifth inhabitant having either loſt, or having ſome humour in, his eye. The eryſipelas, the dropſy, the leproſy, the elephantiaſis, and luſi naturæ, conſtantly offend the ſight. Filth, moſquitos of the moſt dreadful ſort, vermin of every kind, women ſo ugly, that, fortunately for Europeans, their faces are concealed by a black cloth veil, in which are cut two eye-holes; ſtench intolerable; houſes almoſt uninhabitable:—theſe form the charms of Roſetta, and Savary's garden of Eden. The quay, however, is allowed to be a handſome object, and might be made noble. The baths are repreſented as horridly diſguſting. Dr. Wittman, cited alſo by Crutwell, obſerves, that though it contains but few ſtriking public edifices, Roſetta muſt be conſidered as a handſome place by thoſe who have been accuſtomed to mud walls and ſandy deſarts; the moſques and their minarets, as well as their houſes, built with bricks, plaſtered over and white-waſhed. The population he eſtimates at 8 or 10,000, but from the number of empty houſes, it appeared capable of containing at leaſt treble that number. In 1807, the Britiſh were defeated here, with conſiderable loſs, by the Turks; 90 miles N.W. of Cairo. N. lat. 31° 24'. E. long. 30° 40'. Savary. Sonnini. Niebuhr.

ROSETTE, in *Military Language*, an ornamental branch of ribbands, or cut leather, which is worn both by officers and ſoldiers in the Britiſh ſervice, on the upper part of their cues.

ROSETTES, two ſmall bunches of ribbands that are attached to the loops by which the gorget of an officer is ſuſpended upon his cheſt. The colour of the ribband muſt correſpond with the facing of the uniform. The French uſe the ſame term.

ROSETTI, DONATO, in *Biography*, an ingenious Italian, who flouriſhed in the 17th century, but of whoſe perſonal hiſtory little is known. He was a native of Leghorn, where he was probably educated, and was ſo ſucceſsful in the cultivation of the ſciences, that at a very early age he was conſidered as completely qualified to teach mathematics and the elements of philoſophy in different univerſities. While he was profeſſor of logic at Piſa, he publiſhed a treatiſe relating to the ſyſtem of the earth, which was well received. The title of this work was "Antignome fiſico Mathematiche con il nuovo Orbe e Syſtema terreſtre." This was followed by "A Collection of phyſico-mathematical Inſtructions;" "A Treatiſe on the Compoſition of Dutch Glaſſes, and Glaſs Drops;" "A Collection of phyſico-mathematical Demonſtrations" of propoſitions which he had undertaken to prove. In his "Antignome," he maintained that the number of ſenſes was eleven; this increaſe he made out by conſidering the different modes in which we touch bodies as ſo many different ſenſes, and endeavouring to ſhew that the perceptions ariſing from them cannot properly be aſcribed to the ſenſe of feeling in general. He was the author of another treatiſe, entitled "Poliſta fedele," intended to explain the inclination of bodies to unite at their poles, and various phenomena reſpecting their hardneſs, their elaſticity, their extenſion, and the cauſes which convert ſolids into fluids. It is not known when this philoſopher died: he was living at Piſa in the year 1678.

ROSETTI, ANTONIO, chapel-maſter to the duke of Mecklenburg Schwerin, born, according to Gerber, at Milan, in 1744; but we have better authority to ſay that he was a native of Bohemia, and a diſciple of the great Haydn at Vienna, where, in 1755, he was a violiniſt in the imperial chapel, and afterwards in the ſervice of count Althan, 1780. Since that time he has been a voluminous publiſher at Hamburgh and Leipſic, of pieces for the piano-forte, with and without a violin accompaniment, of ſymphonies for a full orcheſtra, on the plan of his maſter Haydn, flute concertos, &c. Some of his ſymphonies, when performed at the concerts in England, while Haydn was in this country, we thought written with force, and abounding with fire and new paſſages.

ROSEWAY PORT, in *Geography*, a populous ſea-port town on the S.E. coaſt of Nova Scotia, N.E. by E. of cape Negro and Harbour.

ROSEWAY *Iſland*, an iſland that lies at the mouth of Port Wager, on the S.E. coaſt of Nova Scotia.

ROSEWELL, THOMAS, in *Biography*, a Preſbyterian divine, was born in Somerſetſhire about the year 1630, and was educated at Oxford. After leaving the univerſity, he was preſented to the living of Strode, in his native county, from which he was ejected in the year 1662, by the Bartholomew act. In 1674 he officiated with a Non-conformiſt congregation at Rotherhithe; and in the year 1684 he was arreſted on a charge of high treaſon: on this charge he was tried in the court of king's bench, November 8th, before the infamous Jefferies. The indictment was on words ſaid to have been delivered from the pulpit, and the witneſſes were three women of abandoned characters, of whom the chief was afterwards ſet in the pillory for perjury. The trial laſted ſeven hours, and Mr. Roſewell behaved with all the decency and reſpect that could have been expected, and made a defence that was applauded by all who heard him. The women, ſays biſhop Burnet, could not prove, by any circumſtance, that they were even preſent at the meeting, and the words to which they ſwore were ſo groſs, that it was not to be imagined that any man in his wits would have made uſe of them in a mixed aſſembly; yet Jefferies urged the matter with his uſual vehemence. He laid it down as an axiom, concerning which there could be no controverſy, that all preaching at conventicles, as he was pleaſed to call diſſenting places of worſhip, was treaſonable, and that this ought to diſpoſe the jury to believe any evidence upon that head. The jury accordingly found the priſoner guilty. As ſoon, however, as the trial was over, ſir John Talbot, who was preſent at it, went to the king, and urged it on his majeſty, that if ſuch evidence was admitted, as had appeared againſt Mr. Roſewell, no one of his ſubjects would be ſafe. Upon this, when Jeffries ſoon after came into the royal preſence, with an air of exultation and triumph, to congratulate his majeſty on the conviction of a traitor, the king afforded him a cool reception, which mortified him exceedingly, but at the ſame time it gave a complete turn to the bent of his mind; ſo that when the court met to hear Mr. Roſewell's counſel, who moved for an arreſt of judgment, this judge, who was as mean as he was corrupt and cruel, aſſumed a tone of moderation, and ſtrongly recommended to the king's counſel caution and deliberation where the life of a man was depending. The priſoner was, in the end, pardoned. He died in 1691. Neal's Hiſt. vol. iv.

ROSHAN, or ROSHAWN, in *Geography*, a country of Aſia, ſituated between Meckley and Arracan, between 92°

92° and 95° E. long., and 21° and 23° N. lat.; about 120 miles in length, and 80 in breadth. See ARRACAN.

ROSHEIM, a town of France, in the department of the Lower Rhine, and chief place of a canton, in the district of Barr; 15 miles S.W. of Strasburgh. The place contains 3355, and the canton 12,017 inhabitants, on a territory of 227½ kiliometres, in 15 communes.

ROSHOVER, a township of Pennsylvania, in Westminster county, containing 1786 inhabitants.

ROSICRUCIANS. See ROSYCRUCIANS.

ROSIENNE, in *Geography*, a town of Samogitia, in which the diet and court of judicature are held; 76 miles S. of Mittaw. N. lat. 55° 30′. E. long. 41° 57′.

ROSIERE, LA, a small island near the S.W. coast of the island of Jersey; 1 mile E.S.E. of Noirmont Point.

ROSIERE, a town of France, in the department of the Somme, and chief place of a canton, in the district of Montdidier. The place contains 2760, and the canton 13,812 inhabitants, on a territory of 120 kiliometres, in 21 communes.

ROSIERES *aux Salines*, a town of France, in the department of the Meurte, on the Meurte, formerly celebrated for its salt-works; 6 miles W. of Luneville.

ROSIERS, a town of France, in the department of the Mayne and Loire, on the Loire; 7 miles N.W. of Saumur.

ROSIERS, *Cape*, the S. limit of the mouth of the river St. Lawrence; being the easternmost point of the district of Gaspee, in Lower Canada. N. lat. 48° 56′. W. long. 63° 40′.

ROSIGNANA, a town of Etruria; 13 miles S.E. of Pisa.

ROSIL, in *Rural Economy*, a term applied to such land as is neither light nor heavy, being a medium between sand and clay; it is sometimes written *rosills*.

ROSILLY BAY, in *Geography*, a bay on the S. coast of Wales. N. lat. 51° 32′. W. long. 4° 16′.

ROSIN, JOHN, in *Biography*, an antiquary, was born at Eisnach in 1551, and died of the plague in 1626. He was author of "Antiquitatum Romanarum," a work of high reputation, of which the best edition is that of Utrecht, in 1701.

ROSIN, *Resina*, in *Pharmacy*. See RESIN.

ROSIN is particularly used for a resinous matter prepared from the juice of the pine-tree; in ordinary use for the making of ointments, plasters, and for other purposes.

For the method of procuring it, see PINE, and TURPENTINE.

ROSITO, in *Geography*, a town of Naples, in Calabria Citra; 16 miles N.E. of Cassano.

ROSITO, *Cape*, a cape on the east coast of Calabria. N. lat. 40° 5′. E. long. 16° 40′.

ROSKOPF, a mountain of Austrian Swabia; 1 mile S.E. of Schonau.

ROSLAND, in our *Old Writers*, heathy land, or ground full of ling: also watery and moorish land.

ROSLAVL, in *Geography*, a town of Russia, in the government of Smolensk. N. lat. 54°. E. long. 32° 50′.

ROSLAW, a river of Saxony, which runs into the Elbe, opposite to Dessau.

ROSLDORF, a town of Austria; 6 miles S.W. of Ehrnsprunn.

ROSLYN, ROSLIN, *Roselyn*, or *Roskelyn*, a village in the parish of Laswade, and county of Midlothian, Scotland, is about six miles S.S.W. from Edinburgh. This place is much celebrated on account of its castle and chapel, and for the romantic character of the scenery in its immediate vicinity. An excursion to Roslyn is one of the favourite summer recreations of the inhabitants of the northern metropolis; and no traveller of taste leaves that part of the kingdom, without contemplating its beauties. The castle is seated on a bold and lofty rock, overhanging the river North-Esk, which dashes over a rugged channel at the base, in a semicircular sweep; and the precipitous banks are covered with a profusion of wood. Only a very small portion of the ancient building is now standing; but a modern mansion has been erected on part of the old walls. It is uncertain when this castle was built; but that event most probably occurred about the commencement of the 12th century, when William de Sancto-Clere (son to Waldernus de St. Clere, who came to England with William the Conqueror) obtained a grant of the barony of Roslyn from the Scottish king, Malcolm Canmore. No mention of it is made in history, however, till the reign of James II. of Scotland, when sir William Hamilton is stated to have been confined here, for joining the rebellious standard of earl Douglas. In 1554 it was set fire to, and in great part demolished, by the forces of king Henry VIII. The St. Clere family, or, as the name is now spelt, St. Clair, was anciently of great note in Scotland. Their possessions were very extensive, and their titles numerous, being earls of Caithness and Orkney, lords of Nithsdale, and barons of Pentland, Cousland, Cardain, Saint-Clair, Herbertshire, Hertfoord, Grahamshaw, Kirkton, Cavers, Newborough, and Roxburgh. Their affluence and power exceeded that of most contemporary nobles, either in England or Scotland; and they lived in a style of magnificence and splendour, which even the Scottish monarchs were scarcely able to rival. James II. conferred upon them the honour of being hereditary patrons and grand masters of masonry in Scotland; privileges which they continued to enjoy for several generations.

The chapel of Roslyn occupies the summit of a hill above the castle. It was founded in the year 1446, by William Saint Clair, earl of Caithness and Orkney, for a provost, six prebendaries, and two singing boys; and was endowed by him with considerable landed possessions. He did not, however, live to complete his undertaking, notwithstanding he spared neither trouble nor expence to effect this purpose before his death, which happened in 1479. From a manuscript memoir of the house of Douglas, deposited in the library of the Faculty of Advocates at Edinburgh, we learn many curious particulars relative to the building of this chapel. It is there said, that the founder "caused artificers to be brought from other regions and forraigne kingdomes, and causd dayly to be abundance of all kinde of workemen present;" and it is subsequently added, "and to the end the worke might be more rare, he causd the draughts to be drawn upon Eastland boords, and made the carpenters to carve them according to the draughts, and then gave them for patterns to the masons, that they might thereby cut the like in stone." The present building is generally supposed to have been intended only for the choir of a large collegiate church, which, according to tradition and probability, it was the design of the founder to have erected. Though in a mutilated state, its architecture is unique, and combines, according to Mr. Gandy, "the Egyptian, Grecian, Roman, and Saracenic styles;" and exhibits the arch "in all its possible forms and principles." This structure measures in the interior 68 feet in length, and 35 in breadth. The exterior is supported by 21 buttresses, surmounted by pinnacles, each differing from the others in its ornaments. Two of these buttresses have double pinnacles, the outer shafts of which are smaller than the inner, with which they are connected by flying abutments. Similar members alſo unite the larger pinnacles with the upper part of the chapel. The eaſtern end diſplays five buttreſſes, with four pointed windows intervening, all of uniform ſize and ſtyle, though varying ſomewhat in the tracery work with which they are ornamented. Each window is divided by a ſtone mullion, faced, both internally and externally, with double columns; and the tranſom of the arch is decorated with half figures of perſons in the attitude of ſupplication, and with different kinds of foliage. On the north and ſouth ſides of the chapel, in the lower compartment, are five windows of a ſimilar kind; alſo a pointed arched door-way, receſſed under a larger ſemicircular arch, above which is an irregular triangular window, highly ornamented. Another tier of windows, on each ſide, gives light to the upper part of the building; but theſe are now much mutilated, having loſt their mullions, tracery, &c. Between every two windows are two canopied niches, and a bracket, which appear to have been deſigned for ſtatues. This portion of the building is ſupported by two oppoſite ranges of five arches each, ſeparating the body of the chapel from the ſide aiſles; beyond which, at the eaſt end, there are two columns, and two more in the centre between them, all of them ſupporting ſtone beams, exhibiting a great variety of ſculptural ornaments. 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"The late Roſlin," ſays father Hay, in his MS. memoirs, "was the firſt that was buried in a coffine, contrary to the ſentiments of James VII., who was then in Scotland;" and he adds, "that the great expence my mother was at in burying her huſband, occaſioned the ſumptuary acts that were made in the next parliament." There was formerly a ſuperſtitious ſtory relative to this chapel current among the common people in the neighbourhood. They believed that, previous to the death of any member of the Saint Clair family, the chapel was to be ſeen in flames, without ſuſtaining any injury. This ſuperſtition is alluded to by Mr. Scott, in his "Lay of the Minſtrel," in the following beautiful lines:

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ROSMARILHAL, a town of Portugal, in the province of Beira, on the borders of Spain; 8 miles W. of Alcantara, in Spain. N. lat. 39°33′. W. long. 6°50′.

ROSMARINUS, in *Botany*, fo called from *ros*, *dew*, and *marinus*, alluding to its fituation on the fea-fhore. Thofe who have obferved it mantling the rocks of the Mediterranean in winter, with its grey flowers glittering with dew, cannot but be ftruck with the elegant propriety of the name.—Linn. Gen. 16. Schreb. 22. Willd. Sp. Pl. v. 1. 126. Mart. Mill. Dict. v. 4. Sm. Prodr. Fl. Græc. Sibth. v. 1. 12. Ait. Hort. Kew. v. 1. 52. Tournef. t. 92. Juff. 111. Lamarck Illuftr. t. 19.—Clafs and order, *Diandria Monogynia*. Nat. Ord. *Verticillatæ*, Linn. *Labiatæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, compreffed at the upper part, with an erect mouth; upper lip undivided; lower cloven. *Cor.* unequal; tube longer than the calyx; limb gaping; upper lip divided into two parts, erect, fhorter, acute, with reflexed margins; lower reflexed, trifid; the middle fegment very large, concave, narrow at the bafe; the lateral ones narrow, acute. *Stam.* Filaments two, awl-fhaped, fimple, with a tooth at one fide, inclined towards the upper lip, and exceeding it in length; anthers fimple. *Pift.* Germen fuperior, four-cleft; ftyle refembling the ftamens; ftigma fimple, acute. *Peric.* none, except the permanent calyx, which contains four ovate *feeds* in its bottom.

Obf. This genus approaches very near to *Salvia*, from which however it differs in having the ftamens fimply furnifhed with a lateral tooth.

Eff. Ch. Corolla unequal, its upper lip cloven. Filaments longer than the corolla, curved, fimple with a tooth. Calyx campanulate, trifid. Seeds four, naked.

1. R. *officinalis*. Common Rofemary. Linn. Sp. Pl. 33. Sm. Fl. Græc. Sibth. t. 14. Woodv. Med. Bot. t. 87.—Leaves feffile.—Native of the fouth of Europe, the Levant, and occafionally in the Grecian iflands; common in gardens, flowering from January to May.—An erect, evergreen *fhrub*, four feet high, very much branched; *branches* obfcurely quadrangular, downy, leafy on all fides. *Leaves* oppofite, fpreading in a recurved manner, linear-oblong, obtufe, revolute, entire; fmooth, dark green, and fhining above; downy and veined beneath. *Flowering branches* axillary, oppofite, fhort, very leafy. *Flowers* axillary, terminal, on very fhort ftalks, erect, of a bright blue colour, variegated with purple and white, having, like the leaves, a ftrong aromatic fragrance, refembling camphor. This is the Λιβανωτις of Diofcorides and other ancient authors. Rofemary, when wild, has broader leaves, larger flowers, and a ftronger fcent than when cultivated in our gardens; indeed Miller, following the old writers, regarded this as a fufficient ground to make them diftinct fpecies; the former being fubject to a variety whofe leaves are ftriped with yellow, and hence called *Gold-ftriped Rofemary*; the latter varying with a white ftripe, and thence named *Silver-ftriped Rofemary*. The filver variety is very tender. From an old opinion of Rofemary-juice having the property of ftrengthening the memory, this plant has been poetically made an emblem of remembrance or fidelity; and this was probably the origin of its being worn or ufed at funerals and weddings.

2. R. *chilenfis*. Chili Rofemary. Willd. n. 2. Ait. Hort. Kew. v. 1. 52.—Leaves on ftalks.—Native of Chili, and flowering in July. This *fhrub* is only known from Molina's Natural Hiftory of Chili, who defcribes it as having ftalked *leaves*. Future obfervation muft determine whether or not it be really a *Rofmarinus*.

Rosmarinus, in *Gardening*, contains plants of the hardy, fhrubby, evergreen kind, of which the fpecies cultivated is the officinal rofemary (R. officinalis).

There are varieties of this with narrow leaves; with broad leaves; with filver-ftriped leaves, and with gold-ftriped leaves.

Method of Culture.—In all the forts it may be effected by planting flips or cuttings in the early fpring months, as from March to May, as well as by layers; in performing the firft methods of which a quantity of young fhoots fhould be cut, or ftripped off, from about five or fix to eight or ten inches long, ftripping off the lower leaves, and then planting them in a border of light earth, in rows a foot afunder, giving a good watering, and repeating it frequently till they are rooted, which they effect in a fhort time; in the fame year they fhoot at top, and become tolerable little plants by autumn; when about the beginning or middle of September, or in the fpring following, they may be tranfplanted where they are defigned to remain for growth.

The layers fhould be laid down in any of the convenient lower young branches, into the earth, in the fpring, fummer, or autumn, and they will be well rooted by autumn following, when they may be taken off, and planted out where they are to remain for plants.

Almoft all the varieties are moderately hardy ever-green plants, though the common green forts are the moft fo; the ftriped kinds being liable to fuffer by hard frofts, if much expofed, or planted in wet ground; of courfe they, as well as all the forts, fhould have a warm fituation and dry foil: fome of the variegated kinds fhould alfo be potted, in order to have the fhelter of a green-houfe in winter. They are moft durable in dry poor foils. In regard to the ufes of thefe plants, the common green forts are generally made ufe of for different medicinal purpofes, the leaves as well as the flowers being employed, and both thefe and the ftriped kinds are planted out as fhrubs for the fake of affording a more full variety. They all afford variety of courfe in the borders, clumps, and other parts of gardens and fhrubberies.

Rosmarinus, in the *Materia Medica*. See Rosemary.

ROSMARUS, in *Zoology*, the name of an animal called alfo by fome the fea-horfe, and more ufually known by the name of *morfe*.

ROSMITHAL, in *Geography*, a town of Bohemia, in the circle of Prachatitz; 11 miles N. of Blatna.

ROSNAY, a town of France, in the department of the Indre; 8 miles N.E. of Le Blanc.

ROSNY, a town of France, in the department of the Seine and Oife; 3 miles W. of Mantes.—Alfo, a town of France; 5 miles E. of Paris.

ROSOLIS, or Ros-solis, popularly *Rofa-folis*, *fundew*, an agreeable fpirituous liquor, formerly much in repute, chiefly taken after meals, by way of a drachm, to aid digeftion; being compofed of burnt brandy, fugar, cinnamon, and milk-water, and fometimes perfumed with a little mufk.

It had its name, becaufe anciently prepared wholly of the diftilled water of the plant Ros *folis*, which fee; but that plant was at length neglected in the compofition.

The beft was that of Turin. The French have now a particular kind, not called *ros folis*, but *du roy*; becaufe ufed with good effect by Louis XIV. It is compofed of Spanifh wine, in which are infufed anife, fennel, aneth, coriander, &c. for three weeks.

ROSOMACHA, or Rosomak, in *Zoology*, a name given by the Ruffians to the glutton. They are, fays Olaus, taken by the hunters chiefly on account of their fkins, members alfo unite the larger pinnacles with the upper part of the chapel. The eaftern end difplays five buttreffes, with four pointed windows intervening, all of uniform fize and ftyle, though varying fomewhat in the tracery work with which they are ornamented. Each window is divided by a ftone mullion, faced, both internally and externally, with double columns; and the tranfom of the arch is decorated with half figures of perfons in the attitude of fupplication, and with different kinds of foliage. On the north and fouth fides of the chapel, in the lower compartment, are five windows of a fimilar kind; alfo a pointed arched door-way, receffed under a larger femicircular arch, above which is an irregular triangular window, highly ornamented. Another tier of windows, on each fide, gives light to the upper part of the building; but thefe are now much mutilated, having loft their mullions, tracery, &c. Between every two windows are two canopied niches, and a bracket, which appear to have been defigned for ftatues. This portion of the building is fupported by two oppofite ranges of five arches each, feparating the body of the chapel from the fide aifles; beyond which, at the eaft end, there are two columns, and two more in the centre between them, all of them fupporting ftone beams, exhibiting a great variety of fculptural ornaments. One of the centre pillars is wreathed, and is popularly called the apprentice's pillar, from a tradition refpecting its execution by an apprentice of the mafter mafon of the ftructure; who, it is faid, finding himfelf unable to underftand the model furnifhed to him, went abroad for inftructions, during which time the work was accomplifhed by the apprentice. It is fingular that a fimilar ftory is told of fome of the beft fculptures in Melrofe abbey; and we believe, alfo, of a much later production of art, the ftatue of king Charles II. in the Parliament-fquare at Edinburgh. Two heads in the chapel are faid to reprefent the mafter and the apprentice. The former is fhewn as frowning, and the latter with a fcar or indention on the forehead, to denote that he was murdered by his mafter, through envy of his fuperior genius. At the eaft end of the chapel are four altars, dedicated to different faints. "Of arches," fays Mr. Britton, in his Architectural Antiquities, "there are more than thirteen varieties to be found in this building. A flat or fegment beneath the roof of the aifles, and over the door to the fub-chapel; femicircular in the vault of the roof, and over the entrance doors; groined, acutely pointed over the weftern aifle; flat pointed between the centre and fide aifles; fharp pointed in the lower windows; ogee to the pifcinas; flattened, and lateft of the pointed ftyle, infide of the door-way, fouth fide; half fegment in the flying buttreffes; counter arch in the triangular windows; flat arch and fegment joined in a door in the vault; feveral arches of various forms in the windows, niches, and canopies, alfo in the battlements." The vault above-mentioned is the burying-place of the family of the Sinclairs. The foil of it is fo dry, that bodies have been found entire 80 years after their interment. They were formerly buried in armour, and without a coffin. "The late Roflin," fays father Hay, in his MS. memoirs, "was the firft that was buried in a coffine, contrary to the fentiments of James VII., who was then in Scotland;" and he adds, "that the great expence my mother was at in burying her hufband, occafioned the fumptuary acts that were made in the next parliament." There was formerly a fuperftitious ftory relative to this chapel current among the common people in the neighbourhood. They believed that, previous to the death of any member of the Saint Clair family, the chapel was to be feen in flames, without fuftaining any injury. This fuperftition is alluded to by Mr. Scott, in his "Lay of the Minftrel," in the following beautiful lines:

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ROSMARILHAL, a town of Portugal, in the province of Beira, on the borders of Spain; 8 miles W. of Alcantara, in Spain. N. lat. 39° 33′. W. long. 6° 50′.

ROSMARINUS, in *Botany*, ſo called from *ros*, *dew*, and *marinus*, alluding to its ſituation on the ſea-ſhore. Thoſe who have obſerved it mantling the rocks of the Mediterranean in winter, with its grey flowers glittering with dew, cannot but be ſtruck with the elegant propriety of the name.—Linn. Gen. 16. Schreb. 22. Willd. Sp. Pl. v. 1. 126. Mart. Mill. Dict. v. 4. Sm. Prodr. Fl. Græc. Sibth. v. 1. 12. Ait. Hort. Kew. v. 1. 52. Tournef. t. 92. Juſſ. 111. Lamarck Illuſtr. t. 19.—Claſs and order, *Diandria Monogynia*. Nat. Ord. *Verticillatæ*, Linn. *Labiatæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, compreſſed at the upper part, with an erect mouth; upper lip undivided; lower cloven. *Cor.* unequal; tube longer than the calyx; limb gaping; upper lip divided into two parts, erect, ſhorter, acute, with reflexed margins; lower reflexed, trifid; the middle ſegment very large, concave, narrow at the baſe; the lateral ones narrow, acute. *Stam.* Filaments two, awl-ſhaped, ſimple, with a tooth at one ſide, inclined towards the upper lip, and exceeding it in length; anthers ſimple. *Piſt.* Germen ſuperior, four-cleft; ſtyle reſembling the ſtamens; ſtigma ſimple, acute. *Peric.* none, except the permanent calyx, which contains four ovate *ſeeds* in its bottom.

Obſ. This genus approaches very near to *Salvia*, from which however it differs in having the ſtamens ſimply furniſhed with a lateral tooth.

Eſſ. Ch. Corolla unequal, its upper lip cloven. Filaments longer than the corolla, curved, ſimple with a tooth. Calyx campanulate, trifid. Seeds four, naked.

1. R. *officinalis*. Common Roſemary. Linn. Sp. Pl. 33. Sm. Fl. Græc. Sibth. t. 14. Woodv. Med. Bot. t. 87.—Leaves ſeſſile.—Native of the ſouth of Europe, the Levant, and occaſionally in the Grecian iſlands; common in gardens, flowering from January to May.—An erect, evergreen *ſhrub*, four feet high, very much branched; *branches* obſcurely quadrangular, downy, leafy on all ſides. *Leaves* oppoſite, ſpreading in a recurved manner, linear-oblong, obtuſe, revolute, entire; ſmooth, dark green, and ſhining above; downy and veined beneath. *Flowering branches* axillary, oppoſite, ſhort, very leafy. *Flowers* axillary, terminal, on very ſhort ſtalks, erect, of a bright blue colour, variegated with purple and white, having, like the leaves, a ſtrong aromatic fragrance, reſembling camphor. This is the Λιβανωτὶς of Dioſcorides and other ancient authors. Roſemary, when wild, has broader leaves, larger flowers, and a ſtronger ſcent than when cultivated in our gardens; indeed Miller, following the old writers, regarded this as a ſufficient ground to make them diſtinct ſpecies; the former being ſubject to a variety whoſe leaves are ſtriped with yellow, and hence called *Gold-ſtriped Roſemary*; the latter varying with a white ſtripe, and thence named *Silver-ſtriped Roſemary*. The ſilver variety is very tender. From an old opinion of Roſemary-juice having the property of ſtrengthening the memory, this plant has been poetically made an emblem of remembrance or fidelity; and this was probably the origin of its being worn or uſed at funerals and weddings.

2. R. *chilenſis*. Chili Roſemary. Willd. n. 2. Ait. Hort. Kew. v. 1. 52.—Leaves on ſtalks.—Native of Chili, and flowering in July. This *ſhrub* is only known from Molina's Natural Hiſtory of Chili, who deſcribes it as having ſtalked *leaves*. Future obſervation muſt determine whether or not it be really a *Roſmarinus*.

Rosmarinus, in *Gardening*, contains plants of the hardy, ſhrubby, evergreen kind, of which the ſpecies cultivated is the officinal roſemary (R. officinalis).

There are varieties of this with narrow leaves; with broad leaves; with ſilver-ſtriped leaves, and with gold-ſtriped leaves.

Method of Culture.—In all the ſorts it may be effected by planting ſlips or cuttings in the early ſpring months, as from March to May, as well as by layers; in performing the firſt methods of which a quantity of young ſhoots ſhould be cut, or ſtripped off, from about five or ſix to eight or ten inches long, ſtripping off the lower leaves, and then planting them in a border of light earth, in rows a foot aſunder, giving a good watering, and repeating it frequently till they are rooted, which they effect in a ſhort time; in the ſame year they ſhoot at top, and become tolerable little plants by autumn; when about the beginning or middle of September, or in the ſpring following, they may be tranſplanted where they are deſigned to remain for growth.

The layers ſhould be laid down in any of the convenient lower young branches, into the earth, in the ſpring, ſummer, or autumn, and they will be well rooted by autumn following, when they may be taken off, and planted out where they are to remain for plants.

Almoſt all the varieties are moderately hardy ever-green plants, though the common green ſorts are the moſt ſo; the ſtriped kinds being liable to ſuffer by hard froſts, if much expoſed, or planted in wet ground; of courſe they, as well as all the ſorts, ſhould have a warm ſituation and dry ſoil: ſome of the variegated kinds ſhould alſo be potted, in order to have the ſhelter of a green-houſe in winter. They are moſt durable in dry poor ſoils. In regard to the uſes of theſe plants, the common green ſorts are generally made uſe of for different medicinal purpoſes, the leaves as well as the flowers being employed, and both theſe and the ſtriped kinds are planted out as ſhrubs for the ſake of affording a more full variety. They all afford variety of courſe in the borders, clumps, and other parts of gardens and ſhrubberies.

Rosmarinus, in the *Materia Medica*. See Rosemary.

ROSMARUS, in *Zoology*, the name of an animal called alſo by ſome the ſea-horſe, and more uſually known by the name of *morſe*.

ROSMITHAL, in *Geography*, a town of Bohemia, in the circle of Prachatitz; 11 miles N. of Blatna.

ROSNAY, a town of France, in the department of the Indre; 8 miles N.E. of Le Blanc.

ROSNY, a town of France, in the department of the Seine and Oiſe; 3 miles W. of Mantes.—Alſo, a town of France; 5 miles E. of Paris.

ROSOLIS, or Ros-solis, popularly *Roſa-ſolis*, *ſundew*, an agreeable ſpirituous liquor, formerly much in repute, chiefly taken after meals, by way of a drachm, to aid digeſtion; being compoſed of burnt brandy, ſugar, cinnamon, and milk-water, and ſometimes perfumed with a little muſk.

It had its name, becauſe anciently prepared wholly of the diſtilled water of the plant Ros *ſolis*, which ſee; but that plant was at length neglected in the compoſition.

The beſt was that of Turin. The French have now a particular kind, not called *ros ſolis*, but *du roy*; becauſe uſed with good effect by Louis XIV. It is compoſed of Spaniſh wine, in which are infuſed aniſe, fennel, aneth, coriander, &c. for three weeks.

ROSOMACHA, or Rosomak, in *Zoology*, a name given by the Ruſſians to the glutton. They are, ſays Olaus, taken by the hunters chiefly on account of their ſkins, fkins, which are much efteemed by people of fortune for robes, as being variegated with very bright colours, refembling flowers. See URSUS *Gulo*.

ROSOSZE, in *Geography*, a town of Auftrian Lithuania; 30 miles S.W. of Brzefk.

ROSOY. See ROZOY.

ROSPORDEN, a town of France, in the department of the Finifterre, and chief place of a canton, in the diftrict of Quimper. The place contains 560, and the canton 4413 inhabitants, on a territory of 127½ kiliometres, in four communes.

ROSPUS, a name ufed by fome authors for the ftrange fifh called the *rana pifcatrix*, or frog-fifh. See SEA-*devil*.

ROSS, ALEXANDER, in *Biography*, was born at Aberdeen, and became mafter of the grammar-fchool at Southampton, and chaplain to king Charles I. His works are numerous, of which the beft known is "A View of all Religions:" and a curious performance, called "Virgilius Evangelizans," taken wholly from the Æneid. He died in 1654, aged 61.

ROSS, JOHN, a learned prelate, was born in Herefordfhire, and educated at St. John's college, Cambridge, where he took his degree of D.D. in the year 1756. He had fome years previoufly to this publifhed a pamphlet in defence of Dr. Middleton againft the criticifms of Dr. Markland, and in 1749 an edition of Cicero's "Epiftolæ ad Familiares," in two vols. 8vo. He was prefented to the vicarage of Frome, in Somerfetfhire, and in 1778 he was advanced to the bifhopric of Exeter. He died in 1792.

ROSS, JOHN LOCKHART, the fifth fon of fir James Lockhart, was born in November 1721, and having manifefted an inclination for the fea-fervice, he was, at the age of 14, placed under captain Ofborn, who then commanded his majefty's fhip the Portland of 50 guns, which failed in September 1735, for Conftantinople. He ferved in feveral different fhips, and under different commanders, till 1743, when he was advanced to the rank of lieutenant. It was not till 1755 that he was appointed to a command, which was in the Savage floop of war, of 12 guns and 70 men. In a very fhort time he took a St. Domingo merchant-man, valued at 30,000*l.* In the following year he was appointed to the command of the Tartar floop of 24 guns, and 200 men. War was now declared againft the French, and on the 20th of September he chafed and engaged two French frigates of 28 guns, and drove them into Morlaix. Without particularizing the inftances of his fuccefs, we may obferve that, between the 20th of September 1756 and the 19th of October 1758, he took nine privateers, containing 220 guns, and about 2500 men, with the lofs of only five men killed and two wounded in the different engagements. At length the name of captain Lockhart was almoft fufficient to terrify the enemy to ftrike. The following fact, which ftands upon the moft indubitable authority, fhews in what manner he was regarded on the feas. A privateer belonging to Briftol, called the King George, and commanded by a Mr. Read, having fallen in with an enemy's fhip of far fuperior force, during the night, and finding that the exigencies of her fituation demanded the moft prompt and vigorous exertions to preferve herfelf from capture, the commander ran with great fpirit along-fide, and hailing the enemy, commanded her to ftrike to the Tartar, captain Lockhart, and was inftantly obeyed without the fmalleft hefitation. Captain Lockhart's conduct in protecting the trade of the country was fo meritorious, that the magiftrates of Plymouth, immediately after his return to port, voted him the freedom of their corporation to be prefented him in a gold box. A prefent equally honourable was made him the enfuing year, by the merchants and underwriters of London, which confifted of a filver cup and falver, curioufly chafed, and emboffed with his arms, and the reprefentation of the Tartar, and the feveral privateers which had been captured by him.

In 1759 he was promoted to the Chatham of 50 guns, and had two fmaller veffels put under his command. In a fhort cruife he took the Arethufa, a French frigate of 32 guns. In the following year he was promoted to the Bedford, a third rate, but did not long retain the command. In the fame year, by the death of a brother, he changed his name to Rofs, and was elected a reprefentative in parliament. It was not till 1777 that he was called again to ferve his country in the fea-fervice. In that year he was employed under the orders of admiral Keppel, in the famous battle on the 27th of July. (See KEPPEL.) In 1779 he was raifed to the rank of rear-admiral of the blue, and appointed fourth in command of the Channel fleet, having hoifted his flag on board the Royal George of 100 guns. About this period he fucceeded his brother to the dignity of a baronet. He next accompanied fir George Rodney on his fortunate expedition, undertaken for the relief of Gibraltar. After his return he went but little to fea; but in 1787 he was advanced to the rank of vice-admiral of the blue; and here clofed the profeffional career of fir John Lockhart Rofs, who, confidering his great zeal and activity in the profecution of the duties of his profeffion, and the vaft benefits which the commercial interefts of his country reaped from his exertions, muft be allowed to rank very high in his profeffion. His coolnefs and intrepidity in the hour of battle were never furpaffed; and, in the courfe of a very long fervice, to fight and to conquer were alike habitual to him. He died in June 1790, after a lingering and painful illnefs; and his remains were interred in the Rofs aifle, forming the eaft end of the church of Fearn, which had been the burying-place of all the refpectable families of the name of Rofs for many ages. Stockdale's edition of Campbell's Lives of the Admirals, vol. vi. Charnock's Biographia Navalis, vol. vi.

ROSS, in *Geography*, a borough and market-town in the lower divifion of the hundred of Greytree, county of Hereford, England, is feated on a commanding eminence, overhanging the river Wye, at the diftance of 15 miles S.E. by E. from the city of Hereford, and 121 W. by N. from London. This town was made a free borough by king Henry III., and feems to have been a place of more importance formerly than at prefent. In the time of Camden it was famous for its cyder, and for the manufacture of iron wares. Its celebrity for cyder yet continues, but the laft-mentioned branch of trade has much declined. According to the parliamentary returns for 1811, Rofs contained 558 houfes, and a population of 2261 perfons. The market-day is Thurfday, weekly; and the fairs are on Holy Thurfday, Corpus Chrifti, 20th July, Thurfday after 10th October, and 11th December. The petty feffions for the hundred of Greytree are held here. The government of this borough is vefted in a ferjeant and four conftables, but their powers are extremely limited. Here are two charity fchools, and an alms-houfe; the latter of which owed its eftablifhment to John Kyrle, whom Pope has characterized and invefted with deathlefs and truly merited fame, by the name of "the Man of Rofs." This truly benevolent character was born at White Houfe, in the parifh of Dymock, Herefordfhire, in 1637; ferved the office of fheriff for the county in 1683, and died in 1724. Though poffeffed only of an annual income of 500*l.*, he not only lived in happinefs and refpectability himfelf, but diffufed around him innumerable

merable benefits to the poor and the unfortunate. Among other advantages conferred by him on Rofs, he raifed the church fpire above 100 feet in height, and inclofed a piece of ground with a wall, and funk a refervoir in the centre of it, for the ufe of the inhabitants. He likewife conftructed a fine broad caufeway at the weftern extremity of the town. The houfe in which Mr. Kyrle refided was afterwards the King's Arms, fituated near the entrance of the town from Gloucefter, but is no longer an inn.

The ftreets of Rofs are moftly fituated on the top and flope of a hill, and are extremely narrow. The market-houfe, though erected fo late as the reign of Charles II., is in a very decayed ftate. It is conftructed of ftone, and difplays the heterogeneous mode of building prevalent in the reign of his predeceffor, James I. The church is a handfome ftructure, having a tower, furmounted by a lofty fpire at its weftern end. In the window over the altar here, among other fragments of painted glafs, is one reprefenting a bifhop, with the infcription, "Thomas Herefordenfis," written beneath in black letter. This bifhop had probably been a benefactor to the church. The views from the furrounding cemetery, and from the contiguous profpect ground, are much celebrated. Immediately below, the river Wye forms a fine femicircle, at one of the extremities of which are the ruins of Wilton caftle; and beyond it an extenfive vale, terminated by diftant mountains. Near the church-yard is a fpot called Bifhop's-Court, from the circumftance of its having been anciently the fcite of a palace, belonging to the bifhops of Hereford.

The ruins of Wilton caftle above-mentioned ftand on the weftern bank of the Wye. This manfion was for feveral centuries the refidence of the Greys, of the fouth, who derived from it their original baronial title, in the reign of Edward I. foon after they acquired poffeffion of it. Its prefent ruinous condition is to be attributed to the royalift governors of Hereford, by whofe orders the whole interior was confumed by fire. The feats and objects of antiquarian intereft in this vicinity are numerous. On the fummit of Eaton-hill, about two miles to the north of Rofs, is a large encampment, probably of Roman origin. The intrenchments are in a very perfect ftate, and are of great depth. A farm-houfe here difplays veftiges of an ancient manfion, and the furrounding grounds are ftill defignated the Park of Eaton; but the hiftory of the place is entirely loft. At a hamlet called Hole-in-the-Wall, about a mile further to the north, are fome foundations of walls, which bear the appearance of great antiquity. What occafioned the appellation by which their fcite is diftinguifhed, is an excavation formed in the rocky bank of a neighbouring garden, which, when complete, led by a flight of fteps downwards into a cavity, whofe roof was fupported by a fingle column. Afcending the hill towards Old Gore is a hollow fpace extending about 100 paces, in which a number of celts were difcovered a few years ago. Thefe inftruments were nearly of the fame fize, and had evidently been caft, as the marks of the mould were vifible. On the oppofite fide of the river from Hole-in-the-Wall, ftands Kingfton-houfe, long the property of the Hofkyns' family; one of whom, ferjeant Hofkyns, is faid to have entertained here James I. with a morrice-dance, performed by ten perfons whofe united ages exceeded one thoufand years. Above this manfion is Fawley-Court, anciently the feat of fir John Kyrle, progenitor to the "Man of Rofs," and now the property of a gentleman named Money, a defcendant from the family by the female line. Goodrich caftle is fituated about four miles to the fouth of Rofs, on a finely wooded promontory, round which the river Wye forms a femi-circular fweep. This fortrefs was for many years the baronial refidence of the Talbots, earls of Shrewfbury. By whom it was originally founded is unknown, though the near affinity of its name to that of duke Godric, who occurs as a witnefs to two charters granted by king Canute, renders it not an improbable conjecture that he was the perfon. Nothing of its authentic hiftory is recorded till the reign of king John, where we find it mentioned as the property of William Strigul, earl marfhal, who died here in 1246. Subfequently it was conveyed by a female heir to William de Valentia, earl of Pembroke, from whofe family it paffed to the Talbots, afterwards earls of Shrewfbury. Elizabeth, daughter of Gilbert, the feventh earl, carried it by marriage to Henry de Grey, earl of Kent, whofe defcendants held it till the death of Henry, duke of Kent, when it was fold to admiral Griffin, anceftor to the prefent proprietor. Few events of hiftorical note are related refpecting this caftle. In the civil wars between king Charles I. and his parliament, it was at firft garrifoned for the latter, but was captured foon after by the royalifts, who, in their turn, were compelled to furrender it to the republicans, after a fiege of fix weeks, A.D. 1646. On the 25th of Auguft, in the fame year, the parliament ordered it to be notified to the countefs of Kent, that it was neceffary the caftle fhould be demolifhed. Accordingly it was difmantled in March following; and has fince been gradually falling to decay, but enough of it yet remains to point out its former extent and grandeur. The form of this ftructure is that of a parallelogram 176 feet long, by 152 broad. Each of the four angles is ftrengthened by a round tower, and in the fouth-weft part of the area is a fquare keep, which appears to be of anterior date to the reft of the building. "This keep tower," fays King, in his Munimenta Antiqua, vol. iii. "has every mark in its ftyle of architecture of being coeval with the Saxon age." It confifts of three ftories, the loweft of which was ufed as a prifon. The principal entrance was by a flight of fteps, which is detached from the main building, and conducts to a platform before the door-way into the fecond and principal ftory, which has no interior connection with the dungeon beneath, as happens in moft Norman caftles. The entrance to the prifon-apartments was under a very remarkable fort of pointed arch, formed of "quite flat fides, which feem, from the appearance of the wall around, and from its peculiar ftyle, to have been inferted many ages after the keep was erected, and in the time of Edward III.;—a fufpicion that appears to be moft ftrongly confirmed by the circumftance, that about the twenty-fecond year of the reign of that king, Richard Talbot, its then lord, obtained the royal licence for having in his caftle a prifon for malefactors; having alfo the cognizance of pleas of the crown, &c. within his lordfhip of Irchenfield and Wormilow." The windows in the two upper ftories are faid, by the fame author, to be genuine Saxon; and that in the middle of the higher ftory feems to have continued unaltered from the period of its conftruction. The columns on each fide ftand within the arch, the femicircular part of which is ornamented with zigzag: this window terminates the middle projecting buttrefs that affifts in fupporting the tower; and under it is a zigzag moulding, or band, which is carried round the whole building. The window in the middle ftory is nearly fimilar to that defcribed; but a ftone frame for glafs is inferted in it, apparently of the age of Henry VI., and probably the work of the celebrated earl Talbot, who, according to tradition, had his private chamber in this keep. The other portions of the caftle are of much later erection than the keep. The entrance was very ftrongly fortified. Immediately in front, and

and within the ſpace incloſed by the ſurrounding foſſe, was a very deep pit, hewn out of the ſolid rock, and having a drawbridge thrown acroſs it, which, when drawn up, exactly fitted the ſpace between the towers on each ſide of the gateway, which was further defended by two maſſive gates and portculliſes, and by loop-holes, and machicolations in the vaulting, through which boiling lead and water were poured down on the heads of aſſailants. This paſſage opened into the great inner court, on one ſide of which ſtands the chapel, now in ruin; and near it is a ſmall octagonal watch-tower, which riſes higher than any other building within the caſtle. Adjoining the entrance to the keep is the garriſon tower, which is thirty-ſix feet ſquare at the baſe; "but the three outward angles diminiſh as they aſcend and form triangular buttreſſes, ſo that the upper part of the tower is circular." From the keep a wall formerly extended to the weſt, or Great tower, which is circular in its outward form, but octangular within. Between this and the north, or Ladies' tower, were ranged the ſtate apartments. The hall was a magnificent room, 65 feet long and 28 broad, and appears, from the pointed ſtyle of its windows, to have been erected in the reign of Edward I. or II. It communicated, towards the north, with a kind of anti-chamber, whence a paſſage led into the great ſtate-room; the northern end of which exhibits two moſt beautiful pointed arches, of a later date than the reſt of the apartments. The Ladies' tower occupies a high and ſteep precipice to the north of this building, and is hence the moſt defenſible part of the caſtle. Its name clearly indicates its appropriation as the reſidence of the female part of the garriſon. See a plan and views of Goodrich caſtle, in Bonner's Perſpective Itinerary; with hiſtorical and deſcriptive accounts.

Three miles eaſtward from Roſs is Roſe, or Bury-hill, where ſome antiquaries have placed the Ariconium of Antoninus, which Camden had fixed erroneouſly at Kencheſter. The ſcite of this ſtation is ſtrongly marked by the colour of the ſoil, which is extremely black within its area, while all around it is inclined to red. About ſixty years ago, the ground here was covered with rubbiſh, and overgrown with briars, &c. but the then proprietor ſoon afterwards incloſed and levelled it. In the courſe of that operation, many Roman antiquities were diſcovered by the workmen; ſuch as fibulæ, lares, lachrymatories, rings, coins, fragments of pillars, and of teſſellated pavements, innumerable pieces of red pottery, and ſome foundations of buildings. A field near this ſtation retains the name of Kill-Dane-Field, but the particulars of the event to which it alludes is unknown. About a mile to the ſouth-weſt is the ſcite of Eccleſwall caſtle, now occupied by a modern manſion; and ſtill more to the ſouth, and ſomewhat nearer to Roſs, are the remains of Penyard caſtle, which appears to have been conſtructed for the defence of the narrow paſs through the woods from the county of Glouceſter, into thoſe of Monmouth and the principality. This fortreſs was demoliſhed during the civil wars. It had formerly a park and chace attached; and the latter appellation is ſtill given to an eminence which riſes to the weſtward of the caſtle. Beauties of England and Wales, vol. vi. by E. W. Brayley, and John Britton, 8vo. 1805. King's Munimenta Antiqua, vol. iii. fol.

Ross, a biſhopric in Ireland, united with Cork by queen Elizabeth in 1586. It contains 124,000 acres, all in the county of Cork, in 33 pariſhes.

Ross, a poſt-town of Ireland, in the county of Cork, diſtinguiſhed by the name of "Roſs Carbery." It is ſituated on a bay or harbour, to which it gives its name, but which is choaked up with ſand. The town is ſituated on a rocky eminence projecting to the ſouth, and nearly ſurrounded by a ſtrand. In the centre of the town is a pretty large ſquare, with four narrow ſtreets diverging from its angles. It is chiefly inhabited by weavers, and a good deal of linen yarn is ſold here. In former times a ſchool was founded here by St. Fachnan, which was much frequented. It is 155 miles S.W. from Dublin, and 32 from Cork.

Ross, *New*, a ſea-port and poſt-town of Ireland, in the county of Wexford. This, according to Mr. Wakefield, appears to be a ſpot well adapted for becoming a place of great commercial importance. It is ſituated at a conſiderable diſtance from the coaſt on the river Barrow, which has a ſufficient depth of water to allow veſſels of large ſize to unload at the quay. Not far remote is the junction of this river with the Nore, the latter of which conveys merchandize to Thomaſtown, within a few miles of Kilkenny, while the former affords a communication by canal to Dublin. The Barrow is alſo united to the Suire, which is navigable to Clonmell. Notwithſtanding theſe advantages, Mr. W. ſtates Roſs to be in a ſtate of inactivity, *without trade or capital.* Other writers ſpeak of it as a flouriſhing place, the buildings numerous and elegant, and the population rapidly increaſing. Roſs is a corporate town, and one of the ſtaple ports for the exportation of wool. To the former circumſtance Mr. Wakefield attributes its decline. It ſends a member to parliament, under the influence of the marquis of Ely. There is a charter ſchool for 60 boys. It is called New Roſs, to diſtinguiſh it from another, now a mere village, a few miles diſtant. New Roſs is 67¼ miles S.S.W. from Dublin.

Ross, a county of the ſtate of Ohio, divided into 11 townſhips, and containing 15,514 inhabitants.—Alſo, a town of Waſhington county, Pennſylvania, containing 1327 inhabitants.

Ross, a ſmall iſland near the W. coaſt of Scotland, and county of Argyle; 6 miles N.N.E. of Cambeltown.

Ross-*Iſland*, lies in the lake of Killarney, county of Kerry, Ireland, in which is a rich vein of grey copper ore, with copper pyrites, galena, and blende, the working of which has been prevented by an influx of the waters of the lake. A caſtle on this iſland has a military governor.

Ross's *Iſland*, a ſmall iſland in the Mergui Archipelago. N. lat. 10° 44'.

Ross *of Balmangar*, a cape of Scotland, on the S. coaſt of the county of Kircudbright, at the mouth of the Dee; 4 miles S. of Kircudbright.

ROSSA, a ſmall iſland near the W. coaſt of the iſland of Corſica; 10 miles N.E. of Calvi.—Alſo, a ſmall iſland in the Mediterranean, near the N. coaſt of Sardinia. N. lat. 41° 15'. E. long. 9° 25'.

ROSSAL Point, a cape of England, on the coaſt of Lancaſhire; 2 miles W. from the mouth of the river Wyre.

ROSSANO, a city of Naples, in Calabria Citra, the ſee of an archbiſhop, formerly the moſt celebrated rendezvous of Baſilian monks in Italy; 27 miles N.N.E. of Coſenza. N. lat. 39° 38'. E. long. 16° 44'.

ROSSARNO, a town of Naples, in Calabria Ultra, on the Metrano; 4 miles S.E. of Nicotera.

ROSSBACH, a town of Saxony, in Thuringia, near which Frederic II. king of Pruſſia, gained, in the year 1557, a glorious victory over the combined armies of France and Auſtria; 5 miles N.W. of Weiſſenfels.

Rossbach, *Ober*, a town of Upper Heſſe; 2 miles S.W. of Fridberg.

Rossbach, *Nider*, a town of Upper Heſſe, near Ober Roſsbach.

ROSSCHOCHA, a river of Ruſſia, which runs into the Indigirka, N. lat. 67° 50′. E. long. 140° 14′.

ROSSDEOGHAN, a ſmall iſland on the W. coaſt of Ireland, in Kenmare river; 10 miles N.E. of Lamb's Head.

ROSSDORF, a town of Bavaria; 12 miles N.E. of Bamberg.—Alſo, a town of Germany, in the county of Henneberg; 10 miles N.W. of Meinungen.

ROSSE, in *Ichthyology*, the name given by Bellonius to that kind of cyprinus of Artedi, which we call the roach.

ROSSEL, in *Geography*, a town of Pruſſia, in the province of Ermeland; 50 miles S.S.E. of Königſberg. N. lat. 53° 57′. E. long. 21° 11′.

ROSSELARE, a town of France, in the department of the Lys; 3 miles N. of Grammont.

ROSSENAW, a town of Auſtria; 2 miles N.W. of Zwetl.

ROSSENBURG, a town of the margraviate of Anſpach; 8 miles N. of Anſpach.

ROSSENDORF, a town of the margraviate of Anſpach; 2 miles N.W. of Cadolzburg.

ROSSI, Gian-Vittorio, in *Biography*, an Italian man of letters, was born of a good family at Rome, in 1577. He was educated under the Jeſuits of the Roman college, where he joined the ſtudies of the law and philoſophy to that of polite literature, but being diſappointed in his expectations with reſpect to the firſt of theſe purſuits, he limited his attention to the laſt. He became a member of the academy degli Umoriſti, of which he was one of the moſt zealous promoters, and gave ſuch proofs of ability in its exerciſes, that ſeveral advantageous offers of employment were made to him. He, at length, accepted the poſt of ſecretary to the cardinal Andrea Peretti, with whom he reſided twenty years. After the death of that prelate he retired to a ſolitary villa on mount Sant' Onofrio, where he lived in tranquillity to himſelf, and engaged in his ſtudies, till he died in 1647, at the age of 70. He was much eſteemed by the men of letters at Rome, as well as by many perſons of rank, among whom was the cardinal Chigi, afterwards pope Alexander VII. Roſſi, who is better known by his claſſical name, Erythreus, was author of ſeveral works. His firſt publication was a kind of ſatire on the corrupt manners of the Romans, entitled "Eudemiæ Lib. X." He alſo publiſhed two volumes of "Epiſtles," addreſſed to cardinal Chigi, under the name of Tyrrhenus, and two others to different perſons; alſo various dialogues on moral topics, orations, and other tracts, which are all in the Latin language. His chief work is entitled "Pinnotheca Imaginum illuſtrium Virorum," being eulogies or biographical accounts of many learned men his contemporaries. Gen Biog.

Rossi, Pasquale, called *Paſqualino of Vicenza*, by long practice after the beſt Venetian and Roman pictures, acquired, without a maſter, a conſiderable power of deſign and colour. Few of his public works remain; one of the beſt is a St. Gregorio in the dome of Matelica. In galleries we meet with his cabinet pictures, repreſenting converſations, gaming parties, concerts, and ſimilar capricci, highly elaborate, and of Flemiſh finiſh.

Rossi, Lemme, publiſhed in 1666, at Perugia, in quarto, a work entitled "Siſtema Muſico," or Speculative Muſic, explaining the moſt celebrated ſyſtem of the ancients in all the genera. This is one of the cleareſt and beſt digeſted treatiſes on harmonics that was produced in Italy during the 17th century.

Rossi, Michael Angelo, a dilettante or gentleman-performer on the violin, who, in the part of Apollo, in 1632, accompanied himſelf on that inſtrument in a muſical drama at Rome, entitled "Il Ritorno di Angelica nell' Indie," to the great delight of the audience. It appears that Stradella, who ſung in his own oratorio of St. John the Baptiſt at Rome, led the band, and accompanied his own voice on the violin.

Rossi. See Luigi.

Rossi, la Pasqua, a female ſinger in the conſervatorio of the Incurabili at Venice in 1770, who performed in a motet by Galuppi under his own direction, in a very ſuperior manner. Italian Tour.

Rossi, Francesco di Puglia, an excellent muſical compoſer of the old ſchool, who produced the following three operas, that were much admired in their day: "Sejano moderno della Tracia," 1636; "La pena degl' Occhi," 1688; and "La Corilda, o l'Amor trionfante della Verdetta."

ROSSIGLIONE, Alto, in *Geography*, a town of the Ligurian republic; 17 miles N.W. of Genoa.

Rossiglione, *Baſſo*, a town of the Ligurian republic; 15 miles N.W. of Genoa.

ROSSIGNOL, a conſiderable lake of Nova Scotia, between Liverpool and Annapolis, ſaid by the Indians to be the main ſource of the Liverpool and Petit rivers.—Alſo, a port on the S. coaſt of Nova Scotia, S.W. of Port de l'Heve.

Rossignol, in *Ornithology*. See Motacilla *Lucinia* and *Phœnicurus*.

ROSSINA, in *Geography*, a town of the duchy of Parma; 14 miles S.S.E. of Parma.

ROSSITA, a river of European Turkey, which runs into the Jantra, near Nicop, in Bulgaria.

ROSSITTEN, a town of Pruſſia, in the province of Samland, on the Kuritſch Nerung; 18 miles N. of Königſberg.

ROSSITZ, a town of Bohemia, in the circle of Chrudim; 8 miles N.N.W. of Chrudim.

ROSSLA, a town of Germany, in the principality of Weimar; 6 miles N.E. of Weimar.

ROSSLEBEN, or Rossel, a town of Saxony, in Thuringia; 3 miles N.N.E. of Wiehe.

ROSSLYN, *Earl of*, in *Biography*. See Wedderburne.

ROSSMORE, in *Geography*, an iſland in Kenmare river, county of Kerry, Ireland, about 6 miles W. of Kenmare town.

ROSSO, Cape, a cape on the E. coaſt of the iſland of Metelin. N. lat. 39° 18′.

ROSSOCKEN, a town of Pruſſia, in the province of Oberland; 25 miles S.W. of Ortelſburg.

ROSSOMAKA, in *Zoology*. See Ursus *Gulo*.

ROSS-SHIRE, a county or diſtrict of Scotland, including the ſmall diſperſed county of Cromarty, which united, form one ſheriffdom, though ſeparated lieutenancies, is ſituated between 57° 7′ 40″ and 58° 7′ 20″ north latitude. It is one of the largeſt ſhires in North Britain, and extends about eighty miles in length, and ſeventy-eight in breadth. The whole comprehends 3799 Britiſh ſquare miles, of which 562 are in the iſle of Lewis, and 344 in Cromarty. Roſsſhire ſtretches acroſs the whole of Scotland, from the northern to the weſtern ocean, and has annexed to it, beſides the iſles of Lewis, Barra, and Rona, the Suliſker-rock, and the Flannan and Shaint iſles, which will be found to be noticed under their reſpective names. It is bounded on the north by the county of Sutherland, on the eaſt by the Moray and Cromarty friths, on the ſouth by the county of Inverneſs, and on the weſt by the Atlantic ocean. According

According to the population returns of 1811, the united counties contain 13,280 houfes, and 60,853 inhabitants.

Hiftorical Events—Rofsfhire, in very remote times, conftituted part of the Pictifh kingdom. At a later period, when the Norwegians obtained poffeffion of the Orkneys, and fubdued the neighbouring counties of Caithnefs and Sutherland, it feems to have fhared the ufual fate of frontier provinces, and to have belonged alternately to the Norwegians and to the Scotch. According to the Icelandic writers, it made part of the dominions of the earls of Orkney; but in the "Defcriptio Albaniæ," both the counties of Rofs and Moray are mentioned as comprehended within Scotland; and other accounts ftate that part of Rofsfhire was poffeffed by the princes of the Hebrides, or lords of the Ifles. The truth probably is, that, favoured by their peninfular fituation, the inhabitants of Rofs paid little refpect to the authority of any of their powerful neighbours. Rofsfhire formed a comitatus, or earldom, as early as the 11th century; but of the hiftory of its firft earls fcarcely any authentic document exifts. What is remarkable, however, contrary to the cuftom in moft other feodal poffeffions, this earldom feems to have defcended to heirs female as well as to heirs male. Hugh, one of the earls of Rofs, was flain at the battle of Halidon-hill, in 1333. William, his fon, fucceeded, who appears to have had fome claim to the Weftern ifles, as in a variety of charters, yet extant, he is ftyled earl of Rofs, and lord of Skye. This nobleman flew Raynold of the Ifles in a fray at Perth; but in endeavouring to eftablifh a right to his poffeffions by force, he was completely thwarted. William left iffue an only daughter, who married Walter Leflie, and thereby gave him a title to the earldom. His fon and fucceffor, Alexander, efpoufed one of the daughters of the regent of Scotland, Robert, duke of Albany, and had by her a daughter, Euphemia, who, while a child, was induced to refign her rights to the regent's fon, who thereby became earl of Rofs and Buchan. He did not, however, long enjoy his honours and poffeffions in quiet, for on the death of Euphemia, as is generally believed by poifon, Donald, lord of the Ifles, afferted his title to the earldom of Rofs, and being received by the inhabitants, not only fucceeded in obtaining poffeffion of the diftrict, but extended his dominions as far fouthwards as the Grampian hills, and tranfmitted them to his pofterity. John, his fon and fucceffor, who lived in the middle of the 15th century, was one of the moft powerful chieftains of his age. He ufed the ftyle of an independent prince, made treaties with Edward IV. of England, &c.; and, indeed, the extent of his territories might well juftify fuch conduct, as his fway was acknowledged over at leaft a fourth part of the whole kingdom of Scotland.

General Afpect.—On the eaftern coaft of Rofsfhire, to a fhort diftance from the fea, the country is comparatively flat, and being chiefly inhabited by perfons fpeaking the Englifh language, has been long confidered to be part of the lowlands of Scotland. This tract is extremely fertile and well cultivated, and abounds with feats belonging to opulent and refpectable proprietors, by whofe exertions it has been greatly improved of late years. The climate is more favourable to agricultural purfuits than in moft of the northern diftricts of our ifland; fo likewife is the foil, which, in many parifhes, is a deep loam, capable of yielding very large crops of wheat. In fhort, fuch are the natural advantages of this narrow tract, that it is confidered little inferior to Fifefhire, either in point of foil or climate. Unfortunately, however, the portion of it fufceptible of arable culture, though nearly fixty miles in length, rarely exceeds a mile and a half in breadth, except in the parifhes of Nigg and Tarbet. The foils here are, of courfe, various. In the parifhes of Fodderty, Dingwall, Kiltearn, Nigg, and Eaftern Fern, a rich deep loam prevails. About Contin, and in the parifhes of Alnefs, Rofekeen, and Kilmuir, the foil is light, but fufficiently favourable for general crops. The other portions confift of a conftant fucceffion of lofty mountains. The central diftrict, however, may be juftly defcribed as a beautiful Highland country, the hills being covered with a profufion of grafs, and every where interfected by ftraths, or valleys, many of them extremely rich and fertile; but on approaching the weftern coaft the general afpect is uninviting. The traveller who climbs a mountain beholds around him a profpect exhibiting a defolate and dreary region, where nothing can be feen but vaft rocky mountains, with fummits broken, ferrated, and fpringing into various forms. Yet amidft thefe hills, fo dreary to the fight, and producing little but heath, fome valleys, at once beautiful and fertile, intervene, which might be cultivated with advantage, did not the climate to which they are fubjected deter the inhabitants. During March and April, the weather is commonly friendly to the operations of the hufbandman. In the autumnal months rain falls in fuch quantities, as to lay the ripening corn flat upon the fields, and to fwell every trifling ftream into a torrent, by which the lands are ftripped of their produce, and fand and ftones are fubftituted. The fair days in this diftrict, according to a regifter kept at Lochalfh, are eftimated at 143 in number annually; but in the months of Auguft, September, October, and November, not more than five days in thirty are free from rain. The foils in the valleys, both here and in the middle diftrict, are moftly alluvial, and partake, in general, of thofe of the nature of the furrounding mountains. At the head of the bay of Applecrofs the foil is fandy; and on its fouthern fide refts on lime-ftone. At Keefhorn it is of the fame defcription, and very fertile. The foil of Terridon is light and gravelly, with the exception of a few patches of mofs; which have lately been brought into a ftate of cultivation. At loch Carron, a great variety of foil may be obferved within a very limited fpace. On the flat fpots along the fhore the foil is light and ftony; on the higher and floping grounds, a fandy loam; and at the head of the loch it is of a loofe clayey confiftence.

Mineralogy.—The mineral products of thefe counties are but very little known, becaufe the fubterranean contents have hitherto been but little inveftigated. Coal is indicated in every part of the Black ifle, in Cromarty, and throughout all the eaftern parts of Rofsfhire. Lime-ftone is abundant on the weftern coaft, where it is leaft wanted, and is likewife partially found at Kirkan, and in the eaftern diftrict, particularly in the vicinity of Geanies and Cadboll. Copper has been wrought in primary lime-ftone near Keefhorn; but the mine is for the prefent abandoned. In the parifh of Kiltearn, fmall quantities of lead-ore have been difcovered; and a vein of the fame metal, very rich in filver, appears in the parifh of Alnefs. Here alfo is a ftratum of iron-ftone, which is plentiful in moft parts of the eaftern diftrict. At Poolew yet remain the ruins of a large fmelting-furnace, the exiftence of which fhews the manufacture of iron to have been once an important bufinefs in that part of the country. Marle has been found in large quantities in the fame diftrict, particularly at Culrain, near the fea; and on the weft coaft, in the parifh of Lochalfh, is an immenfe bank of fhell-fand, the right of property in which has been for many years a fubject of litigation between Mr. Innes of Lochalfh, and the clergyman of the parifh, Mr. Downie, the former contending that it belongs to him as proprietor of the eftate of Lochalfh, and the latter, that it lies

within

within sea-mark, and is therefore *inter regalia*. In the parish of Kincardine stands one of the loftiest mountains in Ross-shire, called Carnchuinaig, on which stones have been found perfectly similar to those known by the name of Cairngorums.

Knockirny, another hill on the borders of the same parish, produces excellent marble, both white and particoloured. The other loftiest mountains in Rossshire are, Tulloch-Ard, in the district of Kintail; Ben-Uaish, in the parish of Kiltearn; and Scuilm-a-bharra, in the parish of Kincardine. That of Tulloch-Ard claims particular attention on account of its importance in remote times. "Like the temple of Janus of ancient Rome, it indicated peace or war; for when war commenced, a barrel of burning tar, on the highest peak, was the signal; and in twenty-four hours all the tenants and vassals of Seaforth appeared at the castle of St. Donan, armed *pro aris et focis*. This mountain is the crest of Seaforth's arms."

Lochs and Rivers.—The eastern coast of the united counties of Ross and Cromarty is washed by three large arms of the sea, the Dornoch, Cromarty, and Murray friths.

On the western coast there are eight arms of the sea, stretching for many miles up the country. These are, loch Broom, Little loch Broom, loch Greinord, loch Ew, loch Torbidon, loch Carron, loch Daich, and the Gairloch; all of them the usual resort of vast shoals of herrings. Gairloch has likewise been celebrated, during several centuries, for the cod-fishing. One proprietor, only, sends on an average 40,000 fish of this kind to market annually. The principal fresh-water lakes are loch Maree, and loch Tannich, the former about fifteen miles long, and the latter seven; besides which there are above twenty less considerable lakes, and a great number of small ones. These abound with fine trout and pike, and in some are charrs. In loch Maree is found that species of trout called the gizzard trout. This loch is adorned with twenty-four small islands, planted with fir-trees, and other kinds of wood. The largest rivers on the western coast are the Ew, the Carron, and the Broom, which fall into the respective lochs of the same names. The first-mentioned of these is frequented by prodigious numbers of salmon, and is perhaps the best angling stream in Britain. Salmon are likewise plentiful in the Carron, and at Ullapool. On the eastern coast the chief rivers are the Conan, the (east) Carron, the Alness, and the Oikel. The Conan and Alness fall into the Cromarty frith, which also receives several minor streams. The Carron empties itself into the Dornoch frith, as does likewise the Oikel, which forms the boundary between the counties of Ross and Sutherland. The salmon fisheries on all these rivers are very productive. The river Beaulie, which flows into the Murray frith, is the boundary of the county for several miles on the Invernessshire side.

There is a variety of sulphureous and chalybeate springs in Rossshire. The spring at Strathpeffer, which is sulphureous, is most remarkable, on account of the very great resort of Highhlanders and strangers to drink its waters from a belief in their medicinal qualities for the cure of cutaneous disorders, and of barrenness in women.

State of Property.—The value of land in these counties, as in most parts of Great Britain, has vastly increased within the last twenty years. Numerous farms, which, at the commencement of that period, were rented at little more than 200*l.* *per annum*, have been leased since 1805, as high as 800*l.* or 1000*l.*; and their monied price, when they have been brought to market, has held a proportional elevation. Landlords, trusting to ignorant surveyors, when about to let their lands, generally put a value on them, which experience has woefully shewn to be far beyond their intrinsic worth. Hence distress arose among the farmers, even when food was at its highest pitch, and most of them were consequently compelled to throw up their leases, or to obtain a considerable reduction of rent.

Most of the estates in Ross and Cromarty shires are held directly under the crown, vice the earls and bishops of Ross. The few duties formerly paid to the earls and bishops are now levied for the government; and being payable chiefly in kind, convertible at the fair price of corn, they have become a very heavy burthen on the estates from which they are taken. Until lately almost every extensive proprietor committed the management of his estate to a factor, but the evils of this practice have at length begun to operate a cure. "There can be no doubt," observes sir George Mackenzie, in his "General View of the Agriculture" of these counties, "but that the crowded population of the Highlands, and their consequent slow improvement, must be attributed, in a great measure, to the extensive power given to factors." The late factor of the proprietor of Lochalsh, by his injudicious conduct, involved his employer in numerous litigations with the minister of the parish, and with his tenants, some of which have been depending for upwards of nine years. The principal landholders are the heirs of the late lord Seaforth, Mr. Innes of Lochalsh, sir Hugh Monro of Fowlis castle, sir Alexander Munro of Novar house, sir Hector Mackenzie of Conanside, sir Roderick Mackenzie of Rosehaugh, sir Charles Ross of Balnagown castle, and Alexander Ross, esq. of Cromarty house. This mansion is by far the most elegant, and the best laid out building of any in this part of the united kingdom, but the pleasure-grounds have been much neglected.

Agriculture.—The proprietors of the eastern district of these counties are very spirited in improving, and follow every species of good husbandry practised in the south. Farmers of the superior class begin to imitate their example; but the smaller tenants are far behind. The usual grains cultivated on the arable lands are bear, oats, potatoes, pease and beans, and, along the shore, wheat. Every rotation customary in the south has been tried; but the want of markets within the county has induced many to lay their farms down with grass. The grasses generally sown, both for hay and pasturage, are red and white clover, with a mixture of rye-grass and rib-grass. The ordinary rotation practised by the small tenants, and which they have uniformly pursued for centuries, is bear, or bigg, with manure, followed by two crops of oats, or sometimes pease, and always a quantity of potatoes; on which root their families are chiefly maintained during nine months of the year. The gentlemen, and more extensive farmers, use lime, marle, and shelly-sand, as manure. The smaller tenants make a compost at the rate of one load of dung to three of earth, which they deposit for some time in pits, and then spread in February on the stubble land. The manure is then ploughed down, and another ploughing is given towards the end of April, when they sow their bear, or bigg. The shelly-sand on the west coast is reckoned a very valuable manure; it lasts from twelve to fifteen years, and has the effect of converting a light brown insipid soil into rich black loam. The size of farms here is various. The native farmers occupy from seven to thirty-seven acres of arable land; and, in some instances, have small grazings contiguous to their arable fields; but, for the most part, the horses and cattle employed in the labour of the farms are sent, as soon as seed-time is over, to graze during summer on some hill pasture, for which five or six shillings *per* head are paid. The gentlemen, and better sort of farmers, possess from 300 to 800 acres,

acres, which are in general inclosed; but the rest of the country is almost entirely open field. Among the smaller tenants leases usually run from five to seven years, at the end of which an increase of rent is most frequently demanded. This limitation of leases greatly retards improvement; for the tenant can reap but little benefit from his labour in so short a space of time; and if he has done any thing more than his neighbours, his farm is coveted, and he must either give a greater increase of rent than it can properly bear, or remove. There are some estates, however, in the leasing of which a different practice has been adopted, to the mutual advantage of the landholder and the tenant.

The central and western districts of Rosshire may be considered as exclusively devoted to pasturage; the small quantities of arable lands in the vallies bearing but a very insignificant proportion to the extent of the country. Till within the last thirty years these districts were inhabited by a number of small farmers who maintained themselves and their families from the produce of the little spots they had to cultivate, and who, in favourable seasons, were enabled to pay the trifling rent imposed by the landlord, from the profit of the cattle they possessed. These extensive districts, particularly the central district, are now converted from cattle into sheep farms; and there is no question of their superior adaptation to the latter species of stock. For every pound of beef which a Highland cattle grazier can send to market, a shepherd can at least bring three pounds of mutton. The wool also furnishes the staple for a useful and important branch of manufacture. Hence the shepherd can afford a double rent with ease; and there can hardly exist a doubt that property in the Highlands will, in process of time, be tripled, or even quadrupled, by sheep farming. The result, however, upon the population of the country is becoming more and more evident. In proportion as capital is acquired, farms augment in magnitude, and a smaller number of people find employment and support within a given space.

Live-Stock.—The cattle reared in the low parts of these counties are chiefly intended for the dairy, and are a mixed breed. The oxen and old cows are commonly fattened for the butchers of Inverness and Fort George. The breeds of sheep kept are various. The pure Cheviots, a mixture of that breed with the Leicester, and a mixture of the latter with the old white-faced horned breed of the country, are frequently met with, and also the pure Leicester. Some gentlemen have introduced the South Down and the Merino, and have successfully attempted crosses of these with the Cheviot breed. The mountain breed is not larger than ponies, but by care and attention in breeding, the size and utility might be greatly augmented. The breed of hogs kept by gentlemen for their tables, is that of China; but the country people chiefly rear the large common sow. Turkies, ducks, pea fowls, Guinea fowls, and common fowls, are reared by most of the families residing in the country, but only to supply their own consumption. Pigeon-houses are very frequent; and bees are beginning to attract considerable attention.

Roads.—Through the cultivated parts of the county the roads have been long noted for their excellence, though there were no other means for making or repairing than the ordinary statute labour. About seven years ago, however, a bill for converting the statute labour into money was presented to parliament, and passed into a law. By this act, the post-road from the borders of the county of Ross, near Beauly, to its termination at the Frith of Dornoch, is to be made turnpike; and authority is given for the erection of toll-gates every six miles. The materials for making roads are every where found in great abundance; but the number of bridges required renders road-making very expensive. The roads forming by government, and the Highland counties conjointly, will cost, on an average, 250*l. per* mile; though their breadth be only fifteen feet. The roads in the mountainous districts, if roads they can be called, are very bad; but most of them are in progress of amelioration. The road from Contin to Lochcarron is considerably advanced.

Towns and Villages.—In the united counties of Ross and Cromarty there are three royal boroughs, all of them situated in the eastern district. These are Tain, on the southern side of the Frith of Dornoch; Dingwall, at the inland extremity of the Frith of Cromarty; and Fortrose, on the northern side of the Moray Frith. Of the villages, the most worthy of notice are Cromarty, Ullapool, Fairntosh, and Lochalsh: the last has lately been constituted a burgh of barony. Fairntosh is remarkable for the singular privilege it enjoyed for nearly a century, of exemption from excise, on condition of an annual payment of 400 marks Scots. This right was resumed by government in 1786, and the sum of 20,000*l.* was granted as a compensation to the proprietor. Before that period, Fairntosh whiskey was proverbial for its purity and excellence; and even yet, the appellation of real Fairntosh is used to denote the best samples of that favourite Highland beverage. Fairs, markets, and "trysts" for cattle, are held at various places throughout the country; some of them established by custom, and others by acts of parliament.

Manufactures and Commerce.—The only manufacture which has been established in these counties is that of biscuit and cotton-bagging at Cromarty, with branches at Invergordon and Port-Mahomack. This is carried on to a considerable extent. The bagging made at these places, and at Inverness, obtains a decided preference, under the name of Inverness bagging, where it is principally sold. Many years ago, a flax manufactory was attempted to be established, but without success. With respect to commerce, it may be observed, that the chief exports are black cattle, sheep, and wool, and a considerable quantity of wheat and oats.

Antiquities.—Rosshire contains a considerable number of remains of antiquity, which are not unworthy of notice. These consist chiefly of Druidical temples, and Pictish or Danish forts, called Duns, and of the castles of the ancient chieftains. In the parish of Kiltearn, in the eastern district, is a Druidical temple, consisting of a row of twelve large stones, so disposed as to form two conjoined ovals. The area of each oval is 13 feet long and 10 feet broad in the centre. At the western extremity of one of them is a stone, which rises eight feet above the surface of the ground; but the other stones do not exceed six feet in length. In the middle of the western oval is a flat stone, which was probably the altar; and at the distance of three paces from the eastern oval is a circular hollow, said to have been a well of considerable depth, but it is now filled up. These ovals occupy the summit of an eminence, round which are drawn three concentric circular ditches; and at the distance of half a mile to the westward is a cairn, 30 paces in diameter, containing in the centre a grave $3\frac{1}{2}$ feet long, 18 inches broad, and 14 deep, lined by four flat stones, and covered by another. Cairns are also numerous on the adjoining hill. In the parish of Nigg, on the the same coast, stands a large obelisk, on one side of which are cut the figures of different animals, and on the other a cross. The former is supposed to be a much older work than the latter; and the tradition is, that the stone was erected in memory of a shipwreck, by which three

three sons of one of the Danish monarchs are said to have lost their lives, and their bodies buried under the obelisk. The rock opposite, where the vessel struck, is from this circumstance still called the King's-Sons. Another obelisk, similar to the above, formerly stood in Nigg church-yard, but the base of it alone remains. Near Dunskeath, on the ledge of a rock over-hanging the Moray frith, are the remains of a castle, built in 1179, by William, surnamed the Lion, king of Scotland. In the parish of Kincardine is Craigchenican, where the gallant marquis of Montrose fought his last battle. He swam to Kyle, and lay some time concealed in Assint; but being discovered and apprehended he was sent prisoner to Inverness. The ground where the battle took place received its present name from the event of that memorable day. Near the church, in the same parish, is an alley, walled in, and terminating in a large semicircle, appropriated to the military exercise and discipline, distinguished by the name of Weapon-shawing; and in the cemetery is a stone sculptured with an imperial crown, and a man on horse-back, in the act of darting a lance. Tradition reports it to be the upper part of a stone coffin, in which the remains of a prince of Loellin, who died of his wounds in the neighbourhood, were deposited. In the same neighbourhood are also several Druidical circles, and likewise some of the round buildings which were formerly mentioned under the denomination of Picts-houses. Near Avoch, the foundations still remain of a large old castle, or fortalice. To this ruin tradition gives the name of Douglas castle. It is about 350 feet long and 160 feet broad, divided into numerous apartments, which appear to have been constructed of coarse red quarry-stone and lime; and was defended on one side by a deep fosse, and on another by bastions. Throughout every part of the eastern district are abundance of places where battles with the Danes and Norwegians, or between rival clans, are said to have been fought. Numbers of cairns point out the spots where the ashes of the dead have been deposited, though concerning most of them tradition is silent. In the parish of Eddertoun, however, on a plain to the west of the church, tradition says a great battle was fought against the Danes, one of whose princes, who fell in action, lies buried in the centre of a large circular barrow in the immediate vicinity. In the parish of Fearn are several Druidical temples; but the most interesting monuments of antiquity here are the abbey and castle of Lochlin. The abbey-church was long used for divine service, but is now in a state of ruin. The castle occupies the summit of a very lofty eminence, and is one of the most conspicuous objects in the country. It is built in the form of two squares, joined together at the corners. Another very ancient castle was situated at Cadboll, whence it derived its name. Few remains of it now exist, except the vaults under ground; but it deserves notice on account of a singular tradition concerning it, which is fully credited by the vulgar, *viz.* that though it was inhabited for many centuries, no person ever died in it; in short, that it possessed a magical charm against death, though not against disease, or the evils attendant on extreme old age. Hence many of the inhabitants, it is said, when they became weary of life, requested to be carried out of the castle, that they might obtain relief. The castle of Craighouse, in the parish of Kirk-Michael, stands close to the shore, inclosed on the land side by a ditch and high wall. All the apartments of that portion of the mansion now most entire are vaulted with stone. This castle was long the property of the family of Williamson, who emigrated to Germany; it afterwards became the occasional residence of the bishops of Ross. In this vicinity is a great number of ancient encampments, likewise various tumuli and cairns. In Killernan parish are two ancient structures, Killcoy and Redcastle, of considerable strength. The latter was anciently of some importance. It was annexed to the crown in 1455, and was constituted a borough of barony, and a free-port, with the right of holding weekly markets, and levying toll and anchorage dues. Rory Mackenzie, the proprietor of Redcastle in 1646, having joined the rebellious standard of the gallant marquis of Montrose, was taken prisoner near Balveny, in Morayshire, and suffered the death of a traitor. During his absence the castle was garrisoned by his sons and dependants, but was soon after stormed and taken by a party of royalists, who put the garrison to the sword and set fire to the buildings. In the mountainous peninsula of Kintail, on the west coast, stand the ruins of the castle of Donan, which was built by Alexander III. of Scotland, to resist the depredations of the Danes. Colin Fitzgerald, ancestor to the late earl of Seaforth, was made constable of the castle, for his bravery at the battle of Largs, fought in 1263. In 1715 it was taken from the king's forces by stratagem; but two years afterwards, having been attacked on the sea side, by a line of battle ship, it was demolished. In the front of a clergyman's house, in Kintail, stands Donan-Diarmed, or the fort of Diarmed. It is of a circular form, twenty feet in diameter, and of the same height. Diarmed's tomb is on the north-east side of the fort.

Such parts of Rosshire as are included in the Hebrides, the reader will find noticed under their respective names, and also under the words WESTERN ISLANDS. Beauties of Scotland, vol. v. Lond. 8vo. 1808. A General View of the Agriculture, &c. of the Counties of Ross and Cromarty, by sir George Stuart Mackenzie, bart. Lond. 8vo. 1810.

ROST, JOHN CHRISTOPHER, in *Biography*, a German poet, was born at Leipsic in the year 1717. He received a good education, and as he advanced in life he studied, with the utmost assiduity, jurisprudence, antiquities, and the belles lettres. His chief instructor was Ernesti, but he studied philosophy also under Hoffman, and attended the lectures of Gottsched, to whose praise he devoted the first fruits of his muse, though he afterwards wrote against him a satirical poem, which was published in 1743. This is said to be the best of his productions, and to abound with genuine and delicate wit. He attempted pastorals in the German language, which were printed at Berlin in 1742, but the morality of them is exceedingly lax, and vice is exhibited too frequently under the captivating form of innocence. A new edition of them appeared at Dresden in 1744, entitled "An Attempt at Pastoral Poetry, with other poetical Pieces," and a third was published in 1768. In 1746, Rost was appointed secretary and librarian to count Bruhl, and died in 1765, in the 48th year of his age. His miscellaneous poems were published after his death, in 1769. Gen. Biog.

ROST, in *Metallurgy*, a term used by the miners at Chremnitz to express the ore of gold after it has been washed and powdered, and melted first with lime-stone, and afterwards burnt with charcoal alone. See LECH.

ROSTAD, in *Geography*, a town of Norway; 70 miles N. of Drontheim.

ROSTAK, a town of Arabia, in the province of Oman, the seat of a sovereign prince, at some distance from the sea; 70 miles W. of Mascat.

ROSTAK, a town of Persia, in the province of Laristan; 90 miles S. of Mar.

ROSTAL, a town of Germany, in the principality of Anspach; 7 miles N.N.W. of Schwabach.

ROSTAN,

ROSTAN, a town of Syria, in the pachalic of Damafcus; 45 miles N.N.E. of Damafcus.

ROSTAYN, a town of Bohemia, in the circle of Boleflau; 4 miles N. of Aycha.

ROSTEN, in the *Materia Medica* of earlier ages, a name given to crab's eyes.

ROSTER, in *Military Language*, a plan, or table, by which the duty of officers, entire battalions, and fquadrons, is regulated.

ROSTGAARD, Frederick, in *Biography*, a learned Danifh writer, was born at Kraagerup, in Seland, in the year 1671. He was educated at Copenhagen, and in 1690 he undertook a tour through Europe; in the courfe of which he paid a vifit to the moft celebrated univerfities of Germany, Holland, England, France, and Italy. After his return in 1669, he was made private keeper of the records to his Danifh majefty, and in 1702 was ennobled and appointed a counfellor of juftice. In 1721 he became chief fecretary in the Danifh chancery, and after receiving a confiderable penfion, he was nominated in 1735 a counfellor of conference. He died in 1745, and bequeathed to the library of the univerfity of Copenhagen a great many manufcripts and feveral printed books, confifting moftly of hiftorical works, with a large fount of Arabic and Perfian types. He was author of a great number of works, among which the following may be enumerated: "Deliciæ Poetarum Danorum;" "A Danifh Tranflation of Corneille's Cid;" "Projet d'une nouvelle Methodé pour dreffer le Catalogue d'une Bibliothéque felon les Matières avec le Plan;" "Enchiridion ftudiofi, Arabicè cum Verfione Latina, edit. ab Hadrino Relando." He collected, with great care, and at a confiderable expence, in various parts of France and Italy, manufcripts of "Libanii Epiftolæ," from which the edition of J. C. Wolfius of Hamburgh was publifhed. It was through the exertions of Roftgaard that the "Fragmentum Theotifcum Ifidori Hifpalenfis" was difcovered and publifhed in the fecond volume of the Danifh Bibliotheque. He was the author of many Latin and Danifh poems, and was employed for feveral years on a Danifh Lexicon, as well as in collecting rare Arabic and Greek manufcripts, and heraldic documents relating to the Danifh nobility. Gen. Biog.

ROSTOCK, in *Geography*, a fea-port town of Germany, in the circle of Lower Saxony, and duchy of Mecklenburg, on a lake which communicates with the Baltic. It contains three churches and an univerfity, jointly founded by the dukes and the town in the year 1419, and privileged by a bull of pope Martin V. afterwards confirmed by the emperor Ferdinand I. But in 1437, the town fell under the ban both of the emperor and pope, and the profeffors removed to Griefswalde, whence they returned again in 1443. In 1487, on account of a mifunderftanding between the dukes and the town, the univerfity was removed to Lubeck, but again reftored in 1492. The place has thrice fuffered from the peftilence, and at the commencement of the reformation was deferted by its profeffors and ftudents till the year 1530, and in 1560 the emperor Ferdinand afforded it a new charter. In purfuance of a convention made, in 1563, between the dukes and the town, the former nominate and pay fifteen profeffors, and the town nine. It was alfo agreed that the dukes fhould annually contribute 3000 florins, and the town 500, towards the falaries of the profeffors. The magiftracy confifts of three burgher-mafters, one fyndic, twelve aldermen, one fecretary, and a prothonotary. It poffeffes the right of coining copper, filver, and gold, and therefore has a mint. Both the civil and criminal jurifdiction are vefted in the magiftracy, with right of appeal to the two fupreme courts of juftice, except in thofe cafes where no appeal is allowed. The town enjoys other confiderable privileges; neverthelefs it is hereditarily fubject to the dukes, in acknowledgment of which fubjection it annually pays 55 rixdollars, as an original tribute, and alfo 600 florins, for the grant of an excife. The trade of this town is very confiderable. In the year 1218 it was admitted into the Hanfeatic confederacy; 25 miles N.E. of Weifmar. N. lat. 54° 10′. E. long. 12° 12′.

ROSTOV, a town of Ruffia, in the government of Jaroflavl, fituated near a lake, to which it gives name: the fee of a bifhop; 36 miles S. of Jaroflavl. N. lat. 57°. E. long. 39° 54′.

ROSTRA, in *Antiquity*, a part of the Roman forum, wherein orations, pleadings, funeral harangues, &c. were delivered.

The roftrum was a kind of chapel, taken out of the forum, and furnifhed with a fuggeftum, or eminence, called more particularly the roftra, where the orators ftood to fpeak.

It was adorned, or, as Livy fays, built, with the beaks of fhips taken from the people of Antium, in a naval engagement; whence the name.

There were two kinds of roftra; *roftra vetera* and *roftra nova*. The latter was erected by Auguftus, and decorated with the prows of veffels which he took at the battle of Actium. The firft were thofe already defcribed.

ROSTRALIS Corona, *Roftral Crown*. See Crown.

Rostralis *Columna*, *Roftral Column*. See Column.

ROSTRATA, in *Zoology*. See Toucan.

ROSTRENEN in *Geography*, a town of France, and principal place of a diftrict, in the department of the North Coafts; 20 miles S. of Guingamp. N. lat. 48° 14′. W. long. 3° 15′.

ROSTREVOR, a poft-town of the county of Down, Ireland, fituate on the bay of Carlingford, and much frequented for fea-bathing. Mr. Wakefield calls it the Brighton of Ireland, and it has been much admired for its romantic fcenery. It is a wooded bank, on a fmall arm of the fea, and has behind it the Mourne mountains. It is $57\frac{1}{2}$ miles N. from Dublin, and $7\frac{1}{2}$ from Newry.

ROSTRIFORMIS Processus, in *Anatomy*, the fame as coracoides.

ROSTRUM literally denotes the beak or bill of a bird. This is a hard horny fubftance, confifting of an upper and under part, extending from the head, and anfwering to the mandibles in quadrupeds. Its edges are generally plain and fharp, like the edge of a knife, or cultrated; fometimes ferrated, or jagged, or pectinated, or denticulated; but always deftitute of real teeth immerfed in fockets. See *Anatomy of* Birds.

Hence the word is alfo figuratively applied to the beak, or fore-part, of the head of a fhip.

The roftrum, or fnout, in fifhes, varies very much in figure, and ferves as a confiderable article of diftinction. It is, 1. In fome plagioplateous, or depreffed, as in the pike, &c. 2. In fome it is conic in fhape, as in the oxyrynchus, &c. 3. In fome it is extended into a long and fharp point, as in the common ones. And, 4. In others it is triangular, or nearly fo, as in the rays. See Fish.

Rostrum is alfo ufed to fignify an inftrument, with which paper is ruled for mufical compofitions.

Rostrum, in *Chemiftry*, fignifies the nofe, or beak, of the common alembic, which conveys the liquor diftilled into its receiver.

Rostrum is alfo a fort of crooked fciffars, which the furgeons, ſurgeons, in ſome caſes, make uſe of for the dilatation of wounds.

ROSTRUM *Leporinum*, in *Surgery*, the piece of fleſh ſituated betwixt the margins of a hare-lip.

ROSTRUM *Seminis*, in *Botany*, the beak of the ſeed, is an elongation of the apex of a naked ſeed, originating either in the baſe of the ſtyle itſelf, remaining in a hardened ſtate (ſee DICHROMENA); or it conſiſts of an appendage to the whole fruit, compoſed of two naked ſeeds; as in *Scandix*. The ſame term applies to a ſimilar elongation of certain ſeed-veſſels; as in *Geranium* and its allies, whoſe beaks bear a ſtrong analogy to thoſe of *Scandix;* and in *Helleborus*, *Delphinium*, and abundance of other genera, where they originate from the indurated ſtyles.

ROSWEIDE, HERIBERT, in *Biography*, a learned Dutch Jeſuit, and writer in eccleſiaſtical antiquities, was born at Utrecht in the year 1569. He entered among the diſciples of Loyola, at Doway in Flanders, when he was 20 years of age, and ſoon diſcovered the ſubjects of ſtudy peculiarly adapted to his genius, by ſpending the time which he was allowed to devote to exerciſe and recreation, in examining the libraries of the monaſteries in that city, and reſcuing the ancient manuſcripts contained in them from duſt and oblivion. Having completed his courſe of academical ſtudies, he filled ſucceſſively the chairs of philoſophy and divinity, firſt at Doway and afterwards at Antwerp, with great reputation for ſeveral years. After this he devoted his time to the compoſition and publication of his various works. He died in 1629, at the age of 60. He publiſhed, in 1607, "Faſti Sanctorum quorum Vitæ in Belgicis Bibliothecis Manuſcriptæ aſſervantur," which he intended as a ſpecimen of a larger work, and which was the prototype of the immenſe collection by Bollandus and others, under the title of Acta Sanctorum. He was author of many other works, among which is "An Account of the Hermits of Egypt and Paleſtine," "An Eccleſiaſtical Hiſtory from the Time of Chriſt to Pope Urban VIII." in two vols. folio; and "The Hiſtory of the Belgic Church."

ROSWALD, in *Geography*, a town of Moravia, in the circle of Prerau, inſulated in Sileſia; 6 miles N. of Jagendorf.

ROSWICK, a town of Sweden, in Weſt Bothnia; 10 miles N. of Pitea.

ROSYCRUSIANS, ROSICRUCIANS, *Roſacrucians*, or *Brothers of the Roſy-croſs*, a name aſſumed by a ſect or cabal of hermetical philoſophers, or of *Theoſophiſts;* who arofe, as it has been ſaid, or at leaſt became firſt taken notice of, in Germany, in the beginning of the 14th century.

They bound themſelves together by a ſolemn ſecret, which they all ſwore inviolably to preſerve; and obliged themſelves, at their admiſſion into the order, to a ſtrict obſervance of certain eſtabliſhed rules.

They pretended to know all ſciences, and chiefly medicine; of which they publiſhed themſelves the reſtorers. They pretended to be maſters of abundance of important ſecrets; and, among others, that of the philoſopher's ſtone; all which they have affirmed to have received by tradition from the ancient Egyptians, Chaldeans, the Magi, and Gymnoſophiſts.

Their chief was a German gentleman, called Chriſtian Roſencruz, educated in a monaſtery, where he learnt the languages. About the cloſe of the 14th century he went to the Holy Land, and viſited the holy ſepulchre; and falling ſick at Damaſcus, he conſulted the Arabs, and other eaſtern philoſophers, by whom he was ſuppoſed to be initiated into this wonderful art. At his return into Germany, he formed a ſociety, to whom he communicated the ſecrets he had brought with him out of the Eaſt, under an inviolable oath of ſecrecy, and finally died in 1484.

This ſociety remained concealed till the beginning of the 17th century, when two books were publiſhed; the one entitled "Fama Fraternitatis laudabilis Ordinis Roſæcruſis," The Report of the laudable Fraternity of Roſicrucians; the other, "Confeſſio Fraternitatis," The Confeſſion of the Fraternity. In theſe works the world was informed, that the fraternity was enabled, by divine revelation, to explain the moſt important ſecrets both of nature and grace; that they were appointed to correct the errors of the learned world, particularly in philoſophy and medicine; that they were poſſeſſed of the philoſopher's ſtone, and underſtood both the art of tranſmuting metals and of prolonging human life; and in fine, that by their means the golden age would return. As ſoon as theſe grand ſecrets were divulged, the whole tribe of the Paracelſiſts, Theoſophiſts, and chemiſts, flocked to the Roſicrucian ſtandard, and every new and unheard-of myſtery was referred to this fraternity. Various were the opinions that were formed of this ſociety; but though its laws and ſtatutes had appeared, no one could tell where the ſociety itſelf was to be found, or who really belonged to it. It was imagined by ſome ſagacious obſervers, that a certain important meaning was concealed under the ſtory of the Roſicrucian fraternity, though they were wholly unable to ſay what it was. One conjectured that ſome chemical myſtery lay hid behind the allegorical tale; another ſuppoſed that it foretold ſome great eccleſiaſtical revolution. At laſt Michael Brele, in the year 1620, had the courage publicly to declare, that he certainly knew the whole ſtory to have been the contrivance of ſome ingenious perſons, who choſe to amuſe themſelves by impoſing upon the public credulity. This declaration raiſed a ſuſpicion againſt the whole ſtory; and as no one undertook to contradict it, this wonderful ſociety daily vaniſhed, and the rumours which had been ſpread concerning it ceaſed. The whole was probably a contrivance to ridicule the pretenders to ſecret wiſdom and wonderful power, particularly the chemiſts, who boaſted that they poſſeſſed the philoſopher's ſtone. It has been conjectured, ſays Brucker, and the ſatirical turn of his writings, and ſeveral particular paſſages in his works, favour the conjecture, that this farce was invented and performed, in part at leaſt, by John Valentine Andrea, a divine of Wartenburg.

We ſhall here ſubjoin ſome further particulars concerning the Roſicrucians.

They have been diſtinguiſhed by ſeveral names, accommodated to the ſeveral branches of their doctrine.

Becauſe they pretend to protract the period of human life, by means of certain noſtrums, and even to reſtore youth, they were called *immortales*.

As they pretended to know all things, they have been called *illuminati:* and becauſe they have made no appearance for ſeveral years, but have kept altogether incognito, they have been called the *inviſible brothers*.

Their ſociety is frequently ſigned by the letters F. R. C., which ſome among them interpret *fratres roris cocti;* it being pretended, that the matter of the philoſopher's ſtone is dew concocted, exalted, &c.

Some, who are no friends to free-maſonry, make the preſent flouriſhing ſociety of free-maſons a branch of Roſicrucians; or rather the Roſicrucians themſelves, under a new name or relation; *viz.* as retainers to building. And it is certain, there are ſome free-maſons who have all the characters of Roſicrucians; but how the era and original of maſonry, as traced by Mr. Anderſon, and that of Roſicrucianiſm, crucianifm, here fixed from Naudæus, who has written exprefsly on the fubject, confift, we leave others to judge.

Notwithftanding the pretended antiquity of the Roficrucians, it is probable that the alchemifts, Paracelfifts, or *fire philofophers*, who fpread themfelves through almoft all Europe, about the clofe of the 16th century, affumed, about this period, the obfcure and ambiguous title of Roficrucian brethren, which commanded, at firft, fome degree of refpect, as it feemed to be borrowed from the arms of Luther, which were a *crofs* placed upon a *rofe*.

But the denomination evidently appears to be derived from the fcience of chemiftry. It is not compounded, fays Mofheim, as many imagine, of the two words *rofa* and *crux*, which fignify *rofe* and *crofs*, but of the latter of thefe words, and the Latin word *ros*, which fignifies *dew*. Of all natural bodies, dew was efteemed the moft powerful diffolvent of gold; and the *crofs*, in the chemical language, is equivalent to *light*, becaufe the figure of a crofs + exhibits, at the fame time, the three letters of which the word *lux*, or *light*, is compounded. Now *lux* is called, by this fect, the feed or menftruum of the red dragon, or, in other words, that grofs and corporeal light, which, when properly digefted and modified, produces gold. Hence it follows, if this etymology be admitted, that a Roficrucian philofopher is one, who, by the intervention and affiftance of the dew, feeks for light, or, in other words, the fubftance called the philofopher's ftone.

The true meaning and energy of this denomination did not efcape the penetration and fagacity of Gaffendi, as appears by his Examen Philofophiæ Fluddanæ, fect. 15. tom. iii. p. 261. And it was more fully explained by Renaudot, in his Conferences Publiques, tom. iv. p. 87.

At the head of thefe fanatics were Robert Fludd, an Englifh phyfician, Jacob Behmen, and Michael Mayer. The common principles, which ferve as a kind of centre of union to the Roficrucian fociety, are the following. They all maintain that the diffolution of bodies, by the power of fire, is the only way by which men can arrive at true wifdom, and come to difcern the firft principles of things. They all acknowledge a certain analogy and harmony between the powers of nature and the doctrines of religion, and believe that the Deity governs the kingdom of grace by the fame laws with which he rules the kingdom of nature; and hence they are led to ufe chemical denominations to exprefs the truths of religion. They all hold, that there is a fort of divine energy, or foul, diffufed through the frame of the univerfe, which fome call the *archeus*, others the *univerfal fpirit*, and which others mention under different appellations. They all talk in the moft fuperftitious manner of what they call the fignature of things, of the power of the ftars over all corporeal beings, and their particular influence upon the human race, of the efficacy of magic, and the various ranks and orders of demons. In fine, they all agree in throwing out the moft crude incomprehenfible notions and ideas, in the moft obfcure, quaint, and unufual expreffions. Brucker's Hift. Philof. by Enfield, vol. ii. Mofh. Eccl. Hift. vol. iv. Eng. ed. 8vo. See BEHMISTS and THEOSOPHISTS.

ROT, in *Rural Economy*, a fort of putrid decay, taking place gradually in different fubftances, either from the effects of moifture or other caufes. Much mifchief is frequently done in this way to different kinds of materials of the farm fort.

This fort of decay in materials, whether of the manure or other kinds, is greatly promoted by their being kept in a continued moift condition, by the atmofpheric air being freely admitted to them; and where they are of a ftrawy, littery, or light nature, by their being thrown together in rather an open manner. The contact of the earth or mould alfo promotes this kind of rot in a very great degree. There is likewife a great variety of other caufes, which have a tendency to bring on and expedite the decay of fubftances both of the hard and lefs firm kinds. See PUTREFACTION.

ROT, among fheep-farmers, a difeafe incident to fheep and other animals, in which both the liver and lungs are affected, and there is often a dropfical tendency. It is moftly connected with moifture or moift fituations; but its caufes are far from being perfectly inveftigated. Dr. Harrifon of Lincolnfhire has, however, lately done much in this way, and drawn many ufeful and fcientific conclufions. The difeafe is readily known to experienced fhepherds by a careful examination of the eye, which is done by placing the fheep between his thighs, and holding the head with both hands. He then proceeds to raife the upper, and deprefs the under eye-lid, by which means the blood-veffels of the tunica albuginea, or white, are brought into view. When they are red, and in great numbers, the fheep is fuppofed to be in good health. The caruncula lacrymalis, or haw and inner furface of the eye-lids, fhould be as red as the veffels on the eye-ball. If they are pale, and the veins are in fmall quantities, and faint-coloured, or livid, the fheep is in a debilitated ftate, or afflicted with the rot. And in all cafes where the blood-veffels have entirely difappeared, the mutton is bad. By frequently examining the eyes in dangerous feafons, fhepherds may always difcover the rot before the fheep begin to fhrink, and, confequently, in time to prevent any material injury to their profits.

The above intelligent writer traces the nature and effects of the difeafe in the following manner: when in warm, fultry, and rainy weather, fheep that are grazing on low and moift lands feed rapidly, and fome of them die fuddenly, there is reafon to fear that they have contracted the rot. This fufpicion will be further increafed, if in a few weeks afterwards the fheep begin to fhrink, and become flaccid in their loins. By preffure about the hips at this time, a crackling is fometimes perceptible. Now, or foon afterwards, the countenance looks pale, and upon parting the fleece, the fkin is found to have exchanged its vermilion tint for a pale red; and the wool is eafily feparated from the pelt. As the diforder advances, the fkin becomes dappled with yellow, or black fpots. About this time the eyes lofe their luftre, and become white and pearly, from the red veffels of the tunica adnata, and eye-lids, being contracted or entirely obliterated. To this fucceed debility and emaciation, which increafe continually till the fheep die; or elfe afcites, and perhaps general dropfy fupervene, before the fatal termination. Thefe fymptoms are rendered more fevere by an obftinate purging, which comes on at an uncertain period of the diforder. In the progrefs of the complaint, fheep become what the graziers call *chockered*, that is, affected with a fwelling under the chin, which proceeds from a fluid contained in the cellular membrane, under the throat. And he adds, that in five or fix days after contracting the rot, the thin edge of the fmall lobe of the liver becomes of a tranfparent white, or blueifh colour, and this fpreads along the upper and lower fides, according to the feverity of the complaint. Sometimes it does not extend more than an inch from the margin. In fevere cafes, the whole peritoneum invefting the liver is difeafed; and then it commonly affumes an opaque colour, interfperfed with dark red lines or patches. The upper part of the liver is fometimes fpeckled like the body of a toad, to which it is faid to bear a ftriking refemblance; round the ductus communis choledocus and hepatic veffels, a jelly-like matter is depofited, which

which varies according to the feverity of the attack, from a table-fpoonful, or lefs, to five or fix times that quantity. Upon boiling, the liver lofes its firmnefs, and feparates into fmall pieces in the water, or remains foft and flaccid. And it is obferved, that graziers and butchers having remarked that fheep are much difpofed to feed during the firft three or four weeks after being tainted, avail themfelves of this circumftance very' commonly to increafe their profits. When the firft ftage is over, flukes begin to appear in the pori biliarii, the ductus communis choledocus, and in the gall-bladder. At firft the number of thefe creatures is fmall; but as the difeafe advances they increafe, and before death, are often very numerous. In the laft part of the complaint, they are fometimes to be found in the ftomach as well as in the inteftines and liver. This, like the vifceral diforders of the human body, may terminate in refolution, effufion, fuppuration, or fchirrus. 1ft. The complaint is faid to terminate in refolution, when the inflammatory action goes off, without deftroying the ftate and texture of the parts. However, he is ftrongly inclined to believe, that every confiderable inflammation in the human body, and in other animals, although it ends in refolution, leaves behind it fome remains, which may be difcovered by an experienced anatomift. When the veffels are thrown into inflammatory action for a few days only, effufion commonly takes place, and the coats become thicker, and affume a buff-like colour. Thefe changes in the fanguinary fyftem often continue through life, and lay the foundation of many chronic and incurable diforders. Sheep that recover from the rot exhibit very different appearances after death, according to the feverity of the attack; but the taint is feldom or never entirely removed. The liver of an old ewe, that lately died fat, and contained fourteen pounds of fuet in her body, had the following appearances: the back part of the fmall lobe was dappled with whitifh fpots; the coats of the ductus communis and pori biliarii were confiderably thickened, and more folid than ufual. In colour they refembled the human aorta in old people, and were full of flukes: in other refpects the liver appeared to be found and natural. The butcher afferted that the variegated appearance and alteration in the ducts were occafioned by a flight taint of long ftanding, which had not been confiderable enough to diforder the economy, or impair the health of the animal fufficiently to prevent its feeding.

2dly. That when fheep die fuddenly in the firft ftage of the diforder, an effufion of ferum, or of wheyifh-coloured fluid, may be commonly difcovered in the cavity of the abdomen, and then the peritoneum furrounding the liver is generally covered with a membrane or coat of coagulable lymph. This form of the rot has been frequently confounded with the refp or red water, though it differs from the latter diforder in the colour of the effufed liquid, in being much lefs expofed to putrefaction, and in feveral other particulars.

3dly. And that abfceffes in the liver exhibit another termination of this malady. They are feldom confiderable enough to kill immediately; but, in confequence of the abforption of purulent matter from them, the fheep frequently wafte away, and die hectical or dropfical. When the collections are fmall, fheep will recover fufficiently to bear lambs for three or four feafons, and afterwards become tolerable mutton. 4thly. That the moft common termination is in fchirri, or what the fhepherds call knots in the liver. The whole fubftance of this important vifcus has been found fo full of fmall roundifh lumps, or fchirrous bodies, that it was difficult to find any found part in it. The firft attack is unfortunately fo very infidious, that the diforder is fcarcely obfervable before the animal begins to wafte and lofe flefh. In this advanced ftate it is faid to labour under the rot or pourriture, from overlooking the commencement of the diforder. And hydatids are obferved to effect fchirrous and purulent livers more frequently than others. When livers are much difeafed, the butchers carefully conceal them from the public eye. To him it is always matter of furprife to find the mutton faleable in thefe fevere cafes. It fhews, in an extraordinary manner, the accommodating power of living matter, which is able to maintain life, and increafe corpulence, under fuch unfavourable circumftances. Shepherds and breeders, who make it a general rule to kill every fheep that becomes indifpofed, from an opinion that very few of them ever recover from any illnefs, would do well to examine the livers and other vifcera of flaughtered fheep. By fuch a practice they would foon be convinced that fheep are able to endure a great deal.

But in refpect to the caufes of the difeafe, it has been imputed, 1ft, to a vitiated dew; 2dly, to a cruft, which adheres to grafs after wet weather, or the overflowing of running water; 3dly, to the luxuriant and quick growth of plants, in hot, moift feafons; 4thly, to grazing certain herbs; 5thly, to fafciolæ hepaticæ, or their ova, being introduced into the ftomachs of animals, by feeding on fwampy and low grounds in moift weather; 6thly, it has been called the *fheep-pox* by profeffor Vibourg, of the veterinary college at Copenhagen; but this is not properly the caufe of the rot. And, 7thly, it is afcribed, by Daubenton, to poor diet, and drinking too much water. Thefe different caufes are objected to, and fhewn not well founded by the firft writer, who thinks that, 8thly, it feems to be occafioned by poifonous effluvia, which, under certain circumftances, are emitted from marfhy foils, in fupport of which it is ftated that the following facts afford ftrong proofs.

His refidence confifts of high and low lands, of a loamy and tenacious nature. While a brook which runs through the farm remains overflowed, and the water continues upon the adjoining flat grounds, his fheep never fuffer any inconvenience, though they are frequently obliged to wade for their provifions. As foon as the flood is fubfided, the fheep can at any time be tainted in a quarter of an hour, while the land retains its moifture, and the weather is hot and fultry. The butchers are fo well acquainted with the importance of this fact, that when his friend has difpofed of any fat fheep, they are ufually turned upon this rotten ground to make them thrive fafter. But by judicious management he has laid the greateft part of his farm completely dry, and is now little troubled with the rot, unlefs when he wifhes to give it to fome particular animals. His neighbours, who have been lefs provident, are ftill fevere fufferers by it; nor are their misfortunes confined to fheep alone. Pigs, cows, affes, horfes, poultry, hares and rabbits, become rotten in this lordfhip, and have flukes in their livers. Many years fince, his grandfather removed ninety fheep from a confiderable diftance to his own refidence. On coming near to a bridge, which is thrown over the Barling's river, one of the drove fell into a ditch, and fractured its fore-leg. The fhepherd immediately took it in his arms to a neighbouring houfe, and replaced the limb. During this time, which did not occupy more than one hour, the remainder were left to graze in the ditches and lanes. The flock were then driven home, and in a month afterwards, the other fheep joined its companions. The fhepherd foon difcovered that all had contracted the rot except the lame fheep; and as they were never feparated upon any other occafion, it is reafonable to conclude that the diforder was acquired by feeding in the road

road and ditch bottoms. And he adds, that a Lincolnſhire farmer purchaſed ſome turnips in Nottinghamſhire, upon which he intended to winter a flock of ſheep. The firſt diviſion, conſiſting of about forty, were detained one night at a village near to the place formerly alluded to, by the overflowing of the Barling's Ean, and were put upon a piece of flat land which leads to the river. The water had not returned to its former channel more than a day or two. Every one of the forty ſheep became rotten; whereas the other diviſion, which ſtopped no where by the way, eſcaped the diſorder, and remained well. Sheep were formerly admitted into ſome adjoining paſtures, in travelling to and from the neighbouring fairs and markets; but ſo many of them contracted the rot, that, for ſome time paſt, the graziers in this county will not ſuffer their flocks to ſtop for a moment near the village. He has repeatedly examined the ſuſpected ditches and paſtures, but never obſerved either flukes, or any of the plants, to which the rot has been attributed: though he muſt candidly acknowledge that he ought to have ſought for them with more care and attention. Theſe ditches communicate with a rivulet, which frequently overflows its banks, and the incloſures are then deluged with water. The ſoil conſiſts chiefly of loam or clay, and the ſurface is ſo flat and level on both ſides of the river, that for want of proper deſcent, the water is a long time detained upon the grounds. He is credibly informed, that in this place the rot affects ſwine, hares, and rabbits, as well as ſheep.

It is further ſtated, that he has likewiſe been informed by Mr. David Wright, that a few years ſince, as a drove of ſheep were paſſing through a long lane in the pariſh of Irby, one of them, being weary, fell down in the middle of the road. The others were permitted to range at large, till their companion was able to travel. They were then driven all together into a paſture, and it was ſoon diſcovered that only the *tired* ſheep had eſcaped the rot. As the flock had never been ſeparated upon any occaſion, we are entitled to conclude that the diſorder was contracted while the tired animal remained upon the road. From theſe and other caſes, the writer thinks himſelf juſtified in aſcribing the rot in ſheep, and other animals, to *paludal* effluvia; but in regard to the nature and conſtitution of which he acknowledges it is very difficult to form any rational opinion, as they have hitherto eluded the moſt ſubtile and delicate inquiries.

In reſpect to the prevention of the diſorder, he ſuggeſts, that where neceſſity requires the paſturage of moiſt grounds in ſummer or autumn, the ſhepherd ought carefully to remove his flock into a dry ſituation before the evening, and provide them with corn, and good hay, or green food. He ſays that a conſiderable farmer of Bohemia kept his ſheep ſound in the wet and fatal year of 1769, by feeding them every night, when turned under a ſhed, or into ſtables, with haſhed ſtraw; and by eating it greedily they were all ſaved. By this judicious practice, the ſheep were removed to ſleep in better air, as well as preſerved in a more vigorous ſtate of body. Sir John Pringle informs us, that perſons have maintained themſelves in good health, during ſickly ſeaſons, by inhabiting the upper ſtories of their houſes; and he has reaſon to believe, that by merely confining ſheep on high grounds through the night, they have eſcaped the rot. He adds, that after the dew is exhaled by the ſun's heat, ſheep may be ſuffered to range in moiſt and ſwampy places, with leſs danger, becauſe the miaſmata, which are formed in the night, and remain entangled among the graſs, or float in the lower part of the atmoſphere, are chiefly diſſipated with the dew. Therefore, unleſs they be very copiouſly produced in the day time, or are unuſually virulent, they will not be ſufficiently concentrated to do much injury to healthy ſheep. While at reſt and aſleep, the operations of the ſyſtem are more feebly performed, and then ſheep are peculiarly expoſed to diſeaſed actions. By conforming to theſe regulations, he has known one flock eſcape entirely, while others have ſuffered materially in the ſame open field.

And it is confidently aſſerted, that decoctions of bitter herbs, with ſalt, have frequently preſerved ſheep from the rot. Salt is ſuppoſed to conſtitute a part of Fleet's celebrated noſtrum; and we know that bitters are deſervedly recommended to prevent intermittents, the dyſentery, and other diſorders, which originate from exhalations. In Oxfordſhire, Dr. Lower has frequently known ſix or ſeven ſpoonsful of ſtrong brine and ſtale urine, with ſoot ſteeped in it, to be given with great ſucceſs. This is done at ſpring and the fall of the year, when the dew is counted moſt dangerous. This courſe of phyſic is continued eight or ten days, or till the ſheep eat their meat heartily; and if they were taken in time, there ſeldom died any in a whole flock. For the ſame purpoſe, Ellis recommends the following medicine in his "Practical Huſbandry." Take a peck or more of malt, and maſh it, as though you would brew it into ale or beer, and make eleven or twelve gallons of liquor; then boil in it a quantity of ſhepherd's purſe, comfrey, ſage, plantain, penny-royal, wormwood, and bloodwort: add yeaſt, and afterwards ſalt the mixture; then turn the liquor into a veſſel. After April comes in, give ſeven or eight ſpoonsful to every ſheep, once in the week, if the weather be wet, and if dry not ſo often.

Some have ſuppoſed that there are various objections to the above notions concerning the nature and cauſes of the rot in ſheep; but eſpecially that of its not being met with in the ſheep of ſome other diſtricts where *marſh miaſmata*, and the diſeaſes which depend upon it, greatly prevail. It has, indeed, been ſtated in the view of eliciting the truth of the matter, by Dr. George Pearſon, that there is an apparent difficulty or objection to the above writer's concluſion—that the rot in theſe animals is occaſioned by the ſame morbific agent which occaſions intermittent and remittent fevers—in the circumſtance that in ſome of the marſhes of the county of Kent, where intermittent fevers affect a great proportion of the inhabitants; and even perſons reſiding in the neighbourhood, although living on dry chalky lands, where ſuch diſeaſes never ſhew themſelves, if at ſome diſtance from the low grounds, unleſs in conſequence of importation; and in Chitney marſh, on the river Medway, near the iſle of Sheppey, one of the moſt prolific ſituations for agues to be found in the kingdom; and which is equally famous for its paſturage, by which very great numbers of ſheep are fed and kept; where the ſallow and indeed cadaverous countenances of the inhabitants, ſhewed that moſt of them were ill, or were recovering from agues; on inquiring into the health of the ſheep, beſides the evidence of the fine healthy condition of the animals, it was found, on the authority of a ſhepherd who had lived thirty-ſix years in the marſh, that he had only ſeen the diſorder once, and that was in the firſt year of his reſidence there; nor is the rot at all common in any part of the county of Kent. The Leiceſter breed of ſheep, he aſſerted, were ſubject to it, but not the ſheep bred in the marſh; nor were theſe animals ſubject to any other diſeaſe more frequently than in other ſituations in general, or particularly in the uplands. On theſe grounds, the doctor thinks, it would appear that one kind of miaſmata of marſhes which produce agues, do not in all ſituations alſo produce the rot. He does not, however, conceive it logically juſt to conclude, from the inſtance which has been given,

given, that miafmata paludum of a different fpecies may not occafion the rot, and alfo agues. It is poffible alfo, he fuppofes, that fome concomitant agents or circumftances may render the fame miafmata productive of one of the difeafes in certain fituations, but not of the other diforder.

The fame circumftances occur in other fituations, as there is a prevalence of miafmata in the Romney Marfh, another great fheep diftrict, which frequently produces intermittent and remittent fevers; while the rot is fcarcely ever known to happen in it. And in Effex there are agues in plenty, in many parts, without the rot in the fheep of them being at all known.

Some of thefe remarks and directions deferve the notice of the grazing farmer, as by proper attention to them much mifchief may often be prevented. But there are fome who fuppofe that moft dependence in the cure of this affection is to be placed upon the removal of fheep into dry fituations, keeping them warm and fheltered, and giving them dry food in the yard. In the Report on Agriculture for Lincolnfhire, fome circumftances are given that may direct the farmer on this point. It is ftated, that in rotting years, the fheep that feed on the falt marfhes over which the fpring-tides come, fell very high in confidence that they are fafe. And that a fhepherd, who when young was fhepherd's boy to an old man who lived at Netlam, a place noted for the rot, fays he is perfuaded that fheep only take the rot in a morning before the dew is off, as by keeping them up till the dew is gone they have been preferved from the difeafe, while others, where this precaution has been neglected, have become difordered.

Others think that the beft and fureft remedy, in thefe cafes, is that of combining plenty of dry food with the free ufe of fea-falt, and at the fame time removing the animals to the found, rich, dry, pafture lands. The rot is never known to be caught on the South Downs of Suffex. When the fheep fuffer in this way, the difeafe is always got while they are keeping in the weald, or other low lands. Such marfhes as are occafionally overflowed by falt-water, are never known to rot fheep, but are moft admirable for keeping them found and healthy; and fhould any thing be capable of curing the rot, it is the fheep feeding on fuch land. Some have obferved, that if, after a froft, even when very early, fheep be turned into fuch meadows and brooks as are at other times particularly liable to rot them, they will not, under this circumftance, fuffer at all; as it is fuppofed the animalculæ which the infects depofit in the fummer among the herbage, are deftroyed by the froft. The flounders found in the livers of the animals, are believed to be taken up with their food. It is more probable, however, that it is only the very minute ova of fuch infects which are taken into the ftomachs of fuch fheep. The autumnal months, when there is no froft, are the moft difpofed to bring on the rot in the above diftrict; but after one fingle night of hard froft, the danger is over for that year.

Rotten fheep have, in a great many inftances, been cured by feeding them on the herbage growing on a thin foil on lime-ftone rock. Hundreds have been known to have become found on lime-ftone land; their livers being completely healed, and the fheep healthy in every refpect.

In the original Agricultural Report of the county of Stafford, it is fuggefted, that the rot in fheep may be removed by the ufe of medicine. The difeafe is conceived as perhaps rather fimilar in its nature to the dropfy, as there is a preternatural abundance of water. The writer remarks, that of fix rotten fheep which he had about fix years before the time of writing, he fucceeded in curing five of them, but the fixth died full of water. One of the five which were cured brought him a lamb the following year, which with its mother, continued healthy, and became fat on grafs; the lamb was fold in the fummer, and the ewe in the beginning of winter, to a butcher. The other four alfo fattened, but in lefs time, on grafs alone, and were parted with in the like manner. On April the 25th, in the year 1802, he alfo drenched two rotten ewes, one of them in the laft ftage of the difeafe; they both became found, acquired fat, and were fold, with many others, in October, to the butcher, undiftinguifhed from the reft. Since that time he has repeatedly tried the fame remedy; and on the whole number of cafes, has not loft more than one in fix or feven.

His method of performing the cure is this: the rotten fheep is to be fafted one night, then one table fpoonful of the fpirits of turpentine is to be taken, and mixed with two of the fame fpoonsful of foft cold water; which is to be given to each fheep for one dofe. The fheep is then to be kept on dry food for three or four days; at the end of which time, the fame dofe of the medicine is again to be repeated, and the fheep continued on dry food for three days longer; at the conclufion of which period fuch fheep may be permitted to join the flock. When affected with a confiderable degree of loofenefs, fheep have often been cured in this manner with great facility.

In fhort, it may be concluded, in regard to the cure of this difeafe, which feems to be caufed by a general debility or weaknefs of the whole fyftem, accompanied with a local affection of the fame nature in the liver, that all fuch foods and remedies as are of a dry nourifhing quality, and which excite and ftrengthen the conftitution, will conftantly be found of great utility, if not wholly capable of affording a perfect cure of the difeafe.

The following receipt was prefented to the Royal Society, by Mr. Boyle, and is preferved in their regifter, vol. ii. p. 303. Some time before Allhollantide, the fheep is to be blooded under the eye, and, if neceffary, again in the fpring; and, in October, his gums may be rubbed at three or four different times with Spanifh falt. But the principal remedy confifts in this: that about Allhollantide, or fomewhat fooner, you take a fmall handful of the forementioned falt, and making the fheep hold up his head, compel him to fwallow it, and keep him from drinking any thing for about an hour after.

Rot, *Dry*, in *Rural Economy*, a highly deftructive vegetable difeafe, affecting the timber in the foundations, and other parts of buildings, in particular foils and fituations. It affects the wood, or ligneous parts, in fuch a manner as to leave it connected by nothing but the fmall hard fibrous portions, which give it a curious tremulous appearance, but all of which, when touched by the hand in the more advanced ftages of the difeafe, readily moulder into a brownifh fnuff-like duft. It is attended with a peculiar earthy fmell, fimilar to that which iffues from frefh dug up wood, which has lain fome time in the ground in contact with decaying animal matter. It is very materially different from that natural fort of decay which takes place in wood from the prefence of wetnefs. This has been fuppofed to originate from very different caufes, fuch as the ufe of wood in too green a ftate, exceffive dampnefs in the foundations of the buildings which are affected with it, the want of a free circulation of air in fuch fituations, and more lately to be the effect of a plant of the fungus tribe, which has leaves as in the miffletoe, &c. the boletus lachrymans. And on the former fuppofitions it has been ftated to the Society for the Encouragement of Arts, &c. by Mr. Bramley of Leeds, in the thirty-firft volume of their Tranfactions, that to bring the matter to the teft by experiments, would require the obfervations of a long

long period, and in ſelected ſituations. And that wood uſed for the general purpoſes of man is cut down at different periods; and although it may be felled at the proper ſeaſon, or when moſt free from ſap or moiſture, it is not always to be effected. Nay, even admitting it to have been cut down in the moſt favourable ſituation, it ſtill abounds with ſuch an extra proportion of moiſture, as to require a regular expoſure to the air prior to its being applied to uſe, if we wiſh to guard againſt that ſhrinking which always takes place where this precaution has not been taken. And although the fir kind contains leſs of this watery portion, yet it aſſuredly poſſeſſes a conſiderable ſhare; and it is in this ſpecies, he apprehends, that the evil called the dry rot moſt generally occurs, as from the facility of working the ſame it is moſt generally applied in buildings. But ſuppoſing it to be fir, or any other ſpecies, wood felled when abounding with any extra proportion of ſap, and applied to uſe without the proper ſeaſoning or expoſure to a free current of air, until ſuch extra moiſture has had time to exhale, is moſt liable to the diſeaſe in queſtion; and the cure, or principal prevention againſt it, would be the precaution of felling all wood only at the proper ſeaſon, or when the ſap is not in circulation. The next mode of prevention would be to uſe ſuch wood only as has been for a conſiderable period expoſed to the influence of a free current of air, or, where convenience will admit, to that of air heated to a moderate degree; ſuch air extracting with greater facility the encloſed moiſture, and in a more certain ratio than the irregularity of our atmoſphere will allow, under other circumſtances.

And it is ſuggeſted, that in all rapidly-improving countries, this evil is likely to be an increaſing one, as the current demand for wood generally exceeds the ſupplies laid by in ſtore, ſo as to be applied to uſe in regular ſucceſſion, after being properly ſeaſoned. And that another cauſe that affects all wood moſt materially, when not fully dried, is the application of paint, the nature of which prevents all exhalation, and confines the encloſed moiſture, till it occaſions a fermentation through the whole fibrous ſyſtem of the wood, and brings on a premature ſtate of decompoſition, or the dry rot. It is likewiſe ſuppoſed that a ſimilar evil may be induced, in conſequence of any newly finiſhed building having all the doors and windows ſhut up, and that for ſome length of time, particularly in moiſt weather. The wood, even though unpainted, is thus frequently placed in our atmoſphere more charged with vapour than in its own internal contents, and it is conſequently in an imbibing inſtead of an exhaling ſtate, and tending to decay. Wood placed in dampiſh ſituations, and the ends of timbers near to moiſt walls, ſuffer from ſimilar cauſes, but what particularly attracted his obſervation to the circumſtances was this, that both oak and fir poſts were brought into this premature ſtate of decay, from their having been painted prior to the due evaporation of their moiſture; and then extending the obſervation, and tracing the hiſtory of other wood affected in a ſimilar manner, he is convinced that the evil frequently thus originates, and its prevention would be in uſing timber previouſly well dried and ſeaſoned for ſuch purpoſes.

And it is added, that ſince theſe obſervations were made, having been buſily engaged in draining from 4000 to 5000 acres of ground, further ideas on the ſubject of the dry rot have occurred to him from the work he has been engaged in. Where houſes are troubled with damp walls, near to the earth's ſurface, it is generally, if not univerſally, occaſioned by the percolation of water from the higher adjoining ground, which, thus intercepted in its current, attempts to follow the general hydroſtatic law, of elevating itſelf, by the ſyphon line, to a height equal to that from whence it has its origin. Thus in houſes differently ſituated, we ſee the damp ariſing to varying degrees of height on the walls, and thoſe are probably correſponding to the height at which the moiſture circulates in the adjoining ground. At its firſt entrance to the building, and whilſt the moiſture is in ſmall quantity, the excavated part of the foundation wall, he thinks, may abſorb, and gradually quit ſuch proportion: but the exceſs, as is generally the caſe in moiſt weather, exceeding that power, the foundation ſtones are then ſaturated in a more rapid proportion than the adjoining rarefied internal atmoſphere can evaporate: the watery particles then creep up, in degrees proportionate to the aſcent from which they originally deſcended, excepting when prevented, or driven off by the ſuperior heat of the adjoining rooms, when, in addition to the diſagreeable damp they cauſe, they frequently occaſion conſiderable damage to the pictures, furniture, &c. Drains laid out athwart the aſcending ground, with a very ſlight deſcent or fall, and made of the depth of one yard for each yard of aſcent, and from the foundation until equal the height that ſuch damp ever riſes, would, there is little doubt, completely ſecure the houſe and furniture from the inconveniencies hitherto ſuſtained, and would generally prove an effectual prevention to moſt caſes of the dry rot, where it originates in extreme moiſture. He is of opinion that the fungus which pervades decaying wood is not the firſt cauſe, but a dependent on the peculiar ſtate to which ſuch wood has been reduced by prior cauſes. The diſſeminated ſeeds finding a proper bed, or nidus, like to the muſhroom, toadſtool, &c. fix their abode, and pervade the whole ſubſtance, thus accelerating the general law of Providence, which tends to make all matter reproductive.

Upon theſe grounds cellars, or ſuch other places, ſhould be drained in the manner he has mentioned, by taking off the percolating water prior to its gaining admiſſion to or contact with the walls: and it is probable that, in moſt caſes, a ſingle drain will have complete effect; it would aſſuredly, he thinks, do ſo, if it was not for the variation of the earth's internal ſtrata, which are not eaſily diſcernible. And that if attention to this rule was paid prior to the building any new ſtreets in towns, it would prove eſſentially uſeful in preventing ſuch miſchief.

And it has alſo been ſuggeſted to the above ſociety, that mortar made of lime from burnt chalk is much more deſtructive to timber than ſtone-lime, or that burnt from lime-ſtone. Chalk-lime attracts moiſture; and communicating it to any timber which it touches, occaſions its decay. And further, likewiſe, that ſea-ſand is prejudicial, if made into mortar, from a ſimilar quality of attracting moiſture from the atmoſphere: this, it is ſuppoſed, may in ſome degree be corrected by waſhing the ſand well in freſh water, where good ſand cannot be procured. But that good mortar, where any is required to be in contact with timber, may be made from a mixture of ſtone-lime freſh burnt, and river-ſand, to which a very ſmall quantity of common brown, or yellow iron ochre ſhould be added, and well incorporated therewith in the operation of making it up. See QUICKLIME.

And it has been ſuggeſted by Mr. Johnſon of Ipſwich, in the ſame volume of the Tranſactions of the above ſociety, that ſome time between 1771 and 1773, he went, at the requeſt of a friend, to the chapel at the Lock hoſpital, through curioſity, to examine a pew there that had frequently been repaired for damages by the dry rot. And that after a cloſe inveſtigation, he found it was the operation of a plant, whoſe leaf reſembled that of the vine. Wherever it had touched, the effect of its poiſonous quality got through the wood to the paint, which he has ſeen a mere ſkin. He propoſed to cover

cover the floor with bricks, laid in mortar, which was accordingly done. He called twice ſince, the laſt time about ſeven years ago, and has reaſon to think that it never appeared again. That the next opportunity of examining it carefully was at Mark-hall, in Eſſex, the ſeat of Mr. Montague Burgoyne. In a parlour there were three pillars of about ten inches in diameter, the outwood of which was between two and three inches thick. Two of them were eaten through in leſs than ſeven years, from the baſes, about two feet upward, within the hollow, and were as rotten as if it had been the effect of a hundred years ſtanding. The gardener of this gentleman was a botaniſt; and found the plant where he directed him to ſearch for it, and ſaid it was the boletus lachrymans. And, he adds, that ſome authors call it a paraſitical plant; and it is ſometimes to be found with the willow and ſallow tribe; but this is not to the purpoſe. Till within a few months he has never been without ſome leaves of the plant. For many years they appear exhauſted and dead, and ſoon crumble into duſt; but he ſuſpects that freſh wood attracts a freſh growth from the root.

At another time, he ſaw it in a houſe at Whitehall, built by ſir John Vanbrugh, whoſe nephew then lived in it. The houſe is, he thinks, only two ſtories high; the plant had aſcended to the upper ſtory, committing devaſtation on the wainſcot all the way. It will deſtroy half-inch deal wainſcotting in a year. He has alſo had it twice in houſes he inhabited, one in Suffolk, and the other in Glouceſterſhire. He bore with the firſt; in the other caſe he undertook to ſtop it, and did it effectually.

It is ſuppoſed, that the cauſe is from the floor being laid on the earth, which has been, where he has obſerved it, of a gravelly or ſandy loam nature. The moiſture from a water-courſe at hand, or a north aſpect, where the outer wall ſtands in a garden-bed, ſo that the rain percolates, are great encouragers; it requires moiſture, he ſuſpects. But it never riſes in the middle of the floor; becauſe, if the ſeed were there, it could not germinate for want of air; but it is eaſy to ſuppoſe that after the floor is ſhrunk, an air may be created between that and the vacancy between the wainſcot and the outer wall, ſufficient for the purpoſes of vegetation. He ſays, he ſaw an inſtance laſt ſummer in the houſe of a friend, a ſtudent in botany. He was ſurpriſed when he told him it was a viſit from a plant; but ſo it proved, and always is, and ever was ſo; nor does it originate from any other cauſe.

With the view of removing it in his own caſe, he removed the original ſoil near the part affected, and ſupplied its place with ſand. He then placed pieces of tile; on thoſe he laid mortar, and tiles over them, puſhing them under the wainſcot, ſo that it had no communication with the joiſts or floor. Pillars in like manner ſhould, he thinks, be kept from the earth. And in laying a floor upon the ground, he ſhould take away the earth for a foot in breadth, and four inches in depth, all round the walls, and place the ends of the joiſts in mortar, covering them with tiles preſſed under the floor and wainſcot, quite to the outward wall. Iron or tin plates would do; but are not ſo cheap as mortar and tiles, and probably much leſs durable in ſuch ſituations. It is ſuppoſed that this plant has no adheſive powers, but in contact with wood. If it could paſs over brick and mortar, it might be ſeen to ſpring from the cellars and infect half the houſes in the kingdom. He recommends, in ſhort, that the wainſcot be kept free from contact with the joiſts and floor.

It is obſerved that the leaves of the plant appearing exhauſted and dead, is owing to their having imparted all their juices to the wood, which change it to a fungus, and not to a powder, like rottenneſs from length of time. And that nothing is more eaſy than to prevent the damage from the plant. Beſides what he has ſaid above, he is poſitive that a tile laid cloſe along the walls round the room, would prevent the growth of the plant, even without mortar; and perhaps it is only neceſſary where the walls are next to the air. And charring the ends of the joiſts for a few inches, and the ſide of the wainſcot at bottom next the wall, would, he ſuppoſes, be ſufficient; for the plant cannot adhere to any thing but wood, and that poſſeſſed of its natural juices, to a certain degree; ſo that he queſtions if old dry oak would receive it. But all the white ſoft woods, as beach, poplars, and deals, are for a long time ready to receive it. Repairing the damage with freſh wood, without removing the earth and plant, is only feeding the evil, or extending the diſeaſe. It is ſuppoſed, that as the plant is of the creeping kind, and cannot riſe two inches, the wood, in all caſes, muſt be in contact with the earth to ſupport it. He adds, that a fungus broader than the palm of one's hand, and an inch or more in thickneſs, is commonly ſeen at the bottom of an old poſt, on the ſurface of the earth; but it is not eaſy to diſcern whether the wood or the earth furniſhes the matter.

The writer further remarks, that he had lately a converſation with an old friend, who ſhewed him two parcels of rotten wood, from an oak barn-floor laid about ſixteen years ago. After lying twelve years, it ſhook upon the joiſts. On examination it was found to be rotted in various parts, and the planks, two inches and a half in thickneſs, were nearly eaten through, though the outſide was gloſſy, and without blemiſh. The joiſts, and a large middle beam, were laid at the ends, in brick and mortar, to create a firm level. No earth was near the wood; and, he thinks, that no air could find a paſſage. The rottenneſs was partly an impalpable powder, of the colour of Spaniſh ſnuff, and other parts were black, as if burnt; the reſt was clearly a fungus. And that this gentleman is a perſon of undoubted veracity; but a nice and exact obſervation is neceſſary in ſuch examinations. He thought nothing of any plant, and it is likely there was none of the boletus; ſo that his aſſertion that it was always to be found, was rather too ſyſtematic. He aſked him if the timber was dry when laid down. He could not however ſay that had been particularly adverted to. It had been ſawed from a large oak, and was, as he thought, in all reſpects proper for a barn-floor. As this ſeems not the operation of the boletus, he aſks, how did it happen? We know that the oak, when in vegetation, is ſubject to what we ſhall call an exudation of juices, which produces the fungus, named the agaric of the oak, with which the Druids of old played many tricks. The oak, then, if ſawed into thick quantities, may emit theſe ſame juices, as the progreſſive courſe of nature to its entire decay. It is added that we have all ſeen oaks of vaſt ſize and ancient record, with a great part of the outſide whole, and all the inſide gone; perhaps the work of a century. In all hollow trees fungus is diſcoverable. To uſe a law term, it is a miſnomer to call it dry rot; for the rotting principle is in moiſture. He further ſtates, that he had never ſeen the rot upon ſo large a ſcale in timber, till lately. The prevention then of beams, rafters, large joiſts, and poſts put into the earth, from decay by the rot, is by charring only, which will dry up all the fungus juices of wood in large ſubſtance. Paint, or a bituminous preparation, may probably ſtop up the pores, and prevent the rot in ſlight work, where the treatment he before obſerved, with fire, might be incom-

incommodious, as to half-inch wainſcot, &c. The incorruptibility of charcoal is proved by a variety of indiſputable facts.

A great many uſeful facts on this ſubject have been ſtated by Mr. Batſon, of Limehouſe, in the twelfth volume of the ſame Tranſactions, in reſpect to his methods of preventing the dry rot in a room much affected with it. The mode he adopted was to clear the ends of his timbers, to take away the infected earth to the depth of two feet, and to fill up that ſpace with anchor-ſmith's aſhes, or aſhes from a foundry, before his flooring boards were laid.

And on minute examinations being made under the direction of the ſociety, at the diſtances of ſix and twelve years after the flooring was laid, the boards, wainſcot, and timbers, were all found entirely free from any appearance of the dry rot. The uſe of ſtone-work next the ground, as the foundations of poſts, door frames, partitions, &c. has alſo been found uſeful in preventing ſuch wood-works from being attacked by this diſeaſe. And alſo the cauſing a more free circulation of air about ſuch foundations by the fixing of iron gratings in ſtone-work in different places, ſo as to produce the moſt perfect ventilation. But notwithſtanding all that has yet been done in reſpect to the nature and modes of preventing this ſort of rot, much ſtill remains to be effected both in regard to the nature of its origin, and the moſt certain means of eradicating it under different circumſtances.

It will probably, however, be found the beſt and moſt effectual plan, until further trials and diſcoveries have thrown more full and complete light on its nature and cauſes, to take care that the wood-works near the ground in all buildings in ſuch places as rot timber have as little contact with it as poſſible, by being raiſed and ſupported at ſome diſtance from it, by means of ſolid ſtone or brick and mortar work, by a full and free circulation of air being every where admitted in the foundations near ſuch wood-works, by being careful to make uſe of ſuch timber only as is perfectly well ſeaſoned and prepared, and by having conſtantly a ſufficient number of drains made all round to diſcharge any moiſture that may occur. It may likewiſe be of farther advantage in all ſuch caſes to avoid painting or coating over the wood-work near the parts which are liable to be diſeaſed or become rotten, for ſome conſiderable length of time after they have been done; as well as to allow of large fires to be occaſionally made, where convenient, as near to ſuch ſituations as poſſible, in order that every ſort of moiſture and dampneſs, together with the peculiar rawneſs of ſuch new works, may always be removed as much as they are capable of in the firſt inſtance, or as ſoon after the works have been finiſhed as may be compatible with their nature and extent.

In regard to the boletus lachrymans being the cauſe of the dry rot in timber, it has lately been contended that the different ſorts of fungus, which are met with upon decaying timber of different kinds, are the production of the remaining powers of life in the ſap of the unſeaſoned wood; and that the ſame ſort of living organizable matter, which, whilſt its powers continued in their perfect condition, would have generated the branch of an oak, will, when debilitated and enfeebled, give exiſtence to a certain kind of fungus, and become the cauſe of this diſeaſe.

Mr. T. Wade, in a recent publication, obſerves, that the term dry rot ſeems to be improperly applied to the decay in timber, which it is generally employed to deſignate, and that the impropriety of the expreſſion, probably, has not a little contributed to involve this ſubject in obſcurity. A very ſhort advance in the inveſtigation of this ſubject will ſhew, that moiſture is a condition neceſſary to the putrefactive proceſs, and that water is the moſt efficient agent in the decompoſition of organized bodies.

By capillary attraction fluids are carried to the tops of the higheſt trees, a phenomenon which has been long obſerved, but has not been ſatisfactorily explained. Preciſely the ſame effect takes place when one end of a piece of timber is immerſed in water, or placed in a damp ſituation. It happens even in vacuo.

Timber, ſo placed, at firſt ſwells, after ſome time it changes colour, then it emits gaſes which have a mouldy or muſty ſmell. In the more advanced period of decay, the maſs dries, and cracks in tranſverſe directions. Laſtly, it becomes pulverulent, and forms vegetable mould. Generally, in ſome of theſe ſtages of decompoſition, the different ſpecies of fungus are found to vegetate on the moſs.

When a vegetable is deprived of life, the matter conſtituting it begins to undergo changes in order to enter into new combinations. It is reduced to ſimple principles by the aid of warmth, and the preſence of air and water. In houſes, ſhips, &c. we cannot prevent the influence of theſe powerful agents, but it may be retarded. It ſeems the uſual mode of ſeaſoning timber by exſiccation is of little uſe. Timber, thus prepared, is found, indeed, to ſhrink and loſe much of its weight; but even very old oak timber, (procured from ancient buildings,) when immerſed in water, or expoſed in a damp ſituation, readily acquires the weight, and ſwells to the dimenſions of green timber, from which, in its properties, it does not materially differ.

Mr. Wade therefore endeavoured to diſcover ſome other means by which timber may be made to reſiſt change, or decay.

Lignum vitæ, box, ebony, &c. are nearly indeſtructible, owing to their being of ſo cloſe a texture that water cannot be abſorbed by them, neither do they give out any ſoluble matter to water, at leaſt not without long boiling, or digeſting at a very high temperature. Therefore the great agent that determines the changes in wood in general, here has not any influence.

Other durable woods, ſuch as teak, cedar, &c. though of an open grain, and very porous, contain reſinous, or oleaginous matter, repelling moiſture, which cannot inſinuate itſelf, as is the caſe with the feathers of ſome fowls, &c. On theſe principles the common periſhable woods may be made to reſemble thoſe which are very laſting, or, indeed, nearly indeſtructible.

Thus, to prevent the decay of oak, &c. it is neceſſary either to cauſe it to be incapable of abſorbing moiſture, or to render the ligneous fibre inſoluble.

Some of the effects produced bear conſiderable analogy with tanning, by which proceſs a ſkin, entirely ſoluble in water, forming jelly or glue, and quickly ſuſceptible of putrefaction, is made into leather, a ſubſtance not at all ſoluble in water, and capable of enduring for a long period, ſometimes for ſeveral centuries.

For various methods of performing this, we beg to refer the reader to Mr. Wade's book, in which the operations recommended ſeem ſimple and economical.

Rot *in Timber*, a diſeaſe in trees which quickly injures and deſtroys the woody parts of them by inducing a ſort of rotting and decay. It has been ſtated to proceed from different cauſes, but the principal, according to the author of the Practical Planter, are thoſe of external wounds or bruiſes, the trees growing in unfavourable ſoils, the roots of which have been barked at the period of planting, or in cutting out plants. And ſecondly, by the tree growing in ſpouty

ſpouty ſoil, whoſe larger roots have been injudiciouſly hacked at the time of tranſplanting, or in cutting out a neighbouring plant. In this caſe the diſeaſe affects the pith, eats upward, and often conſumes the heart to ſuch a degree, while the bark remains in a perfectly ſound ſtate, that the trunk is enfeebled, and eaſily broken. This is demonſtrated by cutting affected trees at different ages, and the *rot* is generally found leſs or more advanced upward, according to the ſize of the cavity. He here ſtates a very curious inſtance of this ſpecies of rot, that occurred at Wemyſs caſtle, in Scotland, in 1795. In thinning a wood, whoſe trees conſiſted chiefly of elm and aſh, in one part of it the ſoil was obſerved to be ſpouty, and the elm-trees in rather a ſickly condition. Every elm-tree cut in this part was more or leſs affected; ſome were rotted a foot, others two, three, &c. feet upwards, and the wood above, to the extremity of the bole, was uniformly ſound, and ſold at two ſhillings a foot. One beautiful aſh-tree, in particular, was ſold ſtanding, at the rate of half a crown a foot of timber; nor was there the ſmalleſt outward blemiſh from the ground to the very top. When it was cut down, a completely ready made *pump*, fifteen feet in length from the ground upwards, was diſcovered, and actually, as he was afterwards informed, applied as ſuch. It is conceived that in this caſe the remedy is to be at all due pains to prevent the cauſe, by carefully draining the ſoil of poiſonous, ochry water, and when neceſſity occaſions the cutting of large roots, to treat them in the manner of an amputated branch.

And a third cauſe of the rot which he notices, is that of ſtagnant water lodging in the angle formed by the ſtem and an upright branch, or in the angle formed by rival ſtems, where no actual ground has ever been made; but, which often happens, if the tree be in a youthful vigorous ſtate, a cup or hollow is formed, reſembling that between the thumb and finger half opened. Here the water lodging, in time penetrates the bark, and forms the firſt receptacle of corruption, which being once begun advances apace to the great injury of the trees. In this caſe the firſt thing neceſſary towards a cure, or prevention of further injury, is to clean out the water, (for which a ſyringe may be uſeful,) duſt, &c. and dry the whole well by aid of a mop or woollen cloth; then to fill it up, until it run over, with tar; after which to fix on an apron of thin lead, in ſuch a manner as that its edges may reach about a foot upwards on each limb of the tree, being joined cloſe, and faſtened with ſaddle tacks, &c.

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incommodious, as to half-inch wainſcot, &c. The incorruptibility of charcoal is proved by a variety of indiſputable facts.

A great many uſeful facts on this ſubject have been ſtated by Mr. Batſon, of Limehouſe, in the twelfth volume of the ſame Tranſactions, in reſpect to his methods of preventing the dry rot in a room much affected with it. The mode he adopted was to clear the ends of his timbers, to take away the infected earth to the depth of two feet, and to fill up that ſpace with anchor-ſmith's aſhes, or aſhes from a foundry, before his flooring boards were laid.

And on minute examinations being made under the direction of the ſociety, at the diſtances of ſix and twelve years after the flooring was laid, the boards, wainſcot, and timbers, were all found entirely free from any appearance of the dry rot. The uſe of ſtone-work next the ground, as the foundations of poſts, door frames, partitions, &c. has alſo been found uſeful in preventing ſuch wood-works from being attacked by this diſeaſe. And alſo the cauſing a more free circulation of air about ſuch foundations by the fixing of iron gratings in ſtone-work in different places, ſo as to produce the moſt perfect ventilation. But notwithſtanding all that has yet been done in reſpect to the nature and modes of preventing this ſort of rot, much ſtill remains to be effected both in regard to the nature of its origin, and the moſt certain means of eradicating it under different circumſtances.

It will probably, however, be found the beſt and moſt effectual plan, until further trials and diſcoveries have thrown more full and complete light on its nature and cauſes, to take care that the wood-works near the ground in all buildings in ſuch places as rot timber have as little contact with it as poſſible, by being raiſed and ſupported at ſome diſtance from it, by means of ſolid ſtone or brick and mortar work, by a full and free circulation of air being every where admitted in the foundations near ſuch wood-works, by being careful to make uſe of ſuch timber only as is perfectly well ſeaſoned and prepared, and by having conſtantly a ſufficient number of drains made all round to diſcharge any moiſture that may occur. It may likewiſe be of farther advantage in all ſuch caſes to avoid painting or coating over the wood-work near the parts which are liable to be diſeaſed or become rotten, for ſome conſiderable length of time after they have been done; as well as to allow of large fires to be occaſionally made, where convenient, as near to ſuch ſituations as poſſible, in order that every ſort of moiſture and dampneſs, together with the peculiar rawneſs of ſuch new works, may always be removed as much as they are capable of in the firſt inſtance, or as ſoon after the works have been finiſhed as may be compatible with their nature and extent.

In regard to the boletus lachrymans being the cauſe of the dry rot in timber, it has lately been contended that the different ſorts of fungus, which are met with upon decaying timber of different kinds, are the production of the remaining powers of life in the ſap of the unſeaſoned wood; and that the ſame ſort of living organizable matter, which, whilſt its powers continued in their perfect condition, would have generated the branch of an oak, will, when debilitated and enfeebled, give exiſtence to a certain kind of fungus, and become the cauſe of this diſeaſe.

Mr. T. Wade, in a recent publication, obſerves, that the term dry rot ſeems to be improperly applied to the decay in timber, which it is generally employed to deſignate, and that the impropriety of the expreſſion, probably, has not a little contributed to involve this ſubject in obſcurity. A very ſhort advance in the inveſtigation of this ſubject will ſhew, that moiſture is a condition neceſſary to the putrefactive proceſs, and that water is the moſt efficient agent in the decompoſition of organized bodies.

By capillary attraction fluids are carried to the tops of the higheſt trees, a phenomenon which has been long obſerved, but has not been ſatisfactorily explained. Preciſely the ſame effect takes place when one end of a piece of timber is immerſed in water, or placed in a damp ſituation. It happens even in vacuo.

Timber, ſo placed, at firſt ſwells, after ſome time it changes colour, then it emits gaſes which have a mouldy or muſty ſmell. In the more advanced period of decay, the maſs dries, and cracks in tranſverſe directions. Laſtly, it becomes pulverulent, and forms vegetable mould. Generally, in ſome of theſe ſtages of decompoſition, the different ſpecies of fungus are found to vegetate on the moſs.

When a vegetable is deprived of life, the matter conſtituting it begins to undergo changes in order to enter into new combinations. It is reduced to ſimple principles by the aid of warmth, and the preſence of air and water. In houſes, ſhips, &c. we cannot prevent the influence of theſe powerful agents, but it may be retarded. It ſeems the uſual mode of ſeaſoning timber by exſiccation is of little uſe. Timber, thus prepared, is found, indeed, to ſhrink and loſe much of its weight; but even very old oak timber, (procured from ancient buildings,) when immerſed in water, or expoſed in a damp ſituation, readily acquires the weight, and ſwells to the dimenſions of green timber, from which, in its properties, it does not materially differ.

Mr. Wade therefore endeavoured to diſcover ſome other means by which timber may be made to reſiſt change, or decay.

Lignum vitæ, box, ebony, &c. are nearly indeſtructible, owing to their being of ſo cloſe a texture that water cannot be abſorbed by them, neither do they give out any ſoluble matter to water, at leaſt not without long boiling, or digeſting at a very high temperature. Therefore the great agent that determines the changes in wood in general, here has not any influence.

Other durable woods, ſuch as teak, cedar, &c. though of an open grain, and very porous, contain reſinous, or oleaginous matter, repelling moiſture, which cannot inſinuate itſelf, as is the caſe with the feathers of ſome fowls, &c. On theſe principles the common periſhable woods may be made to reſemble thoſe which are very laſting, or, indeed, nearly indeſtructible.

Thus, to prevent the decay of oak, &c. it is neceſſary either to cauſe it to be incapable of abſorbing moiſture, or to render the ligneous fibre inſoluble.

Some of the effects produced bear conſiderable analogy with tanning, by which proceſs a ſkin, entirely ſoluble in water, forming jelly or glue, and quickly ſuſceptible of putrefaction, is made into leather, a ſubſtance not at all ſoluble in water, and capable of enduring for a long period, ſometimes for ſeveral centuries.

For various methods of performing this, we beg to refer the reader to Mr. Wade's book, in which the operations recommended ſeem ſimple and economical.

Rot *in Timber*, a diſeaſe in trees which quickly injures and deſtroys the woody parts of them by inducing a ſort of rotting and decay. It has been ſtated to proceed from different cauſes, but the principal, according to the author of the Practical Planter, are thoſe of external wounds or bruiſes, the trees growing in unfavourable ſoils, the roots of which have been barked at the period of planting, or in cutting out plants. And ſecondly, by the tree growing in

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ROTA, a town of Spain, in the province of Seville, on the coaſt of the Atlantic, celebrated for its wine; 3 miles W. of Puerto de Santa Maria.

ROTA. See ZARPANA.

ROTA, in *Mechanics*. See WHEEL.

ROTA *Ariſtotelica*, *Ariſtotle's Wheel*, is the name of a celebrated problem in mechanics, founded on the motion of a wheel about its axis; thus called, becauſe firſt, that we know of, taken notice of by Ariſtotle.

The difficulty is this. While a circle makes a revolution on its centre, advancing at the ſame time in a right line along a plane, it deſcribes, on that plane, a right line, equal to its circumference. Now if this circle, which we may call the *deferent*, carry with it another ſmaller circle, concentric with it, and which has no motion but what it receives from the deferent; which is the caſe of the nave of a coach-wheel carried along by the wheel; this little circle, or nave, will deſcribe a line in the time of the revolution, equal, not to its own circumference, but to that of the wheel: becauſe its centre advances in a right line as faſt as that of the wheel does; as being in reality the ſame with it.

The matter of fact is certain; but how it ſhould be, ſeems a myſtery. It is obvious that the wheel, advancing during the revolution, muſt deſcribe a right line equal to its circumference; but how would the nave, which revolves like the wheel, deſcribe a right line ſo much greater than its circumference?

The ſolution Ariſtotle gives is no more than a good explication of the difficulty. Galileo, who next attempted it, has recourſe to an infinity of infinitely little vacuities in the right line deſcribed by the two circles; and imagines that the little circle never applies its circumference to thoſe vacuities; but in reality only applies it to a line equal to its own circumference; though it appears to have applied it to a much larger.

But it is evident, that this is all gratis dictum. The vacuities are imaginary; and why does not the great circle apply its circumference to them? Laſtly, the magnitude of theſe vacuities muſt be augmented or diminiſhed, according to the different proportion of the two circles.

F. Tacquet will have it, that the little circle, making its rotation more ſlowly than the great one, does on that account deſcribe a line longer than its circumference; yet without applying any point of its circumference to more than one point of its baſe. But this is no more allowable than the former.

The attempts of ſo many great men proving vain, M. Dortous de Meyran, a French gentleman, had the good fortune to hit on a ſolution, which he ſent to the Royal Academy of Sciences; where being examined by Meſſrs. de Louville and Saulmon, appointed for that purpoſe, they made their report, that it was ſatisfactory. The ſolution is to this effect:

The wheel of a coach is only acted on, or drawn in a right line; its circular motion or rotation ariſes purely from the reſiſtance of the ground on which it is applied.

Now this reſiſtance is equal to the force with which the wheel is drawn in the right line, inaſmuch as it defeats that direction; of conſequence, the cauſes of the two motions, the one right, the other circular, are equal; and, therefore, their effects, *i. e.* the motions, are equal. And hence the wheel deſcribes a right line on the ground equal to its circumference.

As for the nave of the wheel, the caſe is otherwiſe. It is drawn in a right line by the ſame force as the wheel; but it only turns round becauſe the wheel turns, and can only turn with it, and at the ſame time therewith.

Hence it follows, that its circular velocity is leſs than that of the wheel in the ratio of the two circumferences; and, therefore, its circular motion is leſs than its rectilinear one.

Since then it neceſſarily deſcribes a right line equal to that of the wheel, it can only do it by ſliding, or what they call the motion of rotation; that is, a part of the circular nave cannot be applied to a part of a right line greater than itſelf but by ſliding along that part, and that more or leſs, as the part of the nave is leſs than that of the circle. See ROTATION.

ROTA is alſo uſed for a particular court of juriſdiction in Rome, eſtabliſhed for taking cognizance of beneficiary matters, &c.

The rota conſiſts of twelve doctors choſen out of the four nations of Italy, France, Spain, and Germany; three of them being Romans, one a Florentine, one a Milaneſe, one of Bologna, one of Ferrara, one a Venetian, one a Frenchman, two Spaniards, and one a German; each having four clerks or notaries under him.

Their office is to judge of all beneficiary cauſes, both within Rome, and throughout the ſtate of the church, in caſe of appeal, and of all civil proceſſes which are for above five hundred crowns.

They are alſo called *chaplains* of the pope, as ſucceeding the ancient judges of the ſacred palace, who held their court in his chapel.

The denomination *rota*, *wheel*, ſome will have derived hence, that they officiate by rotation; others, becauſe the moſt important affairs of the Chriſtian world turn upon them. Du-Cange derives it from *rota porphyretica*, becauſe the pavement of the chamber where they formerly ſat was of porphyry, and faſhioned like a wheel.

ROTA, LA, in *Biography*, an admirable bravura ſinger in the Incurabili Conſervatorio at Venice, in 1770, under the regency of Galuppi.

ROTAB, in *Geography*, a river of Saxony, which runs into the Saale, three miles S. of Lena.

ROTACEÆ, in *Botany*, the 20th natural order among the *Fragmenta* of Linnæus, named from *rota*, a wheel, in alluſion to the form of the *corolla*, which is wheel-ſhaped, *rotata*. No commentary upon this order is found in the lectures of Linnæus, publiſhed by Giſeke. The genera ſtand thus; *Trientalis*, *Centunculus*, *Anagallis*, *Lyſimachia*, *Phlox*, *Exacum*, *Chlora*, *Gentiana*, *Swertia*, *Chironia*, and *Sarothra*. To which are ſubjoined, in a ſeparate ſection, *Aſcyrum*, *Hypericum*, and *Ciſtus*; theſe ſurely have little affinity to the reſt.

ROTACH, in *Geography*, a river of Bavaria, which runs into the Maine, near Lichtenfels, in the biſhopric of Bamberg.

ROTAI, or ROTTE, a ſmall iſland in the Eaſt Indian ſea, where a Dutch factor reſides, who trades with the natives in the chief article of their produce, which is ſugar. The north end of this iſland, and the ſouth end of *Timor* (which ſee), lie N. $\frac{1}{2}$ E. and S. $\frac{1}{2}$ W., and are about three or four leagues diſtant from each other. At the weſt end of the paſſage between Rotte and *Semau* (which ſee), are two ſmall iſlands, one of which lies near the Rotte ſhore, and the other off the ſouth-weſt point of Semau, with a good channel between them, about ſix miles broad. The iſle of Rotte has not ſo lofty and mountainous an appearance as Timor, though it is agreeably diverſified by hill and valley. On the north ſide are many ſandy beaches, near which grow ſome trees of the fan palm; but the far greater part was covered

covered with a kind of brushwood without leaves. Cook's Voyage by Hawkesworth, vol. iii. p. 264.

ROTALA, in *Botany*, so named by Linnæus, from *rota*, a wheel; apparently in allusion to the spoke-like appearance of its numerous radiating whorled leaves.—Linn. Mant. 2. 143. Schreb. 33. Willd. Sp. Pl. v. 1. 189. Vahl. Enum. v. 2. 26. Mart. Mill. Dict. v. 4. Juss. 303.—Class and order, *Triandria Monogynia*. Nat. Ord. *Caryophyllei, sect.* 3, Linn. *Caryophylleis affine*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, membranous, three-toothed, permanent. *Cor.* none. *Stam.* Filaments three, capillary, the length of the calyx; anthers roundish. *Pist.* Germen superior, ovate; style thread-shaped; stigma three-cleft. *Peric.* Capsule ovate, obscurely triangular, inclosed in the calyx, of three cells, and three valves. *Seeds* numerous, roundish.

Ess. Ch. Calyx three-toothed. Corolla none. Capsule of three cells, with many seeds.

1. R. *verticillaris*. Linn. Mant. 2. 175. (Ene pael; Rheede Malab. v. 9. 159. t. 81.)—Native of wet situations in the East Indies, from whence it was sent by Koenig to Linnæus. A small annual *herb*, quite smooth, four inches, or more, in height, erect, branched, having the aspect of an *Ammannia*, as Vahl, from the inspection of the only known specimen, in the Linnæan herbarium, remarked. *Root* with many rows of whorled fibres. *Stem* and *branches* reddish; quadrangular in the upper part. *Leaves* from four, or five, to eight in each whorl, sessile, linear, entire, bluntish, or somewhat emarginate, at the end, about half an inch long; paler, with a prominent rib, beneath. *Flowers* axillary, small, sessile, solitary, pale; their permanent *calyx* membranous and pellucid, globular, investing the *fruit*, about the size of a mustard seed.

ROTAS, in *Geography*, a town of Hindoostan, in Lahore, $81\frac{1}{2}$ miles N.W. by N. from Lahore. N. lat. 32° 58′.

Rotas, a circar of Hindoostan, in the soubah of Bahar, bounded on the N.E. by Boujapour, on the E. by Bahar Proper, on the S. by Palamow, on the W. by the circar of Bidzigur, on the N.W. by Chunar; its form approaching to a square about 58 miles each way. The chief towns are Rotasgur and Saseram.

ROTASGUR, a town of Hindoostan, in the abovementioned circar, situated on the river Soane; 94 miles S.W. of Patna. N. lat. 24° 38′. E. long. 84° 2′.

ROTATA, Corolla, in *Botany*, a monopetalous corolla, whose tube is as short as possible, and the limb horizontally extended, like the form of a wheel. This differs from a salver-shaped corolla, in the want of an elongated tube. See Corolla.

ROTATION, in *Mechanics*, is a term used to denote the motion of the several parts of a solid body about an axis, called the axis of rotation, and which may be either *fixed* or *spontaneous*, according as the body is constrained to make its revolution about a determinate point or line, or is free to revolve in any direction from a momentum impressed upon it in space.

We have already treated of several cases of rotatory motion, under our articles Center *of Gyration*, Percussion, Oscillation, &c. and it therefore only remains, in this place, to offer some general remarks with regard to such motion, and to enumerate a few of the most important particulars relating to this interesting branch of mechanics.

When a solid body turns round an axis, retaining its shape and dimensions unaltered, every particle is absolutely describing a circle round this axis; which axis passes through the centre of the circle, and is perpendicular to its plane. Moreover, in any instant of its motion, the particle is moving at right angles with the radius vector, or line joining it with the centre of rotation: therefore, in order to ascertain the direction of the particle, we may draw a line from that particle perpendicular to the axis of rotation. This line will be in the plane of the circle of rotation of that particle, and will be its radius vector; and a line drawn from the particle, perpendicular to its radius vector, will be a tangent to the circle of rotation, and will represent the direction of the motion of this particle.

The whole body being supposed to turn together, it is evident, that when it has made one complete rotation, each point has described the circumference of a circle, and the entire paths of the different particles will be in the proportion of these circumferences, and therefore of their radii: and this is also true of any portion of these circumferences; that is, the velocities of the different particles are proportional to their radii vectores, or to their distances from the axis of rotation; and all these motions are in parallel planes, to which the axis of rotation is perpendicular. Hence it follows, that when we compare the motion of different revolving bodies with respect to velocity, it is evident that it cannot be done by directly comparing the velocity of any particle in one of these bodies with that of any particle of the other; for as all the particles of each have different velocities, this comparison can establish no ratio. But we may familiarly compare such motions, by the number of complete turns which they make in any equal portions of time; and, therefore, as the length or number of feet described by any body, in rectilinear motion, is a proper measure of its progressive velocity, so the angle described by any particle of a revolving body is a proper measure of its motion or rotation: and in this manner may the motion of two or more bodies be compared, and this velocity is with propriety called the angular velocity.

Again, with respect to the motion of bodies at liberty to move freely by the action of any force impressed: if any such body receives an impulsion in any direction, which does not pass through the centre of gravity, the motion which ensues is a rotatory one. For if, at the same moment, a body is impelled according to any direction A B, (*Plate* XXXVII. *Mechanics, fig.* 9.) not passing through the centre of gravity, an equal and opposite force is exerted upon the body in a parallel direction, C G passing through the centre of gravity, that centre will manifestly be kept at rest: nevertheless it is clear, that the other parts of the body will not be in a state of quiescence, because the two forces, though equal, are not directly opposite; so that the only motion that the body can have, its centre of gravity being at rest, is evidently a motion of rotation about that centre. Now the fixed axis, about which the body revolves, is pressed by the impelling force, while it generates rotatory motion; but the axis, being by hypothesis immoveable, re-acts equally against that pressure; and, when it passes through the centre of gravity, would, as above stated, cause each particle to move with the same velocity, and in the direction of the force. If, then, the force which presses against a fixed axis, in given circumstances, be ascertained, the motion of the body in free space, when the axis is removed, will be known; for the latter motion will consist of the rotatory motion about the axis passing through the centre of gravity, considered as fixed, compounded with the motion of the centre of gravity caused by the force now at liberty to impel the centre, the fixed axis which passes through it being removed.

When a solid body receives an impulse on any one point, or or that point is urged in any way by a moving force, it cannot move unlefs the other points, with which it is connected by the force of cohesion, move alfo; except the force of impulfion is fufficient to overcome that of cohesion, a cafe which is not meant to be confidered here. And whatever is the motion of any particle, that particle muft be conceived as urged by a force precifely competent to the production of that motion, by acting immediately on the particle itfelf. The particle, immediately impelled by the external force, is either preffed towards its neighbouring particles, or is drawn from them; and by this endeavour to change its place, the connecting forces are exerted, or brought into action. We are but little acquainted with thefe connecting forces; but this is of little importance in a mechanical point of view; for the fact, that the forces by which the moleculæ of bodies act on each other are equal, is quite fufficient for our prefent purpofe.

After thefe general remarks, let us endeavour to illuftrate the principles above laid down in the folution of a few of the moft obvious and moft practical cafes relating to this important branch of dynamics.

Let A F G H (*Plate* XXXVII. *Mechanics*, *fig.* 1.) reprefent the circumference of a wheel, which turns in its own plane round a horizontal axis, paffing through S, its centre; and let a weight P, fixed at the extremity of a line A P, communicate motion to the wheel. Let alfo the whole weight of the wheel be Q, and fuppofe this weight to be collected uniformly into the circumference A F G H: then during the defcent of the weight P, each point of the circumference muft move with a velocity equal to that with which P defcends; and confequently fince the moving force is the weight P, and the mafs moved P + Q, the force which accelerates P in its defcent will be that part of the accelerating force of gravity which is expreffed by the fraction $\frac{P}{P+Q}$. The velocity, therefore, that is generated in P, in any given time, is found by means of the general formula, given under the article Accelerated *Motion*; that is, $v = 2ft$, $v = \frac{2Pgt}{P+Q}$; and the fpace through which it has paffed in the fame time is $s = \frac{Pgt^2}{P+Q}$. Thus, for example, if P and Q were equal to each other, then $\frac{P}{P+Q} = \frac{1}{2}$, $v = gt$, and $s = \frac{1}{2}gt^2$.

The parts of the weight Q, which are uniformly difpofed over the circumference A F G H, balance each other round the common centre of gravity S; their weight, therefore, has no effect in accelerating or retarding the defcent of P; and this will be the cafe, whenever the axis of motion paffes through the common centre of gravity. But in order to render the properties of rotatory motion more obvious, it will be convenient to difpofe the parts of the revolving fyftem, fo that the axis of motion fhall not neceffarily pafs through the common centre of gravity. Thus, referring to the preceding figure, inftead of fuppofing the weight Q to be uniformly collected over the circular rim A F G H, let it be collected into any point Q. Here it is evident, that if the mafs Q be acted upon by gravity, the force which communicates motion to the fyftem round S will be variable; it being the greateft, when S Q is horizontal; and gradually diminifhing, till Q has defcended to its loweft point.

But in order to begin firft with the fimpleft cafe, the moving force fhould be conftant, as it will be, if we fuppofe the mafs that is collected in Q to be deftitute of weight, and to poffefs inertia only: it follows, therefore, that during the revolution of Q round S as an axis, the moving force will be conftantly equal to P, and the mafs moved $= P + Q$, and confequently the force which accelerates the defcending weight, or any point in the circumference, will be that part of gravity which is expreffed by $\frac{P}{P+Q}$, the fame as before.

In thefe cafes, the force which communicates motion to the fyftem has been fuppofed a weight, or body, acted on by the earth's gravity, and confequently conftitutes a part of the mafs moved, at the fame time that it acts as a moving force. But motion may be communicated by a force, which fhall add nothing to the inertia of the matter moved; as, for inftance, fteam, mufcular power, &c.: and it will, therefore, be convenient, in many inveftigations, to affume the moving force of this kind. The inertia of the moving force P, therefore, in the fubfequent propofitions, will not be taken into the account, unlefs exprefsly mentioned. Thus, if any number of bodies without gravity, being collected into the points F, H, Q, are caufed to revolve round the axis S, by a moving force P, the force which accelerates thefe bodies in their revolution will be $\frac{P}{F+H+Q}$, when P is without inertia; or it will be $\frac{P}{F+H+Q+P}$, when P is poffeffed of inertia; the bodies F, H, and Q, as alfo the power P, being fuppofed to act at equal diftances from the axis of motion.

But when bodies revolve at unequal diftances from the axis, their velocities being different, other formulæ will be neceffary for determining the force whereby any given point of the fyftem is accelerated.

Let B (*fig.* 2.) reprefent a material point, moveable about an axis of motion paffing through S: with the centre S, and diftance S D, defcribe a circle D G H. Now if B be connected with every point in the area of the circle, which is an inflexible fubftance, no force can be applied to move the circle, but what muft communicate the fame angular motion to B. Let us fuppofe this force to be P, acting on the circumference of the inflexible circle D G H, by means of a line paffing over the fame, to which P is connected. Now the abfolute force of P to move D, or any point in the circumference, will be P; but the communication of motion to this point D is refifted by the inertia of the body B, which being moved with a different velocity, and acted on by a different moving force, its inertia is not to be eftimated by its quantity of matter only, but by confidering what mafs or quantity of matter which, when difpofed at the diftance S D, will oppofe the fame refiftance to the defcent of the weight P, as the body B itfelf does, when acting at the diftance S B.

In order to eftimate this, we muft confider that when any two bodies are put in motion by two conftant forces acting for the fame time, the quantities of matter moved are in a direct ratio of the moving forces, and in the inverfe ratio of the velocities generated; that is, if $\frac{M}{m}$ expreffes the ratio of the moving forces, $\frac{Q}{q}$ that of the quantities of matter, and $\frac{V}{v}$ that of the velocities generated; the relation

tion of these quantities is defined by the equation $\frac{Q}{q} = \frac{M}{m} \times \frac{V}{v}$, by the laws of rectilinear motion. To apply this, it must be observed, that although the absolute force of the weight P, acting upon the point D, remains constantly the same, yet its effect upon bodies placed at different distances from the axis of motion are in the inverse proportion of those distances; therefore, the moving forces exerted by P, on the points B and D, will be in the proportion of S D to S B. Also, by the problem, the angular motion of D and B are equal; and, consequently, the velocity of B is to the velocity of D, as S B to S D. And since the quantities of matter in B, D, are in the direct proportion of the moving forces, or of S D to S B, and in the inverse proportion of the velocities generated, or of S B to S D, we shall have the quantity of matter in B to that contained in D, as $SD^2 : SB^2$; and consequently the weight sought $= B \times \frac{SB^2}{SD^2}$.

The same may be otherwise found thus: let $x =$ the quantity of matter required to be collected in D, M the moving force which acts on B, m that which acts on D, V the velocity of B, and v the velocity of D; then $\frac{B}{x} = \frac{M}{m} \times \frac{v}{V}$, but $\frac{M}{m} = \frac{SD}{SB}$, by the property of the lever; and $\frac{v}{V} = \frac{SD}{SB}$, by the nature of angular motion; therefore, $\frac{B}{x} = \frac{SD^2}{SB^2}$, and $x = B \times \frac{SB^2}{SD^2}$, as above.

Whenever, therefore, a body B revolves round an axis, by the action of a constant force P, applied at a given distance, S D, from the axis, in order to find the force which accelerates D, the mass B may be supposed to be removed, and instead of it an equivalent mass $B \times \frac{SB^2}{SD^2}$ collected in the point D, to which the force is applied. After which, the acceleration of the point D, or any other point of the circumference, will be determined from the principles already explained; for the moving force being P, and the mass moved $B \times \frac{SB^2}{SD^2}$, the acceleration of P, or D, will be that part of gravity expressed by the fraction $\frac{P}{B \times \frac{SB^2}{SD^2}} = \frac{P \times SD^2}{B \times SB^2}$, while we suppose the power P void of inertia; or by $\frac{P}{B \times \frac{SB^2}{SD^2} + P} = \frac{P \times SD^2}{B \times SB^2 + P \times SD^2}$, when the inertia of P is considered.

On the same principle, if any number of bodies, A, B, C, &c. (*fig.* 3.) be put in motion round a fixed axis, passing through S, by a constant force P, applied at D, the point D will be accelerated in the same manner, and consequently the whole system will have the same angular velocity. If, instead of A, B, C, &c. placed at the distances S A, S B, S C, &c. we substitute the bodies $\frac{A \times SA^2}{SD^2}$, $\frac{B \times SB^2}{SD^2}$, and $\frac{C \times SC^2}{SD^2}$; these being collected into the points a, b, and c, respectively; and the moving force in this case being P, and the mass moved $\frac{A \times SA^2}{SD^2} + \frac{B \times SB^2}{SD^2} + \frac{C \times SC^2}{SD^2}$; the force which accelerates D will be that part of the force of gravity that is expressed by the fraction,

$$\frac{P \times SD^2}{A \times SA^2 + B \times SB^2 + C \times SC^2};$$

or, if the inertia of P be considered, by

$$\frac{P \times SD^2}{A \times SA^2 + B \times SB^2 + C \times SC^2 + P \times SD^2}.$$

The velocity of the point D is uniformly accelerated, because the force above determined is invariable: it follows also, that the angular velocity of the system is uniformly accelerated, because the absolute velocity of any point at a given distance from the axis of motion, is as the angular velocity of that point, and consequently of the whole system. It is also manifest, that it is of no consequence whether the bodies A, B, C, &c. revolve in the same or different planes, if their distances from the axes S A, S B, S C, &c. are the same, these distances being estimated by lines drawn from A, B, and C, perpendicular to the common axis of motion; if, therefore, they should be situated in various planes, they may be referred to any one given plane perpendicular to the axis.

It is obvious likewise, that changing the position of the bodies A, B, C, in the same plane will not affect the force which accelerates the system, provided their respective distances from the axis of motion be not altered; thus, with the centre S, and distances S B, S C, let the arcs of circles be described; if B is transfered to b', or C to c', the moving force which acts on these bodies respectively will not be altered, and consequently the masses moved being likewise constant, the accelerating force will be the same.

All these propositions are equally true, whatever may be the force by which the angular motion is generated, provided it be constant; or, if variable, should its action be considered for an evanescent particle of time only.

We have here followed the method employed by Mr. Atwood in his treatise on "Rectilinear and Rotatory Motion;" being, as we conceive, the best calculated to convey a correct and elementary idea of the laws of rotatory motion. But it is obvious, that, instead of considering the given bodies A, B, C, (*fig.* 3.) to be equivalent to other bodies placed at the distance S D, we might enquire, at what distance from the centre of motion S all these bodies must be collected, without changing their masses, so that the same angular motion may be generated in the system? This point is called the *centre of gyration*; and as the method of finding this point has been already treated of under the article Center, we shall, in the subsequent part of this article, consider it as known, and shall proceed to the solution of a few such problems as appear best calculated for illustrating the subject under consideration.

Prop. I.

Let D, E, F, (*fig.* 4.) represent a wheel, or cylinder, turning about an axis passing through its centre of gravity S; round the circumference of which a perfectly flexible line is made to pass, and to the end of which a body, P, is suspended;

pended; then, having given the radius S D, the power P, and the weight of the wheel, or cylinder, D E F, it is required to determine the angular velocity generated in the fyftem in a given time.

Let R reprefent the centre of gyration, and make $SR = r$, $SD = d$, the weight of the cylinder $EDF = w$, and the given power $= p$; then the force which accelerates the point D is $\frac{pd^2}{wr^2}$, if we fuppofe p void of inertia; but if the inertia of p be confidered, the force of acceleration is $\frac{pd^2}{wr^2 + pd^2}$, the force of gravity being affumed unity; but if the force of gravity be taken $16\frac{1}{12} = 193$ inches $= l$; and $3.14159 = c$, then, in the time t, the velocity generated in the point D, or defcending weight P, will be reprefented by

$$v = \frac{2ltpd^2}{pd^2 + wr^2} \text{ inches in a fecond.}$$

And fince the circumference of the circle $EFD = 2cd$, the angular velocity generated in the time t, will be

$$\frac{360° \times 2ltpd^2}{2cd\,(pd^2 + wr^2)} = \frac{360°\,ltpd}{c\,(pd^2 + wr^2)} \text{ degrees, or}$$

$$\frac{ltpd}{cpd^2 + cwr^2} \text{ revolutions in a fecond.}$$

1. On the fame principles it will be found, that the angular velocity generated in the fyftem during the defcent of the weight p, through any fpace S, is

$$\text{ang. vel.} = \sqrt{\left(\frac{lsp}{c^2d^2p + c^2r^2w}\right)} \times 360° \text{ degrees, or}$$

$$\text{ang. vel.} = \sqrt{\left(\frac{lsp}{c^2d^2p + c^2r^2w}\right)} \text{ revol. in a fecond.}$$

2. The fpace defcribed by the weight p in its defcent from reft during t feconds, is $s = \frac{lt^2d^2p}{d^2p + r^2w}$, and confequently, the time of defcribing s is,

$$t = \sqrt{\frac{sd^2p + sr^2w}{lpd^2}} \text{ feconds.}$$

3. The fpace defcribed by p from reft, while an angular velocity of n revolutions in a fecond is generated, is

$$s = \frac{n^2c^2d^2p + n^2c^2r^2w}{lp}.$$

4. The force which accelerates the centre of gyration R, is $f = \frac{pdr}{d^2p + r^2w}$.

5. The abfolute velocity generated in the weight p, while it defcends from reft through the fpace S, is

$v = \sqrt{\frac{4lspd^2}{d^2p + r^2w}}$, and the velocity of the point R, is

$v = \sqrt{\frac{4lspr^2}{d^2p + r^2w}}$, and the velocity generated in the point R, in the time t, is

$$v = \frac{2ltdpr}{{}^2p + r^2w}.$$

All thefe refults are drawn immediately from the known formulæ for accelerated motion, by making $f = \frac{pd^2}{wr^2 + pd^2}$ the accelerating force, as determined in the preceding part of this propofition.

In the above inveftigation we have confidered the revolving fyftem to be a uniform wheel, or cylinder; but, it is obvious, the fame will have place for any fyftem of bodies, provided only that the axis of motion paffes through its centre of gravity, and that R be the centre of gyration of the fyftem.

Prop. II.

Let A B C (*fig.* 5.) reprefent a wheel and axle, and let the axis be horizontal, having given its weight w, and the weight q applied to the circumference of the axle, and p applied to the circumference of the wheel, in order to raife q; it is required to affign the fpace defcribed by the elevated weight q from reft in any given time; the proportion of the radii of the wheel and axle being alfo known.

Here the abfolute force which impels D is p, and fince q acts in a direction contrary to p, with a force $= \frac{q \cdot SA}{SD}$, this muft be fubucted from p, which gives $p - \frac{q \cdot SA}{SD}$ $= \frac{p \cdot SD - qSA}{SD}$ for the motive force which impels D. Let the centre of gyration of the wheel and axle be R; then fuppofe the mafs of matter in the whole fyftem removed, if the mafs $\frac{w \cdot SR^2 + q \cdot SA^2 + p \cdot SD^2}{SD^2}$ be concentrated in D, the point D will be accelerated in the fame manner, as when the parts of the fyftem are difpofed as defcribed in the problem. Since, then, the force which impels $D = \frac{p \cdot SD - q \cdot SA}{SD}$, it follows that this force, divided by the whole inertia, or the mafs fuppofed to be concentrated in D, will give for the accelerative force on $D = \frac{p \cdot SD^2 - q \cdot SA \cdot SD}{w \cdot SR^2 + p \cdot SD^2 + q \cdot SA^2}$, and the accelerative force on $q = \frac{p \cdot SD \cdot SA - qSA^2}{w \cdot SR^2 + p \cdot SD^2 + q \cdot SA^2}$.

Or, if we make $SD = n$, $SA = m$, $SR = r$, then the accelerating force on D is $\frac{pn^2 - qmn}{wr^2 + pn^2 + qm^2}$.

If the inertia of the wheel and axle is not confidered, the above becomes $= \frac{pn^2 - qmn}{pn^2 + qm^2}$. And if the inertia of p alfo $= 0$, then we have $\frac{pn^2 - qmn}{qm^2}$; or, if the mafs moved have no weight, but poffeffes inertia only, as when it is drawn along a perfectly polifhed plane, as reprefented alfo in *fig.* 5, then the accelerative force is fimply $\frac{pn^2}{pn^2 + qm^2}$.

Let this accelerative force in any of the cafes we have fuppofed ſuppoſed be put $= f$; then the ſpace, velocity, time, &c. will be found immediately from the general formula

$$s = \frac{1}{2} t v = g f t^2 = \frac{v^2}{4 g f}.$$

Suppoſe, for example, $SD = n = 6$, $SA = m = 2$, then $SR = r = 6 \surd \frac{1}{2}$. (See CENTER *of Gyration.*) Let alſo $w = 10$, $p = 100$, $q = 40$. Then, by our firſt formula,

$$\frac{n^2 p - n m q}{w r^2 + p n^2 + q m^2} = \frac{36 \cdot 100 - 6 \cdot 2 \cdot 40}{10 \cdot 18 + 100 \cdot 36 + 40 \cdot 4} = \frac{3600 - 480}{180 + 3600 + 160} = \frac{3120}{3940} = \frac{156}{197},$$ the accelerative force on D, that of gravity being 1. Whence the ſpace paſſed through by the deſcending weight p in 1″, is $s = g f t^2 = \frac{156 \cdot 16\frac{1}{12}}{197}$ feet, or $\frac{193 \cdot 156}{197}$ inches.

Whenever motion is communicated to any body, a certain reſiſtance muſt have been overcome by the moving force: this reſiſtance is of various kinds. 1. The inertia of the maſs moved, whereby it endeavours to perſevere in its ſtate of quieſcence, or of uniform motion in a right line. 2. That of a weight, or other abſolute force, oppoſed to the action of the moving power. 3. Obſtacles upon which the moving body impinging is retarded in its progreſs; ſuch, for example, is the reſiſtance which ariſes from the particles of a fluid through which a body moves. The eſtimation of theſe reſiſtances, and their effects in retarding the motion of bodies acted on by a given force, are deducible from the laws of motion, and conſtitute a part of the ſolution of almoſt every problem relating to the motion of bodies.

The moving forces alſo are of various kinds; *viz.* gravity, muſcular power, the impact of bodies ſolid or fluid, &c.; and the effect of theſe moving forces, which are exerted on bodies in order to create motion, excluſive of the reſiſtance oppoſed to them, depend on the various circumſtances of the time in which they act, and on the ſpaces through which the bodies moved are impelled, &c. Whence it follows, that, from the great variety of undetermined conditions which may enter into mechanical problems, there muſt be of courſe various ways of producing the ſame mechanical effect; and it is a very material part of the art, conſidered either in a theoretical or practical point of view, to proportion the means to the end, and to effect this with all the advantages that the nature of the caſe is capable of. It is the due obſervation of theſe particulars, which contribute to render the mechanic inſtruments complete, and the neglect of them defective, in their conſtruction. This proper choice of means to produce mechanical effect, is frequently the reſult of long and continued experience, independent of theory; the knowledge of which, however, when immediately applied to practice, would ſave the artiſt much time and trouble; and, at the ſame time, be productive of other advantages which experience alone muſt be deſtitute of.

PROP. III.

In order to illuſtrate this application of theory to practice, let A B C (*fig.* 5.) be a wheel and axle moveable round an horizonal axis, paſſing through S, and a given weight q, which applied to the circumference of the axle, to be raiſed by the application of a given moving force, p, which is applied to the circumference of the wheel; let it be required to aſſign the proportion of the radii of the wheel and axle, ſo that the time in which the weight w aſcends through any given ſpace ſhall be the leaſt poſſible.

Let the given radius of the axle $SA = m$, $SR = r$, $SD = x$; then, by the laſt propoſition, the accelerative force on p is $\frac{x^2 p - q m x}{w r^2 + p x^2 + q m^2}$, and that which accelerates q is $\frac{m x p - m^2 q}{w r^2 + p x^2 + q m^2}$; the ſquare of the time, therefore, in which any ſpace S is deſcribed by the aſcending weight q, is

$$t^2 = \frac{s}{l} \times \frac{w r^2 + p x^2 + q m^2}{m p x - m^2 q}, \quad (l \text{ being } = 193 \text{ in.})$$

and which, by the queſtion, is to be a minimum. And which, therefore, put into fluxions, and reduced, gives

$$x = \frac{m q + \surd (m^2 q^2 + p w r^2 + q p m^2)}{p},$$

the radius required.

Or, if we do not conſider the inertia of the wheel, then $x = \frac{m q + \surd (m^2 q^2 + q p m^2)}{p}$; if $p = q$, then $x = m + m \surd 2 = m (1 + \surd 2)$, the radius of the wheel in this particular caſe.

To give an example in numbers, let $q = 100$, $p = 33$, $w = 20$, $r = \surd 50$, or $r^2 = 50$, $m = 1$, then the diſtance ſought is $\frac{100 + \surd (10000 + 33000 + 3300)}{33} = \frac{315.17}{33} = 9.55$ inches.

This, therefore, will be the moſt convenient diſtance to apply the given moving force, when the chief object is to leſſen the time of aſcent. If it be required to aſſign the diſtance S D, when the momentum communicated to w, while it aſcends through a given ſpace, is the greateſt poſſible, the ſolution will be the ſame as before, which, therefore, anſwers to two conditions; that is, it will render the time in which q aſcends through a given ſpace the leaſt, and the momentum generated during the ſame aſcent the greateſt poſſible.

If the weight q, inſtead of aſcending in a vertical direction, is drawn along an horizontal plane, as in *fig.* 5, the ſurface of which is ſuppoſed perfectly poliſhed; then the weight q, as oppoſed to the moving force $= 0$, poſſeſſing in this caſe only inertia, we ſhall have for the radius of the wheel

$$x = \frac{\surd (p w r^2 + p q m^2)}{p} = \sqrt{\frac{w r^2 + q m^2}{p}}$$

which, if the inertia of w be rejected, becomes ſimply $x = \sqrt{\frac{q}{p}}$.

Hence, if the quantity of matter to be drawn along the plane is four times greater than that which is contained in the moving force, the radius of the axle S A being given, in order that it may be impelled with the greateſt velocity poſſible, and with the greateſt momentum, the radius of the wheel ſhould be double that of the axle, when the inertia of the wheel is not conſidered.

PROP. IV.

As a further application of our theory, let A B C, (*fig.* 5.) be a wheel and axle; when, having given a moving force or weight p, acting on the circumference of the

the wheel in order to raise a weight q, which is applied to the circumference of the axle, it is required to assign the quantity q, when the momentum generated in it in any given time shall be the greatest possible; the inertia of the wheel and axle not being considered.

Making, as before, $SD = n$, $SA = m$, the force which accelerates q is $f = \frac{nmp - m^2 q}{n^2 p + m^2 q}$; therefore, if $l = 193$ inches, the velocity generated in q in the time t will be $2tl \times \frac{nmp - m^2 q}{n^2 p + m^2 q}$, and the momentum generated in q will be $2tl \times \frac{nmpq - m^2 q^2}{n^2 p + m^2 q}$; and as this is to be a maximum by the problem, its fluxion $= 0$, which being taken and reduced gives $q = \frac{\sqrt{(n^4 p^2 + n^3 m p^2)} - n^2 p}{m^2}$.

Therefore, if $SD : SA :: n : 1$, then $q = p\sqrt{(n^4 + n^3)} - n^2 p$; if the radius of the axle equal the radius of the wheel, that is, $n = 1$; then the weight $q = p(\sqrt{2} - 1)$, and consequently the weight moved must be about $\frac{5}{12}$ths of the moving force.

But if we introduce the weight of the wheel, and call it w, r being the distance of the centre of gyration from the axis, then the momentum generated in the time t will be expressed by $2lt \times \frac{nmpq - m^2 q^2}{wr^2 + n^2 p + m^2 q}$, which is the greatest possible when $q = \frac{\sqrt{(n^4 p^2 + 2n^2 r^2 pw + r^4 w^2 + r^2 nmpw + n^2 mp^2)} - (n^2 p + r^2 w)}{m^2}$.

Prop. V.

Again, let A B C H (*fig.* 7.) be a system of bodies moveable round a vertical axis, which passes through the common centre of gravity of the system. And suppose D E G to be a wheel, the axis of which is vertical, and coinciding with that of the system; let motion be communicated by means of a line going round this wheel, the string D P being stretched by a given weight p; let it be required to assign the radius of the wheel E G D, so that the angular velocity communicated to the system in a given time may be the greatest possible. Let the weight of the system $= w$, and the distance of the centre of gyration from the axis of motion $= r$, the radius sought $SD = x$; then the motive force being p, the velocity generated in a given time in that descending weight will be proportional to $\frac{px^2}{wr^2 + px^2}$, and the angular velocity generated in the same time as $\frac{px}{wr^2 + px^2}$, which is to be a maximum by the conditions of the problem, we have, therefore, $\frac{pwr^2\dot{x} + p^2x^2\dot{x} - 2p^2x^2\dot{x}}{(wr^2 + px^2)^2} = 0$, whence $pwr^2 = p^2x^2$, or $x = r\sqrt{\frac{w}{p}}$, the distance sought.

Supposing, therefore, the moving force $= \frac{1}{4}$ of the weight of the system w, we shall have $x = r\sqrt{\frac{w}{\frac{1}{4}w}} = 2r$; that is, the weight should be applied at a distance from the axis, equal to twice the distance of the centre of gyration, in order to produce the greatest angular velocity in a given time.

Prop. VI.

In order to increase the action of a given moving force against a weight to be raised, or resistance to be overcome, a combination of two or more mechanic powers is frequently made use of. Thus, let p be a power applied by means of a line to the vertical wheel C, (*fig.* 6.), and suppose the circumference of the axle K to be in contact with the circumference of the wheel B, so that the circumference of the wheel B may always move equally fast with that of the axis which belongs to C; let also the axle of B communicate motion to the vertical wheel A, to the axle of which a weight, q, is suspended, so as to act in opposition to p; moreover, let lmn to 1, be the sum of the ratios of the radius of each wheel to that of its axle; then if $plmn = q$, the two weights, p and q, will sustain each other in equilibrio; but if $plmn$ be greater than q, the equilibrium will be destroyed, and the weight q will ascend; and it is required to assign the space which, under those circumstances, will be described by q in a given time.

Let the radii of the wheel and axle A be in the ratio of l to 1; those of B as m to 1; and those of C as n to 1; the distance of the centre of gyration in A from the axis $= r$, the same of $B = r'$, and of $C = r''$; the weight of the wheel and axle $A = w$; that of $B = w'$; and that of $C = w''$.

Now the absolute moving force is p, but since q acts in opposition to it, it must be subducted from p, in order to obtain the real motive force of the system. And since q would balance a weight $= \frac{q}{lmn}$, if applied at p, the force which impels p on the whole will be $\frac{plmn - q}{lmn}$. In the next place, the inertia which resists the communication of motion to p must be ascertained. Now motion is communicated to the wheel A, from the circumference of the axle B, and the inertia of A, and of the weight q, which resists the communication of a force applied at $S = \frac{wr^2 + q}{l^2}$; in regard, therefore, to the inertia of A and q, these may be supposed to be removed, and the equivalent mass $\frac{wr^2 + q}{l^2}$ collected into the circumference of the wheel A, or of the axle B. And since motion is communicated to B, by the circumference of the axle C, the inertia of B, together with the equivalent mass $\frac{wr^2 + q}{l^2}$ will be $\frac{r'^2 l^2 w' + wr^2 + q}{l^2 m^2}$.

In like manner, since motion is communicated to C by the weight p acting at D, the inertia which resists the communication of motion to D or p, will be

$$\frac{pn^2 + w''r''^2}{n^2} + \frac{r'^2 l^2 w' + wr^2 + q}{l^2 m^2 n^2} = \frac{l^2 m^2 n^2 p + l^2 m^2 w'' r''^2 + r'^2 l^2 w' + wr^2 + q}{l^2 m^2 n^2},$$

and the force which accelerates p in its descent from rest

$$= \frac{lmn(plmn - q)}{l^2 m^2 n^2 p + l^2 m^2 w'' r''^2 + r'^2 l^2 w'^2 + wr^2 + q},$$

and

and that which accelerates q

$$= \frac{p\,l\,m\,n - q}{l^2 m^2 n^2 p + l^2 m^2 w''^2 r''^2 + r'^2 l^2 w' + w r^2 + q};$$

if, therefore, we make this force $= f$, all the circumſtances of the motion may be determined by the general formula $s = \frac{1}{2} t v = g f t^2 = \frac{v^2}{4 g f}$; as before ſhewn. See a variety of other propoſitions in Atwood's treatiſe on "Rotatory Motion."

In all the preceding propoſitions, the axis of the revolving ſyſtem has been ſuppoſed fixed; but there are other caſes by which rotatory motion may be produced, which ought to be attended to in this article; ſuch as that which enſue from a body deſcending down an inclined plane, having a ribbon or cord wound about it, one end of which is fixed at the upper part of the plane, which, by preventing the body ſliding freely, cauſes a rotatory motion. The ſame effect alſo follows from the friction of the body againſt the plane; and the ſame may be imagined when there is no plane, but the body is left to fall freely, except ſo far as the cord wound about it ſhall produce a rotatory motion in its deſcent. We ſhall not attempt the inveſtigation of theſe caſes, but merely ſtate the reſults that have been obtained; and muſt refer the reader for the former to the ſeveral treatiſes on dynamics, enumerated under the articles Dynamics and Mechanics.

Let a body (*fig.* 8.) have a cord wound about it, either at its circumference, or any other part, as C, having one end fixed at a point above, as at D; then if the body be left to deſcend by the action of gravity, it will acquire a motion of rotation by the unwinding of the cord, and the ſpace actually deſcended by the body in this caſe, will be to the ſpace deſcended in the ſame time, when falling freely, as C G to C O; O and G repreſenting the centres of oſcillation and gyration when the point of ſuſpenſion is at C. And the weight of the body will be to the tenſion of the cord, as C O to C G. The ſame ratios have place when the body deſcends down an inclined plane; the forces which generate the motion being both decreaſed in the ſame ratio.

The force by which ſpheres, cylinders, &c. are cauſed to revolve as they move down an inclined plane (inſtead of ſliding), is the adheſion of their ſurfaces, occaſioned by their preſſure againſt the plane. This preſſure is part of the weight of the body; for this weight being reſolved into its component parts, one in the direction of the plane, the other perpendicular to it, the latter is the force of the preſſure; and which, while the ſame body rolls down, the plane will be expreſſed by the coſine of the plane's elevation. Hence, ſince the coſine decreaſes, will the arc or angle increaſe. After the angle of elevation arrives at a certain magnitude, the adheſion may become leſs than what is neceſſary to make the circumference of the body revolve faſt enough; and in this caſe, it will proceed partly by ſliding, and partly by rolling; but the angle at which this circumſtance takes place, will evidently depend upon the degree of adheſion between the ſurfaces of the body and plane. This, however, will never happen, if the rotation is produced by the unwinding of a ribbon, and it is on this latter ſuppoſition that the following particular caſes are deduced.

Let W be the weight of the body, s the ſpace deſcended by a heavy body falling freely, or ſliding freely down a plane; then the ſpace S, deſcribed by rotation in the ſame time, by the following bodies, will be in theſe proportions.

1. A hollow cylinder or cylindrical ſurface $S = \frac{1}{2} s$; tenſion $= \frac{1}{2}$ W.
2. A ſolid cylinder $S = \frac{2}{3} s$; tenſion $= \frac{1}{3}$ W.
3. A ſpheric ſurface $S = \frac{3}{5} s$; tenſion $= \frac{2}{5}$ W.
4. A ſolid ſphere $S = \frac{5}{7} s$; tenſion $= \frac{2}{7}$ W. See Gregory's Mechanics, vol. i.

Rotation, *Spontaneous*, is that rotatory motion which a body acquires when acted upon by any external force in free ſpace. And the *centre of ſpontaneous rotation* is that point which remains at reſt the inſtant the body receives its impulſion, or it is that point about which the body begins to revolve.

The moſt general method of treating this ſubject is with reference to three rectangular co-ordinates, after the method of Lagrange and other modern French writers; but as that method is not commonly adopted by Engliſh mathematicians, we muſt neceſſarily either enter at great length into explanation, or run the riſk of not being underſtood by many of our readers, on which account we ſhall here adopt a ſimilar mode of inveſtigation to that which we have followed in the preceding part of this article.

Firſt, then, we may obſerve, that when a body, B, (*fig.* 9.) of any ſhape whatever, receives an impulſe, the direction of which does not paſs through the centre of gravity, and takes in conſequence two motions, as we have ſtated in the early part of this article, it is evident, that for an inſtant of time we may conſider it as having only one motion, namely, a motion of rotation about a point or fixed axis, C, which may be either within the body, or out of it, according to its ſhape, and the diſtance, G S, between the centre of gravity and the direction of impact. If, while the line G S is carried parallel to itſelf from G S to G′ S′, we imagine that it revolves about the moveable point G, as the particles of the body have greater or leſs velocities, as they are more or leſs diſtant from G, it is manifeſt that there is upon S G a certain point, C, which will be found to deſcribe from C′ towards C an arc equal to G G′, which, during an evaneſcent inſtant, may be regarded as a right line; in that caſe the point C will have been carried as far backward by its motion of rotation, as it will have been advanced parallel to G G′ by the velocity common to all the parts of the body; the point C has, therefore, during this inſtant, been actually at reſt in C; and may conſequently be conſidered as a fixed point about which the body during ſuch inſtant has a rotatory motion. This point is the centre of ſpontaneous rotation, and is the ſame as the centre of ſuſpenſion, correſponding to the centre of percuſſion, the centre of percuſſion being the point where the body is ſtruck.

Without entering into a minute demonſtration of this property, we may convince ourſelves of its truth, by conſidering that the action of a body againſt an immoveable obſtacle, in the centre of percuſſion, muſt have the ſame effect upon the body, as if that body had been at reſt, and it had been ſtruck by the obſtacle; in which latter caſe, the centre of ſuſpenſion would not be affected, and therefore it becomes the centre of ſpontaneous rotation. On which account it alſo follows, that the centre of ſpontaneous rotation is wholly independent of the magnitude of impact; but depends entirely on the diſtance that the force φ S, or the reſult of all the forces, acts from the centre of gravity, G; and conſequently, when that force acts in the direction, or coincides with G G′, there will be no motion of rotation, as is obvious.

We may alſo farther obſerve, that if an impact be made on any point of the axis of a ſymmetrical body, or a ſolid of revolution, and that point be conſidered as the point of ſuſpenſion, the wheel in order to raife a weight q, which is applied to the circumference of the axle, it is required to affign the quantity q, when the momentum generated in it in any given time fhall be the greateft poffible; the inertia of the wheel and axle not being confidered.

Making, as before, $SD = n$, $SA = m$, the force which accelerates q is $f = \frac{nmp - m^2 q}{n^2 p + m^2 q}$; therefore, if $l = 193$ inches, the velocity generated in q in the time t will be $2tl \times \frac{nmp - m^2 q}{n^2 p + m^2 q}$, and the momentum generated in q will be $2tl \times \frac{nmpq - m^2 q^2}{n^2 p + m^2 q}$; and as this is to be a maximum by the problem, its fluxion $= 0$, which being taken and reduced gives $q = \frac{\sqrt{(n^4 p^2 + n^3 m p^2)} - n^2 p}{m^2}$.

Therefore, if $SD : SA :: n : 1$, then $q = p\sqrt{(n^4 + n^3)} - n^2 p$; if the radius of the axle equal the radius of the wheel, that is, $n = 1$; then the weight $q = p(\sqrt{2} - 1)$, and confequently the weight moved muft be about $\frac{5}{12}$ths of the moving force.

But if we introduce the weight of the wheel, and call it w, r being the diftance of the centre of gyration from the axis, then the momentum generated in the time t will be expreffed by $2lt \times \frac{nmpq - m^2 q^2}{wr^2 + n^2 p + m^2 q}$, which is the greateft poffible when $q = \frac{\sqrt{(n^4 p^2 + 2n^2 r^2 pw + r^4 w^2 + r^2 nmpw + n^2 mp^2)} - (n^2 p + r^2 w)}{m^2}$

Prop. V.

Again, let A B C H (*fig.* 7.) be a fyftem of bodies moveable round a vertical axis, which paffes through the common centre of gravity of the fyftem. And fuppofe D E G to be a wheel, the axis of which is vertical, and coinciding with that of the fyftem; let motion be communicated by means of a line going round this wheel, the ftring D P being ftretched by a given weight p; let it be required to affign the radius of the wheel E G D, fo that the angular velocity communicated to the fyftem in a given time may be the greateft poffible. Let the weight of the fyftem $= w$, and the diftance of the centre of gyration from the axis of motion $= r$, the radius fought $SD = x$; then the motive force being p, the velocity generated in a given time in that defcending weight will be proportional to $\frac{px^2}{wr^2 + px^2}$, and the angular velocity generated in the fame time as $\frac{px}{wr^2 + px^2}$, which is to be a maximum by the conditions of the problem, we have, therefore, $\frac{pwr^2\dot{x} + p^2x^2\dot{x} - 2p^2x^2\dot{x}}{(wr^2 + px^2)^2} = 0$, whence $pwr^2 = p^2x^2$, or $x = r\sqrt{\frac{w}{p}}$, the diftance fought.

Suppofing, therefore, the moving force $= \frac{1}{4}$ of the weight of the fyftem w, we fhall have $x = r\sqrt{\frac{w}{\frac{1}{4}w}} = 2r$; that is, the weight fhould be applied at a diftance from the axis, equal to twice the diftance of the centre of gyration, in order to produce the greateft angular velocity in a given time.

Prop. VI.

In order to increafe the action of a given moving force againft a weight to be raifed, or refiftance to be overcome, a combination of two or more mechanic powers is frequently made ufe of. Thus, let p be a power applied by means of a line to the vertical wheel C, (*fig.* 6.), and fuppofe the circumference of the axle K to be in contact with the circumference of the wheel B, fo that the circumference of the wheel B may always move equally faft with that of the axis which belongs to C; let alfo the axle of B communicate motion to the vertical wheel A, to the axle of which a weight, q, is fufpended, fo as to act in oppofition to p; moreover, let lmn to 1, be the fum of the ratios of the radius of each wheel to that of its axle; then if $plmn = q$, the two weights, p and q, will fuftain each other in equilibrio; but if $plmn$ be greater than q, the equilibrium will be deftroyed, and the weight q will afcend; and it is required to affign the fpace which, under thofe circumftances, will be defcribed by q in a given time.

Let the radii of the wheel and axle A be in the ratio of l to 1; thofe of B as m to 1; and thofe of C as n to 1; the diftance of the centre of gyration in A from the axis $= r$, the fame of $B = r'$, and of $C = r''$; the weight of the wheel and axle $A = w$; that of $B = w'$; and that of $C = w''$.

Now the abfolute moving force is p, but fince q acts in oppofition to it, it muft be fubducted from p, in order to obtain the real motive force of the fyftem. And fince q would balance a weight $= \frac{q}{lmn}$, if applied at p, the force which impels p on the whole will be $\frac{plmn - q}{lmn}$. In the next place, the inertia which refifts the communication of motion to p muft be afcertained. Now motion is communicated to the wheel A, from the circumference of the axle B, and the inertia of A, and of the weight q, which refifts the communication of a force applied at $S = \frac{wr^2 + q}{l^2}$; in regard, therefore, to the inertia of A and q, thefe may be fuppofed to be removed, and the equivalent mafs $\frac{wr^2 + q}{l^2}$ collected into the circumference of the wheel A, or of the axle B. And fince motion is communicated to B, by the circumference of the axle C, the inertia of B, together with the equivalent mafs $\frac{wr^2 + q}{l^2}$ will be $\frac{r'^2 l^2 w' + wr^2 + q}{l^2 m^2}$.

In like manner, fince motion is communicated to C by the weight p acting at D, the inertia which refifts the communication of motion to D or p, will be

$$\frac{pn^2 + w''r''^2}{n^2} + \frac{r'^2 l^2 w' + wr^2 + q}{l^2 m^2 n^2} = \frac{l^2 m^2 n^2 p + l^2 m^2 w'' r''^2 + r'^2 l^2 w' + wr^2 + q}{l^2 m^2 n^2},$$

and the force which accelerates p in its defcent from reft

$$= \frac{lmn(plmn - q)}{l^2 m^2 n^2 p + l^2 m^2 w'' r''^2 + r'^2 l^2 w'^2 + wr^2 + q},$$

and

and that which accelerates q

$$= \frac{p\,l\,m\,n - q}{l^2 m^2 n^2 p + l^2 m^2 w''^2 r''^2 + r'^2 l^2 w' + w r^2 + q};$$

if, therefore, we make this force $= f$, all the circumftances of the motion may be determined by the general formula $s = \frac{1}{2} t v = g f t^2 = \frac{v^2}{4 g f}$; as before fhewn. See a variety of other propofitions in Atwood's treatife on "Rotatory Motion."

In all the preceding propofitions, the axis of the revolving fyftem has been fuppofed fixed; but there are other cafes by which rotatory motion may be produced, which ought to be attended to in this article; fuch as that which enfue from a body defcending down an inclined plane, having a ribbon or cord wound about it, one end of which is fixed at the upper part of the plane, which, by preventing the body fliding freely, caufes a rotatory motion. The fame effect alfo follows from the friction of the body againft the plane; and the fame may be imagined when there is no plane, but the body is left to fall freely, except fo far as the cord wound about it fhall produce a rotatory motion in its defcent. We fhall not attempt the inveftigation of thefe cafes, but merely ftate the refults that have been obtained; and muft refer the reader for the former to the feveral treatifes on dynamics, enumerated under the articles Dynamics and Mechanics.

Let a body (*fig.* 8.) have a cord wound about it, either at its circumference, or any other part, as C, having one end fixed at a point above, as at D; then if the body be left to defcend by the action of gravity, it will acquire a motion of rotation by the unwinding of the cord, and the fpace actually defcended by the body in this cafe, will be to the fpace defcended in the fame time, when falling freely, as C G to C O; O and G reprefenting the centres of ofcillation and gyration when the point of fufpenfion is at C. And the weight of the body will be to the tenfion of the cord, as C O to C G. The fame ratios have place when the body defcends down an inclined plane; the forces which generate the motion being both decreafed in the fame ratio.

The force by which fpheres, cylinders, &c. are caufed to revolve as they move down an inclined plane (inftead of fliding), is the adhefion of their furfaces, occafioned by their preffure againft the plane. This preffure is part of the weight of the body; for this weight being refolved into its component parts, one in the direction of the plane, the other perpendicular to it, the latter is the force of the preffure; and which, while the fame body rolls down, the plane will be expreffed by the cofine of the plane's elevation. Hence, fince the cofine decreafes, will the arc or angle increafe. After the angle of elevation arrives at a certain magnitude, the adhefion may become lefs than what is neceffary to make the circumference of the body revolve faft enough; and in this cafe, it will proceed partly by fliding, and partly by rolling; but the angle at which this circumftance takes place, will evidently depend upon the degree of adhefion between the furfaces of the body and plane. This, however, will never happen, if the rotation is produced by the unwinding of a ribbon, and it is on this latter fuppofition that the following particular cafes are deduced.

Let W be the weight of the body, s the fpace defcended by a heavy body falling freely, or fliding freely down a plane; then the fpace S, defcribed by rotation in the fame time, by the following bodies, will be in thefe proportions.

1. A hollow cylinder or cylindrical furface $S = \frac{1}{2} s$; tenfion $= \frac{1}{3}$ W.
2. A folid cylinder $S = \frac{2}{3} s$; tenfion $= \frac{1}{3}$ W.
3. A fpheric furface $S = \frac{3}{5} s$; tenfion $= \frac{2}{5}$ W.
4. A folid fphere $S = \frac{5}{7} s$; tenfion $= \frac{2}{7}$ W. See Gregory's Mechanics, vol. i.

Rotation, *Spontaneous*, is that rotatory motion which a body acquires when acted upon by any external force in free fpace. And the *centre of fpontaneous rotation* is that point which remains at reft the inftant the body receives its impulfion, or it is that point about which the body begins to revolve.

The moft general method of treating this fubject is with reference to three rectangular co-ordinates, after the method of Lagrange and other modern French writers; but as that method is not commonly adopted by Englifh mathematicians, we muft neceffarily either enter at great length into explanation, or run the rifk of not being underftood by many of our readers, on which account we fhall here adopt a fimilar mode of inveftigation to that which we have followed in the preceding part of this article.

Firft, then, we may obferve, that when a body, B, (*fig.* 9.) of any fhape whatever, receives an impulfe, the direction of which does not pafs through the centre of gravity, and takes in confequence two motions, as we have ftated in the early part of this article, it is evident, that for an inftant of time, we may confider it as having only one motion, namely, a motion of rotation about a point or fixed axis, C, which may be either within the body, or out of it, according to its fhape, and the diftance, G S, between the centre of gravity and the direction of impact. If, while the line G S is carried parallel to itfelf from G S to G′ S′, we imagine that it revolves about the moveable point G, as the particles of the body have greater or lefs velocities, as they are more or lefs diftant from G, it is manifeft that there is upon S G a certain point, C, which will be found to defcribe from C′ towards C an arc equal to G G′, which, during an evanefcent inftant, may be regarded as a right line; in that cafe the point C will have been carried as far backward by its motion of rotation, as it will have been advanced parallel to G G′ by the velocity common to all the parts of the body; the point C has, therefore, during this inftant, been actually at reft in C; and may confequently be confidered as a fixed point about which the body during fuch inftant has a rotatory motion. This point is the centre of fpontaneous rotation, and is the fame as the centre of fufpenfion, correfponding to the centre of percuffion, the centre of percuffion being the point where the body is ftruck.

Without entering into a minute demonftration of this property, we may convince ourfelves of its truth, by confidering that the action of a body againft an immoveable obftacle, in the centre of percuffion, muft have the fame effect upon the body, as if that body had been at reft, and it had been ftruck by the obftacle; in which latter cafe, the centre of fufpenfion would not be affected, and therefore it becomes the centre of fpontaneous rotation. On which account it alfo follows, that the centre of fpontaneous rotation is wholly independent of the magnitude of impact; but depends entirely on the diftance that the force ϕ S, or the refult of all the forces, acts from the centre of gravity, G; and confequently, when that force acts in the direction, or coincides with G G′, there will be no motion of rotation, as is obvious.

We may alfo farther obferve, that if an impact be made on any point of the axis of a fymmetrical body, or a folid of revolution, and that point be confidered as the point of fuſpenſion, the correſponding centre of oſcillation will be the centre of ſpontaneous rotation. This follows immediately from the properties of the centre of percuſſion and oſcillation. (See CENTER.) To which we may alſo add, that ſince the force divided by the body acted upon, is a general expreſſion for the velocity of the centre of gravity of that body; therefore the velocity of the centre of gravity of the body will be the ſame, whatever may be the direction of the impelling force; ſo that the permanency of the quantity of motion obtains the ſame in motions about a centre of ſpontaneous rotation, as in all other caſes.

PROP. I.

When ϕ S, (*fig.* 9.) the direction of impact, paſſes through the centre of the impelling body, the centre of gravity of the body ſtruck, will move with a velocity equal to the product of the quantity of motion of the impelling body into the diſtance between the centre of gravity and ſpontaneous rotation, divided by the ſum of the products of the impelling body into the diſtance of the point of impact from the centre of ſpontaneous rotation, and of the impelled body into the diſtance of the impelled body, into the diſtance between the centres of ſpontaneous rotation and of gravity.

Let the quantity of matter of the impinging body be b, its velocity v, or $bv = \phi$; and when the body B is ſtruck in the direction ϕ S, (in which the centre of the body b is always found), let the velocity of its centre of gravity be V, the centre of ſpontaneous converſion being at C. Then C G : C S :: V : *the velocity of the point* S, which is therefore $V \cdot \frac{CS}{CG}$; conſequently, $v - V \cdot \frac{CS}{CG}$ = the velocity loſt by b in the direction ϕ S; whence, by the third law of motion, $b \times \frac{v \cdot GC - V \cdot CS}{CG} = B \cdot V$, and by reduction, $V = \frac{b \cdot v \cdot CG}{B \cdot CG + b \cdot CS}$, as was to be demonſtrated.

Hence, if the inertia of the ſtriking body be evaneſcent, the velocity V will become $\frac{bv}{B} = \frac{\phi}{B}$, being the ſame as would be generated if the body b impinged directly on it with the velocity V.

PROP. II.

The inertia of the ſtriking body being evaneſcent, the angular velocity of the ſyſtem about the centre of gravity is equal to the momentum of the impelling body, divided by twice the product of the maſs of the impelled body, and the diſtance C G, into the periphery of a circle whoſe diameter is unity.

If the fixed axis paſſed through C, the centre of gravity would deſcribe a circle, whoſe radius is C G, with the velocity $\frac{bv}{B}$. But, in the preſent caſe, the motion of the ſyſtem will be compounded of the uniform rectilinear motion of the centre of gravity, in the direction G′ C, perpendicular to C S, and the angular motion $x G' p = G C G'$, generated round the centre of gravity. And ſince the periphery of a circle, whoſe radius is C G, is $2\pi \cdot CG$ (π being = 3.1416), we have this analogy, $\frac{bv}{B} : 2\pi \cdot CG :: 1'' : \frac{2\pi \cdot B \cdot CG'}{bv}$, the time of one revolution in ſeconds. Whence it follows, that the number of revolutions, or parts of a revolution, in a ſecond, or the angular velocity U, will be $1 \div \frac{2\pi \cdot B \cdot CG}{bv} = \frac{bv}{2\pi \cdot B \cdot CG}$.

And ſince C is the centre of percuſſion to S as a centre of motion, if Q be the centre of gyration with reſpect to G as a centre of motion (that is, if Q be the principal centre of gyration), we ſhall have $GC \cdot GS = GQ^2$, or $CG = \frac{GQ^2}{GS}$. This value of G C being ſubſtituted for it in the preceding expreſſion for the angular velocity, it becomes $U = \frac{b \cdot v \cdot GS}{2\pi B \cdot GQ^2}$. It follows alſo from what is ſhewn above, that the centre of ſpontaneous rotation, during the motion of the ſyſtem, deſcribes the common cycloid. For the motion of any point in the ſyſtem is compounded of the uniform rectilinear motion of the centre of gravity, and of the angular motion generated round that centre; but the velocity with which the centre of ſpontaneous rotation would move round the centre of gravity, if there only exiſted a rotatory motion in the ſyſtem, would be equal to that with which the centre of gravity would move round it, if the centre C were fixed; conſequently, ſince the centre C has both a rotatory and progreſſive motion, each of which is equal to that of the centre of gravity, it will deſcribe a cycloid.

PROP. III.

In the body, or ſyſtem B, (*fig.* 9.) to which, when quieſcent, motion has been communicated by the impulſe of a force, ϕ, without inertia, that is, rectilinear motion to the centre of gravity meaſured by the ſpace V, which that centre would deſcribe uniformly in any given time, and angular motions meaſured by the revolutions U, or parts of a revolution, which it would deſcribe uniformly round G in the ſame time; then if the notations in the preceding propoſitions be retained, and Q be the principal centre of gyration, when the ſyſtem revolves about its centre of gravity, the perpendicular diſtance from the centre of gravity, at which the impelling force muſt act ſo as to have generated theſe progreſſive and rotatory motions, will be $GS = \frac{2\pi \cdot U \cdot GQ^2}{V}$.

Let ϕ S be the direction of the impulſe, and let ϕ be equal to the momentum of an evaneſcent body b, moving with the velocity V, B being the weight of the ſyſtem; then the velocity communicated to the centre of gravity of the ſyſtem, will, by the laſt propoſition, be $= \frac{b \cdot v \cdot SG}{2\pi \cdot B \cdot GQ^2}$. But by the propoſition, the velocity communicated to the centre of gravity of the ſyſtem is V; and the angular motion, that is, the number of revolutions, or parts of a revolution, deſcribed while the centre of gravity paſſes over the ſpace V, is U; ſo that from the conditions there ariſes this equation, $U = \frac{b \cdot v \cdot GS}{2\pi \cdot B \cdot GQ^2} = \frac{V \cdot GS}{2\pi \cdot GQ^2}$, by putting V for its equal $\frac{bv}{B}$. Hence $GS = \frac{2\pi \cdot U \cdot GQ^2}{V}$.

If

If the body B be a ſphere, whoſe radius is r, then $GQ^2 = \frac{2}{5}r^2$, and if u be the abſolute velocity of rotation of an equator of the ſphere, we have $U = \frac{u}{2\pi r}$; whence the preceding value of G S is transformed to this, $GS = \frac{2}{5}r \cdot \frac{u}{V}$.

This propoſition may be applied to the double motion of the planets. The earth revolves about an axis paſſing through its centre of gravity, while, by a motion of tranſlation, that centre is carried on in free ſpace in an orbit nearly circular; and a ſimilar kind of double motion has been diſcovered in ſeveral of the planets, and analogy leads us to believe it obtains in the others. Now, ſuppoſing the bodies of the planets to be ſpherical, as they are nearly, the uſe of this propoſition at once appears. Having given, for inſtance, the magnitude of an impulſe, with reſpect to the maſs of the earth, and the direction ϛ S, in which it was applied, at any given diſtance S G from the centre of gravity, the angular motion round G would be inferred; and converſely if the actual rotatory velocity of the earth's equator, and the velocity in its orbit, be aſcertained, the diſtance G S from the centre, at which it may have received a ſingle impulſe ϛ S adequate to produce the double motion, may be readily found.

Thus, any point in the earth's equator paſſes over 25,020 miles by rotation in one ſidereal day; and if the mean diſtance of the earth from the ſun be 95 million miles, the earth will paſs over nearly 596,904,000 miles by its orbital motion in a year, or in about 366 ſidereal days; hence $596,904,000 \div 366 = 16,308,852$, will be equal to V in our theorem, while $25,020 = u$. Conſequently, $GS = \frac{2}{5}r \cdot \frac{u}{V} = \frac{r}{163.2}$. So that if an impulſe be impreſſed upon a quieſcent ſphere, and the direction of force ſhould be at a diſtance S G from its centre of gravity of about $\frac{1}{163}$d part of its radius, the angular motion of that ſphere, and the abſolute motion of its centre, will have the ſame relation to each other, as thoſe which actually obtain in the earth.

The time of the rotations of Mercury, Uranus, and the laſt new planets, are unknown; but for the following planets it is aſcertained, ſo that, by the ſame theorem, we obtain theſe values of G S; *viz.* Mars, $\frac{r}{195}$; Jupiter, $\frac{r}{2.8125}$; Saturn, $\frac{r}{2.588}$; the Moon, $\frac{r}{555}$.

We have not ſufficient data for the ſun; but the very circumſtance of his having a rotation of $27^d\ 7^h\ 47^m$, makes it very probable that he, with all his attendant planets, is alſo moving forward in celeſtial ſpace, perhaps round ſome centre of ſtill more general and extenſive gravitation; for the perfect oppoſition and equality of two forces, for giving a rotation without a progreſſive motion, has the odds againſt it of infinity to unity. This corroborates the conjectures of philoſophers, and the obſervations of Herſchel and other aſtronomers, who think that the ſolar ſyſtem is approaching to that quarter of the heavens in which the conſtellation Aquilea is ſituated.

Prop. IV.

If a body revolves about an axis paſſing through its centre of gravity with the angular velocity U, while this axis is carried round another axis, alſo paſſing through its centre of gravity, with the angular velocity U, theſe two motions compoſe a motion of every particle of the body, round a third axis lying in the plane of the other two, and inclined to each of the former axes in angles whoſe ſines are inverſely as the angular velocities round them; and the angular velocity V round this new axis, is to that about one of the primitive axes, as the ſine of the inclination of the latter axis, to the ſine of the inclination of the new axis to the other primitive axis.

Thus, if a body turns round an axis A G a, (*fig.* 10.) paſſing through its centre of gravity G, with the angular velocity U, while this axis is carried round another axis B G b, with the angular velocity u; and if G D be taken to G E as U to u, (the points B and E being taken on that ſide of the centre where they are moving towards the ſame ſide of the figure,) and the line D E be drawn, the whole and every particle of the body will be in a ſtate of rotation, about a third axis C G c parallel to D E, lying in the plane of the other two, and the angular velocity v about the axis C G c, will be to U as D E : D G; and to u as D E : G E. For let P be any particle of the body, and ſuppoſe a ſpherical ſurface, whoſe centre is G, to paſs through P. Draw P R perpendicular to the plane of the figure; then is P R the common ſection of the circle of rotation I P; round the axis A a, and the circle K P k of rotation round the axis B b. Let F and O be the centres of theſe circles of rotation, and I i, and K k, their diameters. Draw the radii P F, P O, and the tangents P M, P N; theſe tangents are in the plane M P N, which touches the ſphere in P, and the plane of the axis in the line M N, to which a line drawn from G, through R, would be perpendicular. Suppoſe P N to repreſent the velocity of rotation of the point P, about the axis B b, while P f repreſents its velocity of rotation about A a, and complete the parallelogram P N t f; then is P t the direction and velocity of the reſultant of the compoſition of P N, P f, and it is manifeſtly in the ſame plane as the conſtituent lines. Let perpendiculars f F, t T, be drawn to the plane of the axis, and the parallelogram P N t f will be orthographically projected on that plane, its projection being alſo a parallelogram R N T F. Draw the diagonal R T. Then, ſince P R is perpendicular to the plane of the primitive axis, P R t T is ſo likewiſe; and conſequently the compound motion P t is in the plane of a circle of revolution about ſome axis ſituated in the plane of the other two. Produce I R, and draw G C interſecting it perpendicularly in H; and let L P l be the circle of rotation, its diameter being L l = 2 L H; then is P t a tangent, and perpendicular to P H, and it will meet I R in ſome point Q of the line M N. The particle P is in a ſtate of rotation about the axis C G c; its velocity is to the velocities round A a, or B b, as P t to P F, or P T to P N. Now P N the tangent is perpendicular to O P, and P R is perpendicular to O N; therefore O P : P N :: P R : R N, or $RN = \frac{PN \cdot RN}{PO}$. But the velocity of P about the axis B b, is $u \cdot OP$; whence $RN = \frac{U \cdot OP \cdot PR}{OP} = u \cdot PR$.

In like manner, R F = U . P R; conſequently R F : R N :: U : u :: G D : G E. But N T : R N :: ſin. N R T : ſin. N T R :: ſin. G E D : ſin. G D E; hence ſin. N R T : ſin. N T R :: ſin. G E D : ſin. G D E. Now, ſince N R is perpendicular to E G, and N T (parallel to F I) perpendicular to D G, we have R N T = E G D. Hence T R is perpendicular, and C c parallel to E D. Alſo, ſince R N, R F, R T, are as the velocities u, U, v, about theſe different axes, and vary reſpectively, as E G, D G, D E, we have v : U : u :: E D : G D : G E; which was to be demonſtrated.

Hence, if every particle of a body, whether ſolid or fluid, receives at the ſame time two ſeparate impulſes, the one

one competent to the production of a motion of the particle round an axis with a certain angular velocity, and the other competent to the production of a rotatory motion about another axis with a certain velocity, the combined effect of all these impulsions, will be a motion of the whole system about a third axis, given in position, with an angular velocity which is also given; and this motion will obtain, without any separation or disunion of parts, except such as may be occasioned by the action of the centrifugal forces resulting from the rotation.

Hence, also, if a body be turning round any axis, and every particle, in one instant, get precisely such an impulse as is competent to produce a given angular velocity round another axis, the body will turn round a third axis given in position, with a given angular velocity.

Lastly, when a rigid body acquires a rotation about an axis, by an impulse on one part of it, and either at the same time, or afterwards, receive an impulse on any part which alone would have produced a certain rotation about another axis, the joint effect of these impulses will be a rotation about a third axis, in conformity with this proposition. For when a rigid body acquires a motion about an axis, not by the simultaneous impulse of the precisely competent force on each particle, but by an impulse on one part, there has been propagated to every particle, (by means of the cohesive forces,) an impulse precisely competent to the production of that motion which the particle actually acquires; and when a rigid body already turning round an axis A a, receives an impulse which makes it actually turn about another axis C c, there has been propagated in each particle a force precisely adequate to the production, not of the motion but of the *changes* of motion which takes place in that particle; that is, a force which, when compounded with the inherent force of its primitive motion, produces the new motion, that is, by the proposition a force which alone would have caused it to turn about a third axis B b, with a rotation making the other component of the actual rotation about C c.

This elegant theorem, the enunciation of which is due to P. Frisi, is very important, and gives a great extension to the doctrine of the composition of motion. It is of great use in many curious problems, and particularly that of the precession of the equinoxes. Those who wish for farther information on the subject of rotatory motion, may consult Gregory's "Mechanics," from which we have taken the three last propositions; Simpson's "Tracts;" Frisi's "Cosmographia;" "Philosophical Transactions," 1780; Landen's "Memoirs;" Atwood "On the Rotatory Motion of Bodies;" Lagrange's "Méchanique Analytique;" and a memoir "Sur le Mouvement de Rotation," by Français, Paris, 1813; in which latter work the subject is treated with all the generality it seems to admit of, and which method we should have adopted in this article, but for the reasons stated in the commencement of it, that is to say, the length to which we must have extended it, in order to have rendered it intelligible to the English reader.

Rotation is also synonimous with Rolling, which see.

Rotation, in *Geometry*, the circumvolution of a surface round a line, called the *axis of rotation*.

By such rotation of planes, the figures of certain regular solids are formed or generated.

The method of cubing solids, generated by such rotation, is laid down by M. de Moivre, in his specimen of the use of the doctrine of fluxions. For the fluxions of such solids take the product of the fluxion of the abscissa, multiplied by the circular base, and suppose the ratio of a square to the circle inscribed to be as $\frac{n}{1}$; the equation expressing the nature or property of any circle, whose diameter is d, is $yy = dx - xx$. Therefore $4\,\frac{d x \dot{x} - x^2 \dot{x}}{n}$ is the fluxion of a portion of the sphere, and consequently the point itself $4\,\frac{\frac{1}{2} x d x - \frac{1}{3} x^3}{n}$, and the circumscribed cylinder is $4\,\frac{d x x - x^3}{n}$; therefore the portion of the sphere is to the circumscribed cylinder as $\frac{1}{2} d - \frac{1}{2} x$ to $d - x$. Phil. Trans. N° 216.

For other instances of this kind, and a view of the application of the doctrine of fluxions, to find the contents of solid bodies, see Solidity. See also Centrobaryc *Method*.

Rotation, *Revolution*, in *Astronomy*. See Revolution.

Rotation, *Diurnal*. See Diurnal, and Earth.

Rotation, in *Anatomy*, the action of the musculi rotatores; or the motion which they give to the parts they are fixed to.

There are two muscles, the great and the little obliquus, used to perform the rotation of the eye. The obturator internus and externus effect the rotation of the thighs.

Mr. Winslow has given an account of this, as well as of pronation, and other circulatory animal motions. See Mem. de l'Acad. des Sciences, 1729. See also Extremities.

Rotation *of Crops*, in *Agriculture*, the several means of cropping lands of the arable kind in such a manner as to prevent their being exhausted as much as possible, and at the same time to preserve them free from weeds in the most complete and perfect mode. The proper alternation of different sorts of crops in this intention, is a matter of vast importance to the interests of agriculture, and in which immense improvements have been made in this and other countries within this last half century, but which is still far from any thing like perfection. See *Course of* Crops.

In addition to what has been stated under the head referred to above, it may be observed, in this place, that the nature and state in which the manure is, when applied to the lands, should likewise be attended to in fixing the rotations of the crops, in order that the first and all the succeeding ones may be supported in the best and most effectual manner by the changes that are always taking place afterwards in such materials, when united and incorporated with the soils; and in this way, those parts of them which are not fitted to or suitable for one kind of crop, may be converted to the nourishment and support of the next, and so on in the same manner. Thus, where the turnip is the first crop in the rotation, and manure of the fresh dung kind is used, which directly affords it the necessary supply of soluble matter, while the heat which is generated in its decomposition assists the sprouting and growth of the seed, it should be succeeded by barley, or some other similar sort of grain crop, with suitable grass seeds, as the land will have been but little robbed of its fertility by the preceding turnip crop, and of course will plentifully supply the soluble portions of the gradually decomposing substance of the manure to that crop; while the grasses that remain on the land, which, in many cases, draw only a small portion of the matter of which they are composed from the earth, and in all probability take up the gypseous substance contained in the manure, which would be of little utility to other sorts of crops, and

and which, in confequence of their large fupply of leaves, derive a confiderable proportion of their nutriment from the furrounding atmofphere, when they become ultimately ploughed down into the ground, afford a confiderable fupply of manure to the fucceeding wheat crop, by the gradual decay and decompofition of their roots and leaves, and befides, the woody fibrous parts of the farm-yard manure, which was at firft applied, and which contains in its compofition the phofphate of lime, as well as fome other foluble parts which are of difficult reduction, are now broken down, and brought into a fuitable ftate for the fupport of that crop.

After this deteriorating and exhaufting crop has been taken from the ground, recourfe muft again be had to frefh manure, and the rotation be renewed.

And in the ftrong clayey foils, after the land has remained for two years in the ftate of grafs, from the time of taking a well frefh dunged foil for barley crop, the leys may be ploughed down and fown with pea and bean crops; after which the pea and bean ftubble may be turned in for a wheat crop; and in many cafes this may be followed by crops of winter tares and winter barley to be eaten off upon the land in the fpring feafon, previoufly to its being prepared by their being ploughed in, and other means for the fowing of turnips.

In thefe cafes, the rotation may ceafe and begin again, either after taking the wheat crop, or thofe of the tares and winter barley, according as the circumftances of the different cafes may be in refpect to the land.

It may be noticed, that pea and bean crops, in all cafes of this nature, appear to be very well fuited to form and prepare the land for wheat crops, as is clearly afcertained, from their being alternately cultivated for many years together in fome fuch fituations. This may probably depend, in fome meafure, upon the fmall proportion of fubftance fimilar to that of albuminous matter which they contain, and afford, as well as upon the principles fupplied by the decay of the bean roots in the ground, which may be capable of forming a part of the glutinous material in wheat crops.

In the bufinefs of cropping lands, it may likewife be neceffary to have regard to the nature and manner in which the different forts of plants are fed and fupported, for though the compofition of them in general may be very fimilar, the fpecific differences in the products of a number of them, as well as many other facts and circumftances, fully demonftrate that they muft draw different forts of matters from the earth or foil, and although it muft be obvious that fuch vegetables as have the fmalleft fupplies of leaves, will, in proportion, be the moft exhaufting to the earth or foil of its common nutrient materials, yet that particular forts of plants, as they are principally fupported by particular kinds of matters, will, where their produce is carried off the land, require peculiar principles of fuch natures to be fupplied to the foil on which they grow.

The cafe of the potatoe, as well as fome other plants, is highly illuftrative of this point, as it is well known that it produces the moft fully, and in the moft luxuriant manner at firft, while the ground or mould is in a frefh or virgin ftate, and juft turned up from old ley or pafture; but that in the courfe of a few years it degenerates and declines, ftanding in need of a new frefh foil; and the nature of its production has a conftant tendency to fearch for this, as the fibrous radicles afford new bulbs or roots at a confiderable diftance from the old plant.

Such grounds alfo as have been long cropped with fome kinds of artificial graffes, as red clover, &c. frequently ceafe to yield good and full crops of them; they becoming, in the language of the farmer, fick of, or tired with them; one principal and probable reafon of which is, perhaps, the deficiency or abfolute want of the peculiar fort of material which is neceffary for their growth and fupport, as above, which in this inftance is that of gypfum. This, therefore, may be proper to be regarded in determining the rotations in fuch cafes.

A moft remarkable cafe of this property and capability of particular plants to drain and exhauft the land of the particular principles and fubftances fuited to their growth and fupport, is met with in the mufhroom tribe, which are afferted never to appear in fucceffion on the fame point of ground.

In fhort, in every rotation of crops, it is of effential importance that every part of the land fhould, in its turn or fucceffion, be made to contribute, as fully as it is capable, to the different plants as crops, by their being properly chofen and adapted in this refpect.

In many inftances of ftrong loamy land, great benefit may be derived from cropping with beans, which have been fully dunged for, after barley and clover, as the latter of the above crops and the manure will fupply abundant fupport for the bean crop, and that crop, in its ftubble and roots, afford an admirable preparation and fupply of food for wheat, as already noticed; which may be properly and beneficially fucceeded by tares, which again prepare the ground well by their being fed off on the land, or foiled for another crop of wheat. The rotation may then begin again.

Some think that all plants, the feeds of which yield oil, exhauft land in a very high degree. Thus cole, which is a fort of cabbage, efpecially when it perfects its feed, as well as the cabbage itfelf, which is believed by many to deteriorate the land greatly, is improper as a crop in preparation for wheat, though it is had recourfe to in many diftricts, and thought highly of for that purpofe. Great caution is conftantly neceffary in the rotations of cropping with fuch forts of plants as crops.

In fome cafes of the lighter kinds of mixed foils, peas are found full as good a preparation for the wheat crop as beans, having the advantage of being off the land fo much fooner. Peafe or tares alfo prepare well for wheat, after ray-grafs, on the ftone-brafh lands in many inftances, when well cultivated.

That bean crops fhould always precede the wheat, and not follow it, as is too frequently the cafe in a number of diftricts, is fufficiently evident from the above remarks. Peas may fometimes be fubftituted in the place of the bean crop, with confiderable propriety and utility.

It may be concluded on this moft interefting fubject, that of all the figns which denote the progrefs or perfection of the art of hufbandry in any diftrict or country, there is none which is more certain and correct than that of the rotations of the crops, which are purfued by the farmers in the management of their arable lands. Where there is no regular and appropriate change in the kinds of the crops, fo as to fuit them to the nature of their fupport, and the ftates and circumftances of the land, the fyftem of farming muft be in a wretched ftate indeed; but where the arable grounds are regularly preferved in a productive ftate, by fuitable rotations well applied, not only the intereft of the tenant is promoted, his judicious conduct rendered evident, and the advantage of the proprietor fecured by the improvement which is effected, but the good of the community greatly increafed, by the products of the earth being rendered fo much more abundant for its ufe and fupport.

The practice of applying manure and cropping, fo as to draw out the ſtrength of it, and that of the ſoil, as ſoon as it can be done, until the land is rendered quite barren and incapable of affording any more produce without ſome reſpite, is moſt miſerable, and deſerves the higheſt reprobation, though not uncommon.

It has been contended, that a well-ſelected rotation of crops is capable of doubling the ſupport of the preſent population, and of vaſtly increaſing the wealth and reſources of the nation. Alſo, that having recourſe to proper modes of cropping, may ſometimes be highly beneficial in preventing the ruſt or mildew in wheat, as over-dunging immediately for ſuch crops is found to be productive of the diſeaſe, while the application of it previouſly to ſome ſort of ſmothering crop, ſuch as rape or cole in ſtrong lands, and potatoes on thoſe that are light, is an almoſt effectual means of avoiding it. Some maintain that this diſeaſe ſeldom or ever takes place in wheat crops after rape or cole, and others aſſert the ſame to be nearly the caſe in them after potatoes. And that, as wheat after clover on light ſoils is liable to be affected in this way, it may occaſionally be of importance to take it before that crop ſomewhat in this manner, potatoes, wheat, clover, barley.

Rotation *of Crops*, in *Gardening*, the introduction of the moſt proper and ſuitable courſes of crops, for the production of good garden vegetables of different kinds, and for the keeping of the ground in the richeſt and moſt proper condition for the cultivation and growth of them. This is equally important and neceſſary in the garden as in the field, but it cannot, by any means, be ſo fully and effectually accompliſhed in the former as in the latter, on account of the ſmallneſs of the uſual limits of it, and the greatneſs of the number of different articles which are required to be raiſed and cultivated, as well as their more intimate relation to each other. See Crops, *Courſe of*.

In addition to what has been ſaid under the head above alluded to, it may be obſerved, that the management of this buſineſs may, in ſome meaſure, be effected by a ſuitable diviſion and arrangement of the cultivated culinary vegetables into different claſſes, as crops for the purpoſe, as their natures, habits, methods of culture, and difference in duration and other circumſtances may indicate. And by the application of the manure which is uſed in ſuch ſtates, kinds, and manners, as that it may go the fartheſt, be conſumed to the greateſt advantage in the raiſing of the different ſorts of vegetables in ſucceſſion, and produce them of the beſt and moſt healthy kinds.

Manure ſhould be applied in the firſt inſtance only for thoſe crops that are not injured in any way by it, but which receive great benefit from its uſe, and cannot be grown well without its being always employed in ſuch ſtates as are moſt favourable to them, according to their different natures, habits, and kinds, as the potatoe, cabbage, bean, celery, &c. When theſe crops have taken up the more groſs parts, the finer and more delicate vegetables may ſucceed on the ſame land in their proper order, ſo as to conſume the remaining parts of the manure in the moſt advantageous ways, both to the produce and the land.

On this principle, the rotations ſhould obviouſly begin either with the potatoe, cabbage, bean, celery, or ſome other crop of a ſimilar kind, well manured for; and be followed by thoſe of the more delicate ſorts, in their moſt ſuitable courſes, ſo as not to be hurt in their growth or flavour. The uſe of graſs ſeeds on well manured land may alſo ſometimes be had recourſe to by market gardeners, for laying down their lands in the view of refreſhing them, and ſoon breaking them up again.

By proper attention to the different circumſtances which have been noticed above, and others of the ſame nature that may occur, different uſeful and advantageous rotations of crops may be introduced into garden culture, and the art be, in this way, very greatly improved.

ROTATOR, in *Anatomy*, a name given to the oblique muſcles of the eye, called alſo, from the direction of the fibres, *circulares*, and from the effect of their action, *amatorii.* See Eye.

ROTCHET, in *Ichthyology*, an Engliſh name for the fiſh called by authors *cuculus*, and more frequently by us the red *gurnard*. See Trigla *Cuculus*.

ROTE, an old muſical inſtrument, frequently mentioned in the French Fabliaux, and ſuppoſed to mean the *valle*, an inſtrument played with a wheel, inſtead of a bow.

Rote, in *Geography*, a river of Germany, which runs into the Itch, two miles N. of Coburg.

ROTEBRO, a town of Sweden, in the province of Upland; 30 miles N.N.W. of Stockholm.

ROTELE, in *Ichthyology*, a name by which ſome call the *rutilus latior*, or *rubellus fluviatilis*, more frequently known by the name of the roach, a river-fiſh, with red belly-fins and tail. See Cyprinus *Rutilus*.

ROTELSEE, in *Geography*, a town of the duchy of Wurzburg; 4 miles E. of Kitzingen.

ROTENBACH, a town of the archduchy of Auſtria; 9 miles N.W. of Schwanaſtadt.

ROTENBERG, a town of Auſtria; 18 miles S.W. of Freyſtatt.

ROTENBURG, a town of Switzerland, in the canton of Lucerne; 4 miles N. of Lucerne.—Alſo, a town of Wurtemberg, on the N. ſide of the Neckar, oppoſite to Ehingen; 21 miles S.W. of Stuttgart. N. lat. 48° 32′. E. long. 9° 3′.—Alſo, a town of Germany, in the county of Verden, on the Wumme; 12 miles N.N.E. of Verden. N. lat. 53° 8′. E. long. 9° 24′.—Alſo, a town of Germany, in the principality of Heſſe, on the Fulda; 25 miles S.S.E. of Caſſel. N. lat. 51° 1′. E. long. 9° 42′.—Alſo, a town of Brandenburg, in the New Mark, on the Oder; 12 miles E.S.E. of Croſſen. N. lat. 52° 5′. E. long. 15° 30′.—Alſo, a town of the duchy of Baden; 14 miles E.S.E. of Spire. N. lat. 49° 15′. E. long. 8° 48′.—Alſo, a town of the duchy of Magdeburg; 40 miles S. of Magdeburg.

ROTENSTEIN, a town of the duchy of Carinthia; 10 miles S.W. of Saxenburg.

ROTGANS, Luke, in *Biography*, an eminent Dutch poet, was born of a good family at Amſterdam, in 1645. His education led him to the cultivation of polite literature, which, for a time, he quitted to take up arms in defence of his native country, when invaded by the French in 1672. When his ſervices were no longer required, he retired to a villa between Amſterdam and Utrecht, where he reſumed with new vigour his favourite purſuits. When peace was concluded between France and Holland, he paid a viſit to Paris. He died of the ſmall-pox in 1710, in the 66th year of his age. He was author of a number of poems, highly eſteemed in his own country. Of theſe, one is a "Life of William III.," in eight books. His other pieces are moral and miſcellaneous, which, with two tragedies, were printed, in 1715, at Lewarden.

ROTH, in *Geography*, a town of Germany, in the principality of Anſpach, at the union of the Roth and Rednitz, containing an aſylum for thoſe who have been guilty of manſlaughter; and manufactures of ſtockings, Spaniſh lace, and ſtuffs; 15 miles S. of Nuremberg. N. lat. 49° 10′. E. long. 10° 59′.—Alſo, a river of Germany, formed from two ſprings, called the Ober and the Unter Roth, which unite

unite near Hilpolſtein, on the borders of Franconia; and after this union, it falls into the Rednitz, near the town of Roth.—Alſo, a river of Bavaria, which riſes about 10 miles S. of Landeſhut, and runs into the Inn, oppoſite to Scherding.—Alſo, a town of Germany, in the lordſhip of Limberg; 4 miles W.N.W. of Gaildorf.—Alſo, a river of Germany, which runs into the Danube, S.W. of Leipheim.

Roth, *Ajeſt*, a town of Bohemia, in the circle of Prachatitz; 4 miles N.E. of Piſek.

Roth, *Haus*, a town of Sileſia, in the principality of Neiſſe; 7 miles E.N.E of Neiſſe.

ROTHA, a town of Saxony, in the circle of Leipſic; 6 miles S. of Leipſic. N. lat. 51° 12′. E. long. 12° 21′.

ROTHALS, in *Ornithology*, a name given by Geſner, and ſome others, to the pochard, or red-headed wigeon, the *anas ferina;* a bird diſtinguiſhed from all others of the duck-kind, by having no variegation in its wings. See Duck (Ferina).

ROTHARIS, in *Biography*, king and legiſlator of the Lombards, was duke of Breſcia, at the time of the death of king Ariovald, in the year 638, who left a widow, named Gundeberg, but no male iſſue. The Lombards gave this lady the privilege of raiſing to the throne the perſon whom ſhe ſhould fix on for her huſband, and her choice fell upon Rotharis, the ſubject of this article. For the ſake of uniting himſelf with the queen, he repudiated his own wife, whom, however, he promiſed to maintain in the dignity of a queen. This engagement he did not long regard, but ſhut her up in an apartment of the palace of Pavia, where ſhe remained five years; when, through the mediation of Clovis II., ſhe was reſtored to her rank in ſociety. Rotharis had ſcarcely aſcended the throne, when he had to contend with all the power of certain nobles diſaffected to his government, which, however, he quelled, and afterwards reigned with equal glory and proſperity at home and abroad. His predeceſſor had bound himſelf by a treaty with the exarch of the empire, to reſtrain himſelf within certain boundaries; but Rotharis did not conceive himſelf under any obligation to obſerve this treaty, and ſuddenly burſt into the province of the Cottian Alps, which he reduced, and then made himſelf maſter of all the towns in the Venetian territories. The exarch, at the ſame time, made an incurſion into the Lombard territory, which called away Rotharis from his conqueſts: an engagement enſued, in which the exarch was totally defeated, and obliged to ſave the relics of his army by ſpeedy flight. Rotharis likewiſe penetrated into Liguria, and took Genoa, Albenga, and other maritime towns, which he pillaged and diſmantled, carrying away the inhabitants as priſoners. Rotharis has the high merit of having firſt given to his nation a code of written laws. In the fifth year of his reign he ſummoned a general diet of his nobles at Pavia, where, with their conſent, he enacted a number of laws, which were made public in an edict iſſued in 643, conſiſting of 386 articles. Theſe, though they bear the ſtamp of a rude age and people, are accounted more judicious than the laws of ſome other barbaric people. It has been obſerved, that Rotharis was ſufficiently enlightened not only to deride the ſuperſtition of witchcraft, but to protect the victims of that reputed crime from popular rage. He alſo practiſed religious toleration, and provided in all the cities of his kingdom a biſhop for each of the two prevailing perſuaſions, the Arian and the Catholic. He died in 653, at the age of 47 years, having reigned more than 15 years. Univer. Hiſt.

ROTHBEIN, in *Ornithology*. See Scolopax *Calidris*.

ROTHBURY, in *Geography*, a market-town and pariſh in Coquetdale ward, in the county of Northumberland, England, is ſituated 29½ miles N. by W. from Newcaſtle, and 306½ miles N.N.W. from London. In the oldeſt records, this place is called Robirie, Rathbury, and Routhbiry; and its name has by ſome been derived from the Britiſh word *Rhath*, ſignifying *a cleared ſpot*, or the Gaelic *Rath*, denoting *a ſurety* or *place of ſafety;* but it is more probable, on account of its Saxon termination, that it was ſo called from *roth*, *red*, from the ferruginous appearances around it, where iron mines and ochre abound. Soon after the Conqueſt, Rothbury, though itſelf only a member of the barony of Warkworth, appears to have been a large manor, including alſo thoſe of Thropton and Snitter. King John enfeoffed the barons of Whalton, in this manor, for the payment of one knight's fee. It reverted to the crown, together with Warkworth, by ſettlement; and was, in 1330, granted to the Percies, and entailed upon their male poſterity. The duke of Northumberland is now lord of the manor, but poſſeſſes very little freehold property in the town. No remarkable hiſtorical event has ſignalized this place. Previous to the union of England with Scotland, the inhabitants of Rothbury and its vicinity appear to have retained longer than moſt others the ferocity and lawleſsneſs of the ancient race of borderers. The reformation was late in finding its way hither; and there are yet ſome traits remaining of the ruder ages, but which are gradually wearing away. A foot-ball play on Shrove-Tueſday, at which all the males above eight years old are required to attend, is one; and the continuance of the cuſtom of bondage-ſervice, in the foreſt of Rothbury, is another. But this laſt injurious uſage having been abandoned upon the property of the duke of Northumberland, by his grace, it will ſoon, it is to be hoped, be only remembered by tradition.

According to the parliamentary returns in 1811, the town contains 133 houſes, and 750 inhabitants: the pariſh, however, includes 27 other townſhips, which compriſe 712 houſes, and 3732 inhabitants.

Rothbury ſtands in a ſequeſtered and romantic glen, on the north ſide of the river Coquet. The town is wide, airy, and tolerably well built, and is much frequented, during the ſummer ſeaſon, by valetudinarians, to drink goats' whey; theſe animals abounding very much amongſt the adjacent cliffs and rocks. There is a weekly market, but very indifferently ſupplied, and it has four fairs in the year. The church is a very ancient ſtructure, dedicated to All-Saints, in the form of a croſs, and contains a font of very curious workmanſhip, and ſeveral reſpectable monuments. Witton or Whitton tower, one of a line of towers, which, in the border-wars, extended from Hepple to Warkworth, a ſtrong ancient building, with the arms of Unfranville on its weſt ſide, is now the rector's manſion. The living is worth about 1200*l. per annum*. Here is a bridge of three arches over the Coquet.

On the top of a hill, between this town and Thropton, is a circular intrenchment, with a double ditch and vallum, called Old Rothbury; and not far from it, in a ſand-ſtone rock, is a large cave.

Rothbury-foreſt is about ſeven miles from eaſt to weſt, and four miles from ſouth to north. There is now very little wood upon it, and the whole land is nearly incloſed. It contains mines of lime-ſtone, coal, iron, and ochre; though, ſince the wood has diſappeared, nothing but coal is dug, and that only to a very limited extent. In that part of the foreſt, north of the Coquet, and eaſt of Rothbury, near the road leading from Alnwick, are Dibden-wells, the

waters

waters of which were formerly held in high eftimation, and were much reforted to for the cure of fcorbutic eruptions.

Halyftone, a fmall village, about five miles weft from Rothbury, is fuppofed to have been a place of fome confequence in the time of the Saxons; for here, according to the venerable Bede, Paulinus baptized, in a copious adjoining fpring, called our Lady's well, upwards of 3000 perfons. There was alfo a priory of Benedictine nuns, a few veftiges of which are now in exiftence.

Harbottle caftle, about a mile from Halyftone, was once a formidable fortrefs, but is now in ruins. It was given by William the Conqueror to Robert de Unfranville, lord of Tours and Vian, by a general grant of the lordfhip of Redefdale, to hold, by defending that country for ever from wolves and enemies, by the fame fword which the Conqueror wore when he entered Northumberland. In 1173 it was facked by the Scots; but in 1296 it was befieged in vain by them. It is now the property of Thomas Clennels, efq., who has built a modern manfion near it.

At Hepple, on the Coquet, about five miles from Rothbury, there was alfo a ftrong caftle, or tower, of which there are very few remains at prefent. Cartington caftle, two miles north-weft from Rothbury, was formerly the feat of the Ratcliffes: the part of it which remains is kept in good repair, and is very ftrongly built. Here is an afylum for fix females of the Roman Catholic religion, who, from their fecluded life, are ufually called nuns. See Hiftorical and Defcriptive View of the County of Northumberland, &c., 2 vols. 8vo. 1811, drawn up by Mr. Mackenzie of Newcaftle. Beauties of England, vol. vii. Northumberland, by the Rev. Mr. Hodgfon.

ROTHEM, a river of Germany, which runs into the Danube, 5 miles above Ulm.

ROTHEMSEE, a lake of Germany, in the principality of Anfpach; 6 miles E. of Gerhardfbron.

ROTHENBACH, a town of Germany, in the circle of the Lower Rhine; 30 miles E.S.E. of Francfort on the Maine.—Alfo, a town of Bavaria, in the bifhopric of Bamberg; 2 miles E. of Forcheim.—Alfo, a town of Bavaria, in the territory of Nuremberg; 3 miles N.W. of Altorf.

ROTHENBURG, a town of Lufatia, on the river Neiffe; 14 miles N. of Gorlitz. N. lat. 51° 23′. E. long. 15° 2′.—Alfo, a city of Bavaria, capital of a territory, and imperial, near the Tauber, fituated on a mountain. The water of the Tauber fupplies the town by means of a machine, which raifes it to a part called the Klingenthurn, and from thence it falls down, forming three fountains in the town. The city is encompaffed with ditches and walls, the latter being fortified with towers. It has five churches, and the inhabitants are Lutherans. This is a very ancient place, and it continued imperial till the year 1802, when it was affigned among the indemnities to the elector of Bavaria; 18 miles W. of Anfpach. N. lat. 49° 22′. E. long. 10° 14′.—Alfo, a town of the duchy of Magdeburg; 40 miles S. of Magdeburg.

ROTHENFELS, a caftle giving name to a county, called Konigfegg Rothenfels, and ceded to Bavaria among the indemnities; one mile N.W. of Immerftadt.—Alfo, a town of the duchy of Wurzburg, on the Maine, the caftle of which was demolifhed by the peafants in the year 1525; 16 miles W.N.W. of Wurzburg.

ROTHENSIRBEN, a town of Silefia, in the principality of Breflau; 8 miles S. of Breflau.

ROTHENSTEIN, a town with a caftle, in the duchy of Wurzburg; 8 miles S.S.E. of Königfhofen.

ROTHER, a river of England, in Suffex, which runs into the fea at Rye.—Alfo, a river in the county of Derby, which runs into the Don, near Rotheram, in Yorkfhire.

ROTHER-*Beafts*, a word ufed in old ftatutes, and ftill in the northern parts of England, for any horned beafts; as oxen, cows, fteers, heifers, &c.

Whence *rother-foil*, in Herefordfhire, is taken for the dung or foil of fuch cattle.

ROTHER-*Nails*, are fuch as have a very large head, and are ufed to faften the rudder-irons in fhips. See RUDDER.

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waters of which were formerly held in high eftimation, and were much reforted to for the cure of fcorbutic eruptions.

Halyftone, a fmall village, about five miles weft from Rothbury, is fuppofed to have been a place of fome confequence in the time of the Saxons; for here, according to the venerable Bede, Paulinus baptized, in a copious adjoining fpring, called our Lady's well, upwards of 3000 perfons. There was alfo a priory of Benedictine nuns, a few veftiges of which are now in exiftence.

Harbottle caftle, about a mile from Halyftone, was once a formidable fortrefs, but is now in ruins. It was given by William the Conqueror to Robert de Unfranville, lord of Tours and Vian, by a general grant of the lordfhip of Redefdale, to hold, by defending that country for ever from wolves and enemies, by the fame fword which the Conqueror wore when he entered Northumberland. In 1173 it was facked by the Scots; but in 1296 it was befieged in vain by them. It is now the property of Thomas Clennels, efq., who has built a modern manfion near it.

At Hepple, on the Coquet, about five miles from Rothbury, there was alfo a ftrong caftle, or tower, of which there are very few remains at prefent. Cartington caftle, two miles north-weft from Rothbury, was formerly the feat of the Ratcliffes: the part of it which remains is kept in good repair, and is very ftrongly built. Here is an afylum for fix females of the Roman Catholic religion, who, from their fecluded life, are ufually called nuns. See Hiftorical and Defcriptive View of the County of Northumberland, &c., 2 vols. 8vo. 1811, drawn up by Mr. Mackenzie of Newcaftle. Beauties of England, vol. vii. Northumberland, by the Rev. Mr. Hodgfon.

ROTHEM, a river of Germany, which runs into the Danube, 5 miles above Ulm.

ROTHEMSEE, a lake of Germany, in the principality of Anfpach; 6 miles E. of Gerhardfbron.

ROTHENBACH, a town of Germany, in the circle of the Lower Rhine; 30 miles E.S.E. of Francfort on the Maine.—Alfo, a town of Bavaria, in the bifhopric of Bamberg; 2 miles E. of Forcheim.—Alfo, a town of Bavaria, in the territory of Nuremberg; 3 miles N.W. of Altorf.

ROTHENBURG, a town of Lufatia, on the river Neiffe; 14 miles N. of Gorlitz. N. lat. 51° 23′. E. long. 15° 2′.—Alfo, a city of Bavaria, capital of a territory, and imperial, near the Tauber, fituated on a mountain. The water of the Tauber fupplies the town by means of a machine, which raifes it to a part called the Klingenthurn, and from thence it falls down, forming three fountains in the town. The city is encompaffed with ditches and walls, the latter being fortified with towers. It has five churches, and the inhabitants are Lutherans. This is a very ancient place, and it continued imperial till the year 1802, when it was affigned among the indemnities to the elector of Bavaria; 18 miles W. of Anfpach. N. lat. 49° 22′. E. long. 10° 14′.—Alfo, a town of the duchy of Magdeburg; 40 miles S. of Magdeburg.

ROTHENFELS, a caftle giving name to a county, called Konigfegg Rothenfels, and ceded to Bavaria among the indemnities; one mile N.W. of Immerftadt.—Alfo, a town of the duchy of Wurzburg, on the Maine, the caftle of which was demolifhed by the peafants in the year 1525; 16 miles W.N.W. of Wurzburg.

ROTHENSIRBEN, a town of Silefia, in the principality of Breflau; 8 miles S. of Breflau.

ROTHENSTEIN, a town with a caftle, in the duchy of Wurzburg; 8 miles S.S.E. of Königfhofen.

ROTHER, a river of England, in Suffex, which runs into the fea at Rye.—Alfo, a river in the county of Derby, which runs into the Don, near Rotheram, in Yorkfhire.

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ROTHESAY, or ROSAY, a royal borough-town and pariſh in the county and iſle of Bute, Scotland, is ſituated on the bank of a fine bay, at the N.W. ſide of the iſland. The ancient Gaelic and patronimic name of this pariſh is Cilla-bhruic, which ſignifies the church dedicated to St. Broke. The town is yet called, in the Gaelic language, Bailea-Mhoide, or the town where the courts of juſtice are held. Rotheſay is undoubtedly of high antiquity; but it does not ſeem to have been conſtituted a royal borough till the year 1400, when king Robert III., who was then reſident at the caſtle, raiſed it to that dignity. At that period it was a conſiderable town, but in ſucceeding years it declined greatly both in extent and population, as was apparent in the early part of the laſt century, by the number of ruinous houſes, and foundations of others, which were then viſible. About fifty years ago, indeed, it was reduced to the condition of a mean village, poſſeſſing only one decked veſſel of inconſiderable burthen. Under the auſpices of the late earl of Bute, however, the induſtry and emulation of the inhabitants began to revive, and the town has again advanced to a ſtate of comparative proſperity and opulence. Even ſo early as 1790, the inhabitants had accumulated ſhipping to the amount of 4246 tons, and it is believed the eſtimate of tonnage is now nearly doubled. This change has been principally effected by the encouragement given to the herring-fiſheries, in which the inhabitants of Rotheſay have about 100 ſmall veſſels employed annually; but in part it is likewiſe to be attributed to the eſtabliſhment of ſome cotton-mills in the immediate vicinity. Rotheſay, as a royal borough, unites with Cambletown, Irvine, Inverary, and Ayr, in the election of a repreſentative to the great council of the nation. It is the ſeat of the county courts of juſtice; and has the honour of giving the title

title of a Scottish dukedom to the heir apparent of the British throne.

The castle of Rothesay is now a mere ruin, and is so completely enveloped with ivy, that only small portions of its walls are discernible to the eye. It was erected at different periods; part of it, forming the present entrance, by king Robert III., and the remainder at a much more remote date. The latter division is quite circular, and is strengthened by projecting round towers. This castle, in remote times, was the scene of several events of military note in Scottish history. According to Torfæus, Husbec, grandson of Somerled, was killed in an attack on a castle in Bute, most probably of this. In 1263, Haco, king of Norway, obtained forcible possession of it, and of the whole island; and in 1334 it was seized by Edward Baliol, because its then owner, the high steward of Scotland, was related to the Bruces, and was next heir to the throne. The year following, the island was invaded by the English under lord Darcy, and given up to plunder; which so exasperated the natives, that, in conjunction with those of Arran, they made an attack upon the castle soon after lord Darcy left it, and succeeded in regaining possession of it. Subsequent to this period it became a royal residence. King Robert II. and III. lived in it for a considerable time; and it would appear that much attention was bestowed on it, for in the reign of James V. we find that one of the articles of accusation exhibited against sir James Hamilton, was his not accounting for three thousand crowns destined for the "reform of the castle and palace of Rosay." In 1544, the earl of Lennox, assisted by the English, made himself master of this place; after which it became the principal residence of the Stuarts, ancestors of the present family of Bute, and continued so till the year 1685, when it was burnt by the duke of Argyle. The earl of Bute, however, yet ranks among his titles that of hereditary keeper of this palace.

The parish of Rothesay extends about ten miles in length, and from three to four in breadth. In the time of episcopacy, it was within the diocese of the Isles, and on the establishment of Presbyterianism, was included in the presbytery of Irvine, or Cuninghame, and the synod of Glasgow and Ayr. In 1639, however, it was disjoined from that presbytery and synod, and annexed to the presbytery of Denoon, and synod of Argyle, to which it continues united. According to the parliamentary census of 1811, this parish contained 702 houses, and 4970 inhabitants, of whom 3544 are resident within the borough. The Statistical Account of Scotland, by Sir John Sinclair, bart. vol. i. 8vo. 1791. Pennant's Tour in Scotland, &c. 4to. vol. i. Lond. 1776. Beauties of Scotland, vol. v. 8vo. 1808. Carlisle's Topographical Dictionary of Scotland, 2 vols. 4to. 1813.

ROTHEWASSER, a river of Saxony, which runs into the Elbe, about three miles below Pirna.

ROTHHAUSEN, a town of Germany, in the county of Henneberg; 8 miles S. of Meinungen.

ROTHHEIM, a town of the duchy of Wurzburg; 5 miles N.E. of Aub.

ROTHIA, in *Botany*, received its name from Schreber, in honour of Dr. Albert William Roth, a physician of the duchy of Bremen, born in 1755; whose *Flora Germanica*, though as yet unfinished, his *Catalecta Botanica*, and various other works, have procured him a distinguished rank amongst European botanists.—Schreb. Gen. 531. Willd. Sp. Pl. v. 3. 1611. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 463. Lamarck Illustr. t. 667. Gærtn. t. 174. Roth. Catal. v. 1. 103.—Class and order, *Syngenesia Polygamia-æqualis*. Nat. Ord. *Compositæ semiflosculosæ*, Linn. *Cichoraceæ*, Juss.

Gen. Ch. *Common Calyx* rounded, finely villous; of about seven equal, linear, acute scales. *Cor.* compound, imbricated, uniform, of numerous equal florets, all perfect, whose partial corolla is of one petal, ligulate, linear, abrupt, with five teeth. *Stam.* Filaments in each floret five, capillary, very short; anthers united into a cylindrical tube. *Pist.* Germen in each floret ovate; style thread-shaped, the length of the stamens; stigmas two, reflexed. *Peric.* none, the calyx closing over the *seeds*, which are solitary in each floret; those of the disk cylindrical, somewhat turbinate, striated, with sessile capillary down, feathery in its lower part; those of the radius cylindrical, striated, enveloped in scales of the receptacle, but destitute of down. *Recept.* flat; hairy in the disk; chaffy at the radius; the chaffy scales in several rows, linear, channelled, erect, rather acute, tubular at the base, the outermost equal in length to the calyx, the inner ones gradually shorter.

Eff. Ch. Receptacle hairy; chaffy in the circumference. Calyx of many equal scales. Seed-down hairy, sessile in the disk; none in the radius.

Obs. This genus, as every body observes, is very near *Andryala*, and we greatly fear ought not to be separated from it. Dr. Roth at first named it, after a friend of his. *Voigtia*, in Roemer and Usteris' Magazine, Fasc. 10. 17. What Gærtner has delineated and described for *Andryala*, v. 2. 361. t. 158, is now made a species of *Rothia;* to which circumstance however he does not advert at p. 371 of the same volume, where *Rothia* is described; neither does Roth, in his original description of this genus, seem to have had *Andryala* at all in his contemplation, or he would surely have contrasted their essential characters. In fact the genus of *Andryala* itself depends upon two of the species now called *Rothia*, with which the third indubitably accords. If *A. lanata* of Linnæus constituted a distinct genus, the name of *Andryala* might remain with it; but there is much reason to believe this plant ought to be referred to *Hieracium*, the hairiness of its receptacle being uncertain or variable. *A. cheiranthifolia* and *ragusina* have so precisely the habit of *Rothia*, that we can hardly allow them to be separated from it by any technical characters that we can discern. In this difficulty we shall here give the species of *Rothia* as we find them; only premising that, by any thing here said, we mean not to invalidate Dr. Roth's claim to be commemorated by some certain and immutable genus, to which his high botanical merits richly entitle him.

1. R. *andryaloides*. Andryaline Rothia. Gærtn. v. 2. 371. Roth. Catal. n. 1. Willd. n. 1. (Voigtia tomentosa; Roth in Roem. and Ust. Mag. fasc. 9. 17.)—Stem much branched from the very base. Leaves downy, ovato-lanceolate, clasping the stem, nearly entire.—Native of Spain. *Root* annual, branched, somewhat woody. *Stem* twelve or eighteen inches high, erect, brown, downy; its branches alternate, widely spreading. *Leaves* alternate, distant, recurved, rather wavy, downy, and hoary. *Flower-stalks* axillary and terminal, solitary, nearly twice as long as the leaves, naked, erect, single-flowered, extremely downy. *Bractea* solitary under each flower, lanceolate, very downy, scarcely longer than the *calyx*, which is also downy and whitish; contracted and globose before the *flower* opens, but afterwards lax, consisting of from five to seven scales. *Corolla* yellow; the florets of the circumference purplish at the back. The outer row of scales of the *receptacle* is exactly like the *calyx;* the rest gradually smaller, downy on the outside. The *flowers* are open before noon only. The

The whole herb has ftraight, prominent, capitate hairs, intermixed with its downy pubefcence. *Roth.*

2. R. *cheiranthifolia.* Stock-leaved Rothia. Roth. Catal. n. 2. Willd. n. 2. Ait. n. 2. (Andryala finuata; Linn. Sp. Pl. 1137. A. integrifolia β; Syft. Nat. ed. 12. v. 2. 525.)—Stem erect, corymbofe. Leaves finely woolly, lanceolate, finuated, or deeply toothed; the uppermoft feffile, ovate, taper-pointed, entire. Native of Spain and the fouth of France, flowering there in May. It is marked in Hort. Kew. as a hardy annual, flowering in July and Auguft. *Herb* milky, clothed with denfe, white, woolly down, intermixed in the upper part with copious, prominent, capitate, tawny hairs, giving it a reddifh hue, efpecially when old. *Stem* twelve or eighteen inches high; branched above, at firft corymbofe, then racemofe. *Leaves* feffile, alternate, rather diftant, obtufe; the lower ones about a finger's length, with fhort, triangular, diftant teeth, and intermediate finufes; the uppermoft gradually fmaller and entire. *Flower-ftalks* naked, or with here and there a linear *bractea.* *Calyx* of from three to five fcales. Outer fcales of the *receptacle* like the calyx in ftructure, but rather longer, very downy at the back; inner ones fhorter, fmooth, and more membranous. *Corolla* of a golden yellow in every part.—We cannot help fufpecting that what Dr. Roth thus defcribes as the outer fcales of the *receptacle,* do in fact belong to the *calyx,* which appears to us compofed of a row of very numerous equal woolly fcales, furrounded with a few fhorter external ones, as ufual in many of this tribe.

3. R. *runcinata.* Hoary Rothia. Roth. Catal. n. 3. Willd. n. 3. Ait. n. 2. (Andryala integrifolia; Linn. Sp. Pl. 1136. Syft. Nat. ed. 12. v. 2. 525. α. Sonchus lanatus; Dalech. Hift. v. 2. 1116.)—Stem erect, corymbofe. Leaves downy; the lower ones oblong, runcinate; upper lanceolate, flightly toothed. Flower-ftalks villous, glandular.—Native of the fouth of Europe. Biennial, twice as large as the foregoing, and varying much in luxuriance. The lower *leaves* are ftalked. Whole *herb* clothed with fine, denfe, velvet-like pubefcence, very thick and woolly about the *calyx,* which is moreover befet with long golden hairs. Roth, very paradoxically, defcribes the *calyx* as confifting of only one or two leaflets, or fcales, reckoning as fcales of the *receptacle* what all the world, furely, would call a *calyx.* This, therefore, is only a difference of words, and appears ftill further to invalidate the diftinction between *Rothia* and *Andryala.* Thefe plants, in reality, require to be all examined and compared, in a living ftate, by fome botanift accuftomed to confider genera on a large fcale, and who is particularly acquainted with fyngenefious plants. We do not profefs to be, at prefent, furnifhed with materials for the purpofe.

ROTHIA, in *Geography,* a town of the ifland of St. Vincent, in York bay. N. lat. 13° 7′. W. long. 61° 16′.

ROTHLA, a town of Bavaria, in the territory of Rothenburg; 8 miles N. of Rothenburg.

ROTHMUNSTER, a princely abbey of Germany, on the Neckar, given as an indemnity, in the year 1802, to the prince of Hohenlohe; 2 miles S. of Rothweil.

ROTHWEIL, a town of Wurtemberg, fituated on the Neckar, being a very ancient imperial town, and which the emperors Charles IV. and Wenceflaus engaged to maintain as fuch. It is chiefly remarkable for its imperial tribunal, the firft traces of which are to be found in the provincial court of Swabia, which feems to have originated in the time of the emperor Louis of Bavaria, and, till the middle of the 15th century, was fometimes called the provincial court of the emperor, and fometimes the imperial tribune of Rothweil. In the year 1802 it was given to the duke of Wurtemberg; 44 miles S.S.W. of Stuttgart. N. lat. 48° 7′. E. long. 8° 34′.

ROTHWELL, called alfo ROWELL, a town and parifh in the hundred of Rothwell, and county of Northampton, England, is fituated 4 miles N.W. by W. from the town of Kettering, and 78 miles N.W. by N. from London. This place is faid to derive its name from two remarkable fprings in the vicinity, the water of one of which is of a petrifying quality, and in the other are frequently found numerous fmall bones, conjectured to be thofe of frogs. Here was a fmall priory of Auguftine nuns, dedicated to St. John Baptift, and which was probably founded by the Clare family, whofe fucceffors in the manor appear, upon record, as its patrons. Rothwell was formerly a confiderable market-town, but the market has been long difcontinued. The market-houfe is worthy of attention, from the ftyle of the building. It was begun by fir Thomas Trefham, but never completed, owing to his death, which happened in the third year of James I. His fon and fucceffor, Francis Trefham, was providentially the inftrument of the difcovery of the gunpowder-plot, by fending a letter to lord Monteagle, who had married Mr. Trefham's fifter, and thus led to the detection of the confpiracy.

In the church are feveral monumental memorials of the Trefham family, and others for different perfons. Rothwell has an annual fair, held on Trinity-Monday. According to the returns to parliament in 1811, the parifh contains 330 houfes, and 1451 inhabitants.

In the hundred of Rothwell, at Great Oxendon, is a remarkable echo in the belfry of the church-tower. To a perfon ftanding at the diftance of 673 feet, on the weftern part of the elevated ground on which the church is built, this echo returns diftinctly thirteen fyllables. An echo, but not to an equal extent, is obtainable from the top of an adjacent hill to the fouth; but fcarcely any exifts on the eaftern or northern fides of the tower. But it is faid, that the effect has lately been confiderably diminifhed, by alterations which have been made in the belfry-windows.

Braybrooke church, between Oxendon and Rothwell, exhibits a very curious and highly decorated monument, erected for fir Nicholas Griffin, knight, who died in 1509. It difplays an affemblage of pedeftals, fhields, crefts, and other ornaments, very characteriftic of the age of queen Elizabeth.

Kelmarfh-hall, on the one fide of Rothwell, and Rufhton-hall, on the other, are noble family manfions; and the latter in particular is very beautifully fituated.

Robert Talbot, one of our early Englifh antiquaries, who flourifhed about 1546, was a native of Thorpe Malfor, a village between Rothwell and Kettering. He was the friend and affociate of Leland, and both Camden and Burton feem to have made confiderable ufe of his annotations on the Itinerary of Antoninus. Hiftory, &c. of Northamptonfhire, by Bridges and Whalley, 2 vols. folio. A new edition, with large additions and corrections, of this work, is now preparing by Mr. George Baker of Northamptonfhire.

ROTHWENSDORF, a town of Saxony, in the margraviate of Meiffen; 3 miles S. of Pirna.

ROTIME, a town of Fez, near the Atlantic.

ROTKNUSSEL, in *Ornithology,* a name by which the Germans call the *gallinula melampus* of Gefner. It is a bird fomewhat approaching to the fnipe-kind; its back is brown, with a flight admixture of reddifh, and fome fpots of a dufky colour; its wings are variegated with black and white, and its

its beak and legs are black. It is common in many parts of Germany. See GLAREOLA *Nævia*.

ROTLESREUT, in *Geography*, a town of Germany, in the principality of Culmbach; 5 miles S.E. of Culmbach.

ROTMEINSDORF, a town of the duchy of Wurzburg; 2 miles E. of Ebern.

ROTNEBY, or RONNEBY, a fea-port town of Sweden, near a river of the fame name, which runs into the Baltic. It has fome trade, a harbour, medicinal fprings, and feveral manufactures. The inhabitants are free of Carlfcrona; 9 miles W. of it.

ROTOLO, an Egyptian weight of twelve ounces, each ounce confifting of twelve drachms, and each drachm of fixteen carats. See ROTTOLO.

ROTONDO, ROTUNDO, in *Architecture*, a popular term for any building that is round both within and withoutfide, whether it be a church, hall, a faloon, a veftibule, or the like.

The moft celebrated rotondo of antiquity is the Pantheon at Rome, dedicated to Cybele, and all the gods, by Agrippa, fon-in-law of Auguftus; but fince confecrated by pope Boniface IV. to the Virgin, and all the faints, under the title of Sta. Maria della Rotondo.

The chapel of the Efcurial, which is the burying-place of the kings of Spain, is alfo a rotondo; and, in imitation of that of Rome, is alfo called Pantheon.

ROTONDO, in *Geography*, a town of Naples, in the province of Bafilicata; 6 miles S.S.E. of Turfi.

ROTROU, JOHN DE, in *Biography*, a French dramatic writer, was born, in 1609, of an ancient family at Dreux. He diftinguifhed himfelf by a great facility in compofing dramatic pieces, both in tragedy and comedy. In this line of literature he was fo far fuperior to his predeceffors, that he is denominated by Voltaire "the founder of the theatre." He was patronized by cardinal Richelieu, and Corneille ufed to call him his father. He was always a needy man, and wrote moft of his pieces under the preffure of immediate neceffity, fo that he never had an opportunity of giving a finifh to them. At length, however, he was enabled to purchafe the office of lieutenant-particular of his native place, where he conftantly refided. A peftilential diforder breaking out, and making great ravages at Dreux, he was intreated by his brother to quit that town, and come to Paris; but his reply fhewed that he was refolved to remain on the fpot where his duty placed him. In one of his letters he faid, "At the moment I am writing, the bell is tolling for the twenty-fecond death this day: my turn will come when it pleafes God." He died in a very fhort time after this, in the 41ft year of his age. Of his numerous plays, the beft are "Chofroes," "Antigone," and "Wencellaus." The latter was revived by Marmontel, and Voltaire fpeaks of feveral parts of it in the higheft terms.

ROTSCHOWALM, in *Geography*, a fea-port of Ruffia, in the government of Viborg, fituated on the north coaft of the gulf of Finland, on the borders of Sweden, formed by feveral iflands, fortified with forts and redoubts.

ROTSCHWENTZEL, in *Ornithology*, the name of a bird defcribed by Gefner, and fome other authors, and feeming to be the fame with our *ruticilla*, or red-ftart. See MOTACILLA *Phœnicurus*.

ROTSIMPA, in *Ichthyology*, a name given by the Swedes to a fpecies of cottus, called by Jonfton and Schonveldt *fcorpius marinus*. It is different from the fcorpæna of the generality of writers, and is of the cottus kind. It is diftinguifhed by Artedi under the name of the *fmooth cottus*, with many thorns upon the head, and with the upper jaw fomewhat longer than the under one. See COTTUS *Scorpius*.

ROTSUSTA, in *Geography*, a river of Walachia, which runs into the Podrus, 5 miles N.W. of Strehaja.

ROTTBOLLIA, in *Botany*, fo named by the younger Linnæus, after Dr. Chriftian Friis Rottböll, Profeffor of Botany, as well as of Anatomy, in the univerfity of Copenhagen, who died in 1797, aged 70. He is particularly diftinguifhed by his defcriptions and figures of new or rare plants, a thin folio, publifhed in 1773, with 21 very neat and accurate plates. As this volume contains only plants of the order of *Calamariæ*, it is ufually quoted *Rottboll's Gramina*, or Graffes, though that appellation is not precifely correct. The fame writer has publifhed feveral botanical treatifes befides, either in the form of univerfity effays, or in the Medical Tranfactions of Copenhagen.—Linn. fil. Nov. Graminum Genera, 23, with a figure. Suppl. 13. Schreb. 721. Willd. Sp. Pl. v. 1. 463. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 175. Sm. Fl. Brit. 151. Prodr. Fl. Græc. Sibth. v. 1. 71. Brown Prodr. Nov. Holl. v. 1. 206. Juff. 31. Lamarck Illuftr. t. 48.—Clafs and order, *Triandria Digynia*. Nat Ord. *Gramina*, Linn. Juff.

Gen. Ch. *Common Receptacle* cylindrical, thread-fhaped, jointed, with an oblong excavation on one or two fides of each joint, at the bottom. *Cal.* Glume lateral, fixed, fimple or divided, clofing the hollows of each joint, and containing one or two florets. *Cor.* Glume concealed by the calyx, of one or two membranous unawned valves. *Stam.* (in each floret) Filaments three, capillary; anthers linear, forked at each end, hanging out of the floret. *Pift.* (in one floret only of each joint) Germen oblong, abrupt, convex at one fide, concave at the other; ftyles two, capillary; ftigmas feathery, prominent. *Peric.* none, except the hollow of each finally feparated joint, clofed with the calyx. *Seed* folitary, the fhape of the germen.

Eff. Ch. Calyx fixed, nearly fingle-flowered, fimple or divided. Flowers alternate, on a jointed common ftalk.

Obf. The genera which our learned friend Mr. Brown has feparated from *Rottbollia* will be found mentioned under the articles HEMARTHRIA, LEPTURUS, OPHIURUS, and MICROCHLOA. The laft we conceive to be the moft diftinct. We fhall here take the genus *Rottbollia* as it ftands in Linnæus and Willdenow, and have drawn up the generic character accordingly.

1. R. *incurvata*. Sea Hard-grafs. Linn. Suppl. 114. Willd. n. 1. Ait. n. 1. Fl. Brit. n. 1. Fl. Græc. t. 91. Engl. Bot. t. 760. Knapp. Gram. t. 103. Fl. Dan. t. 938. (Aegilops incurvata; Linn. Sp. Pl. 1490.)—Spike round, awl-fhaped, incurved. Glume of the calyx awl-fhaped, clofe-preffed, deeply divided. Stipula very fhort, abrupt.—Native of the fandy fea-coafts of Europe. A fmall annual grafs, flowering in Auguft. The *root* confifts of numerous long capillary fibres. *Stems* numerous, decumbent at the bafe, from three inches to a foot long, branched, jointed, leafy, round, flender, very fmooth. *Leaves* linear, acute, narrow, rough on the upper furface and edges; their *fheaths* a little fwelling, fmooth, ftriated, fhorter than the leaves, each crowned with a fhort blunt *ftipula*. *Spikes* folitary at the end of each branch, rigid, long and flender, more or lefs curved. *Calyx* fpreading whilft in full bloom. *Florets* folitary, perfect, all fertile.

2. R. *filiformis*. Thread-fhaped Hard-grafs. Roth. Catal. v. 1. 21. Nardus gangitis; Herb. Linn. (Gramen junceum nodofum minimum capillare; Barel. Ic. t. 117. f. 1.)—Spike thread-fhaped, flightly compreffed, erect.

erect. Glume of the calyx sword-shaped, deeply divided. Stipula elongated, lanceolate, obtuse, jagged.—Native of the south of Europe. Much more slender than the former, with a purplish *stem*, and smaller, rougher, channelled *leaves*. *Florets* more crowded together. This is certainly what Linnæus had in his herbarium for *Nardus gangitis*, when he described that plant in his Sp. Pl. ed. 1. 53, though the mark of a cross indicates that he had some doubts concerning it. Those doubts arose from the synonyms quoted in the Sp. Pl. which have nothing to do with the grass before us. Their history may be found in Transf. of Linn. Soc. v. 1. 116.

3. R. *cylindrica*. Stout Hard-grass. Willd. n. 3. (Gramen loliaceum junceum majus; Barel. Ic. t. 5. G. loliaceum, spicis articulosis erectis; Mont. Gram. 43. f. 28. G. myuros, &c.; Bocc. Mus. 70. t. 59.)—Spike round, awl-shaped, slightly curved. Glume of the calyx undivided.—Native of the south of Europe. This appears to be of a stouter habit than even the first species, but we know nothing of it, except from the authors quoted. Monti says it differs from *R. incurvata* in having the glume of the *calyx* undivided.

4. R. *Thomæa*. Mouse-tail Hard-grass. Willd. n. 4. Roxb. Corom. v. 2. 17. t. 132. (R. pilosa; Willd. n. 7. Nardus Thomæa; Linn. Suppl. 105.)—Spike linear, compressed, nearly straight. Florets imbricated, in two rows.—Gathered by Koenig on the mountain of St. Thomas in Tranquebar. A small, glaucous, densely tufted grass, whose *leaves* are fringed with long hairs. *Spikes* solitary on each stem; their common stalk zigzag at each of the flat sides of the spike, but not perceptibly jointed. *Florets* imbricated closely, in an alternate order, along each edge of the spike. Glume of the *calyx* keeled, undivided, a little recurved at the point.

5. R. *repens*. Creeping Hard-grass. Forst. Prodr. 9. Willd. n. 5. (Lepturus repens; Brown Prodr. Nov. Holl. v. 1. 207.)—Spike round, awl-shaped. Glume of the calyx undivided. Sheath of the leaves bearded at the top. Root creeping.—Native of the South Sea islands, and the tropical part of New Holland, on sandy sea-shores. *Branches* ascending. *Leaves* imperfectly two-ranked, straight, linear, rather involute; their sheaths bearded, with scarcely any visible *stipula*. *Spike* thread-shaped, acute, beardless; its joints separable. *Glumes* of the calyx pointed, longer than their corresponding joints. *Brown*.

6. R. *lævis*. Smooth Hard-grass. Retz. Obs. fasc. 3. 11. Willd. n. 6.—Spike cylindrical. Joints two-flowered. Glumes of the calyx oblong, obtuse, undivided, very smooth, the length of the joint.—Native of Tranquebar. *Roots* apparently perennial, with strong fibres. *Stems* ascending, a foot or more in height, scarcely branched, leafy. *Leaves* densely tufted at the root, short, broad and flat, smooth; their sheaths densely bearded, without any membranous *stipula*: stem-leaves short, distant, with long sheaths. *Spikes* terminal, solitary, erect, three or four inches long, pale, smooth, each joint furrowed, with two lateral, not quite opposite, hollows. *Glume* of the calyx very smooth and even like ivory, with an obtuse, oblique, greenish point, and a little furrowed at the very base.

7. R. *compressa*. Flat-spiked Hard-grass. Linn. Suppl. 114. Willd. n. 8. Retz. Obs. fasc. 3. 12. Roxb. Corom. v. 2. 30. t. 156. (Hemarthria compressa; Brown Prodr. Nov. Holl. v. 1. 207.)—Spike compressed, awl-shaped, incompletely jointed. Joints two-flowered. Outer glume of the calyx undivided; the points of all the glumes straight.—Native of the East Indies, China, and New South Wales, about ponds. *Stems* compressed, leafy. *Leaves* smooth, naked, with compressed sheaths. A stalked tuft of *spikes*, accompanied by a leafy *involucrum*, springs from the upper sheaths. *Calyx* of two valves; one of them internal.

8. R. *uncinata*. Hooked Hard-grass. (Hemarthria uncinata; Brown Prodr. Nov. Holl. v. 1. 207.)—Spike compressed, awl-shaped, incompletely jointed. Joints two-flowered. Outer glume of the calyx undivided; the point of the inner one hooked.—Gathered by Mr. Brown in the island of Van Diemen.

9. R. *hirsuta*. Great Hairy-spiked Hard-grass. Vahl. Symb. fasc. 1. 11. Willd. n. 9. (Triticum ægilopoides; Forsk. Ægypt-Arab. 26.)—Spike awl-shaped, very hairy. Calyx of the perfect florets spreading; of the male ones close-pressed. Stem angular in the upper part.—Native of Egypt; not unfrequent about Alexandria, flowering in March. We have specimens from Dr. Delile, who informs us that a figure of this grass is destined for the great work, descriptive of Egypt, part of which has already appeared at Paris. The *stem* is branched, rigid, about two feet high, leafy, jointed, the upper joints angular, being flattened at one side, striated, a little roughish. *Leaves* involute, rigid; their sheaths smooth, strongly furrowed, crowned with a tuft of hairs; the upper ones somewhat inflated. *Spike* solitary, partly enveloped in the uppermost sheath, about three inches long, rather compressed. *Glumes* lanceolate, taper-pointed, emarginate, clothed externally with copious, long, white hairs.

10. R. *Cymbachne*. Boat-valved Hard-grass. Willd. n. 10. (Cymbachne ciliata; Retz. Obs. fasc. 6. 36.)—Spikes in pairs, flowering at one side only. Calyx of the perfect florets with an inner, boat-like glume. Leaves fringed at the base.—Found by Koenig in Bengal. A slender grass, a foot high, with several, simple or branched, *stems*; the latter bearing one leaf, the others leafless. *Leaves* short, thin, fringed at the margin, above the sheath, with long, white, separate hairs; sheath abrupt, pale-brown at the summit, fringed. *Spikes* terminal, in pairs, linear, an inch and a half long, some consisting of perfect, the others of female, *flowers*. *Common stalk* linear, membranous, flat at the back, with three longitudinal furrows; zigzag, with alternate hollows, in front. *Calyx* of the *perfect flowers* of two valves, single-flowered, both of them parallel and exposed to view, close-pressed to the common stalk, or receptacle; the outermost valve linear, obtuse, fringed at the back; innermost half-ovate, acute, boat-shaped, greatly compressed, striated, coloured, fringed at the back, inclosing the corolla. *Anthers* and *stigmas* black. *Female flowers* with a single-valved, close-pressed, ovate, fringed *calyx*, slightly cloven at the point. *Corolla* and *stamens* wanting. *Stigmas* longer than in the former. *Retzius*.

11. R. *Coelorachis*. Hollow-stalked Hard-grass. Forst. Prodr. 9. Willd. n. 11.—"Spike round, flowering at one side only. Florets in pairs; one of them stalked. Calyx of two valves."—Native of the island of Tanna. We have seen no specimen. Mr. Brown mentions this as one of the few certain *Rottbölliæ*, according to his own strict limitation of the genus. We presume, from the name, that Forster had originally considered this plant as constituting a distinct genus; and that he named it in allusion to the hollows of the common receptacle; which, nevertheless, are proper to *Rottböllia*.

12. R. *dimidiata*. Half-spiked Hard-grass. Linn. Suppl. 114, excluding the synonym. Willd. n. 12.—Spikes

compressed,

compreſſed, flowering at one ſide; ſtriated with undulating lines at the other. Flowers two to each joint, one rather above the other, with ſhort abrupt ſcales at their baſe.—Native of the Eaſt Indies, and of the Braſils, in ſandy ground. Whether Thunberg's Cape plant be the ſame, we are not certain, there being ſome confuſion between our *Rottböllia* and the *Panicum dimidiatum* of Linnæus; which latter we have never ſeen, but Koenig and Retzius inſiſted on their being two very different things. *R. dimidiata* is a ſtout, branched, ſmooth graſs, with very broad, obtuſe, ſpreading *leaves*, whoſe ſheaths, like the *ſtem*, are very much compreſſed. *Spikes* ſeveral, on ſolitary or cluſtered, ſimple, axillary and terminal, ſtalks, two or three inches long, about their own length. Each *ſpike* is tapering, ſtout, jointed, curiouſly ſtriated at the back, with alternately curved and recurved lines; bearing, at the oppoſite ſide, on each joint, two angular *flowers*, one elevated above the other, and each accompanied by a ſhort ſcale at the baſe. The ſtructure of the *flowers* we have not been able to examine.

13. R. *exaltata*. Tall Hard-graſs. Linn. Suppl. 114. Willd. n. 13. Brown Prodr. n. 1. Roxb. Corom. v. 2. 30. t. 157. (Stegoſia cochinchinenſis; Loureir. Cochinch. 51, on the authority of a ſpecimen from the author, in the Bankſian herbarium.)—Spike round, flowering on every ſide, beardleſs. Glumes obtuſe, rough as well as the common receptacle. Leaves and their ſheaths hairy.—Native of the Eaſt Indies, and of Cochinchina. A tall graſs, with a ſolid *ſtem*. Sheaths of the *leaves* furrowed, beſprinkled with elevated points, each bearing a briſtle. *Spikes* ſolitary, lateral, four or five inches long.

14. R. *formoſa*. Silky Hard-graſs. Brown n. 2.—"Spike round, flowering on every ſide; its joints, as well as the outer glumes of the perfect flowers, ſilky; thoſe of the neuter ones ſmoothiſh and empty."—Gathered by Mr. Brown in the tropical part of New Holland.

15. R. *perforata*. Perforated Hard-graſs. Roxb. Corom. v. 2. 43. t. 182.—Spike round, flowering on every ſide, beardleſs. Glumes obtuſe, ſmooth. Common receptacle perforated in each joint, between the oppoſite flowers. Leaves ſmooth. Sheaths woolly at their ſummit.—Native of low rich paſture-ground on the coaſt of Coromandel, but rare. *Root* fibrous. *Stems* ſeveral, about two feet high, erect, round, jointed, ſolid, ſlender, ſmooth, leafy. *Leaves* ſmall, narrow, ſmooth, except at their edges. *Sheaths* very woolly at the ſummit within, which woollineſs extends a little way up the leaf. *Spikes* ſolitary, ſtalked, terminal and axillary, ſlender, erect, four or five inches long. *Flowers* two to each of the lower joints, oppoſite; one to each of the upper ones; ſometimes all perfect; ſometimes many of them have *ſtamens* only. This, like moſt of the other ſpecies, is a coarſe graſs, not eaten by cattle.

16. R. *corymboſa*. Corymboſe Hard-graſs. Linn. Suppl. 114. Willd. n. 14. Roxb. Corom. v. 2. 42. t. 181. (R. punctata; Retz. Obſ. faſc. 3. 12. Ægilops exaltata; Linn. Mant. 575. Retz. Obſ. faſc. 2. 27. Ophiurus corymboſa; Brown Prodr. Nov. Holl. v. 1. 207.)—Spikes aggregate, thread-ſhaped, ſmooth. Glume of the calyx ovate, obtuſe, undivided, with reticulated depreſſions.—Native of ditches on the coaſt of Malabar, as well as of the tropical region of New Holland. The *ſtem* is tall, round, leafy, finely ſtriated, ſmooth. *Leaves* flat, with long ſmooth ſheaths. *Spikes* purpliſh, many together, ſlender, in tufts, on ſimple or compound, ſmooth, cylindrical ſtalks, from the ſheaths of the ſhort uppermoſt leaves. Glume of each *calyx* the length of the joint, a little ſpreading, at leaſt in the dry ſpecimen, and curiouſly reticulated at the outſide.

17. R. *digitata*. Finger-ſpiked Hard-graſs. Sm. Fl. Græc. Sibth. v. 1. 73. t. 92.—Spikes terminal, cluſtered. Receptacle angular, rough. Flowers partly ſtalked. Glumes keeled, taper-pointed. Sheaths of the leaves hairy. Gathered by Dr. Sibthorp in the low country about the baſe of the Bithynian Olympus. This is a large graſs, three feet high, with all the appearance of being perennial. *Stem* branched, leafy, round, ſmooth. *Leaves* a foot or more in length, moderately ſpreading, flat, acute, rather glaucous, with a pale central rib; their upper ſide rough, and often hairy; their ſheaths long, cloſe, ribbed, dotted and hairy. *Stipula* of a few ſhort hairs. *Spikes* ſeveral, from nine to twelve inches long, erect, forming an oblong tuft at the top of the ſtem; rarely ſolitary. *Receptacle*, or *common ſtalk*, of each zigzag, angular, rough-edged, every joint accompanied at its concave ſmooth ſide by two *flowers*, one ſeſſile, the other on a ſtout, angular, club-like ſtalk, half the length of the correſponding joint. *Calyx* of two unequal, awl-ſhaped, rough-keeled valves; that of the ſtalked flower containing two *florets*, one of which is male; that of the ſeſſile flower only a ſolitary *floret*, ſometimes perfect, ſometimes furniſhed merely with *ſtamens*. *Corolla* in all the florets of two pellucid white glumes, ſhorter than the calyx. *Anthers* and *ſtigmas* yellow.

18. R. *muricata*. Prickly Hard-graſs. Retz. Obſ. faſc. 3. 12. Willd. n. 15. (Ægilops muricata; ib. faſc. 2. 27.)—"Spikes round, ſeveral together, on long ſtalks. Calyx fringed with prickles; the neutral ones cloven."—Found in the Eaſt Indies, by Koenig.—*Stems* angular, leafy. Sheaths of the *leaves* fringed. *Spikes* axillary, two or three together, thicker than in *R. exaltata*, each on a long ſtalk. *Calyx* ſlightly downy, fringed with marginal prickles.

19. R. *ſanguinea*. Red-flowered Hard-graſs. Retz. Obſ. faſc. 3. 25. Willd. n. 16.—Spikes axillary, alternate, ſtalked, approximated. Corolla awned at the baſe.—Native of China.—*Stem* ſemi-cylindrical, jointed, leafy; the upper joints inveſted with dilated, hood-like ſheaths, from each of which ſprings a ſolitary ſpike, on a long ſtalk, the latter concealed by the ſheath. *Spikes* thread-ſhaped. *Flowers* alternate. *Corolla* red, with a long awn from its baſe. Retzius's deſcription of a *bractea*, as well as of the parts of the flower, is not clear to us without a ſpecimen. He ſays this graſs has entirely the aſpect of an *Andropogon*.

R. monandra, Cavan. Ic. v. 1. 27. t. 39. f. 1. Leccion. 52, ſeems rather a ſpecies of *Nardus*, and is, we believe, the *N. ariſtata* of Linnæus, under which name it was ſent to Mr. Davall, by ſignor Molineri, from Piedmont. See NARDUS, n. 2, where Cavanilles may ſafely be cited.

ROTTE, in *Geography*. See ROTAI.

ROTTELN, a town of the duchy of Baden; five miles N.N.E. of Bâle.

ROTTEN STONE, in *Mineralogy*, a decompoſed ſtone, uſed for poliſhing. See TRIPOLI.

ROTTENBACH, in *Geography*, a town of Bavaria, in the territory of Nuremberg; three miles S.S.W. of Lauf.

ROTTENBERG, a town of Bavaria; 14 miles N.N.W. of Landſhut.

ROTTENDEAN, a village of England, in Suſſex, very near the ſea, and frequented for ſea-bathing; four miles S. of Brighthelmſtone.

ROTTENEG, a town of Auſtria; 13 miles S.W. of Freyſtatt.

ROTTENMANN, a town of the duchy of Stiria; 20 miles

miles N.W. of Judenburg. N. lat. 47° 26′. E. long. 14° 8′.

ROTTENNESS, Putredo. See Putrefaction.

ROTTENSTEIN, in *Geography*, a town of Bohemia, in the circle of Konigingratz; eight miles W.N.W. of Geyersbe[illegible].

ROTTERDAM. See Anamooka.

Rotterdam, a fortress in the island of Celebes, near Macassar, belonging to the Dutch. It lies about 800 feet from the beach, opposite to the road of Macassar, where a pier-head extends, which serves for unloading of the ships, and close to which there are 15 or 16 feet of water. The church is a neat building, and has room for 200 persons. The walls of the fortress are high and strong, and constructed of rock-stone. See Vlaardingen.—Also, a small island in the gulf of Manaar, near the W. coast of the island of Ceylon; 10 miles N. of Manaar.—Also, a town of America, in New York, on the N. side of Oneida lake.—Also, a city and sea-port of Holland, situated on a river named "Rotter," where it joins the Meuse. This place had the privileges of a city not long after the year 1270. It has been accustomed to hold the first rank in the assembly of the states among the small cities of Holland; and next to Amsterdam it used to be reckoned the richest and most flourishing city of the whole state, on account of the convenience of its harbour, where depth of water allowed the largest vessels to enter, and canals facilitated their loading and unloading at the warehouses of the merchants. The port of Rotterdam was more frequented by British traders than that of Amsterdam, because when vessels had weighed anchor, one tide brought them out to sea. Among the principal buildings are the town-house, the bank, the East and West India houses, the arsenal, and some of the churches, particularly that dedicated to St. Laurens. On the E. side of the city are a large basin and dock, for the purpose of building and launching vessels in the service of the Admiralty, and the East India Company. The magistracy consists of a council of 24, out of which are elected four burgomasters, a grand bailiff, and seven echevins. Besides the magistracy of the city, here are also three other tribunals, *viz.* the college of the grand bailiff, or dyckgrave of Schieland, and council, composed partly of nobility and partly of the cities of Rotterdam, Goude, and Schiedam, that hold their assemblies at Rotterdam, in a house called Landhuys, whose business it is to inspect the dykes, superintend the roads and canals, and take care of every thing that pertains to the environs of the city; the second tribunal is that of the judges of Schieland, whose jurisdiction extends over what does not belong particularly to the magistrates of cities; the third is the college of the lords of the admiralty for the Meuse, who have a house appropriated to that business. Rotterdam was the birth-place of Erasmus, and it is said that his statue still remains, and also the house in which he was born. The streets are long and generally narrow, and the foot pavement is only distinguished by a clean line of bricks; the population is estimated at about 48,000 people; 30 miles S.S.W. of Amsterdam. N. lat. 51° 55′. E. long. 4° 24′.

ROTTES, a town of Norway; 50 miles N.E. of Romsdal.

ROTTI, an island in the gulf of Venice, near the coast of Friuli. N. lat. 45° 45′. E. long. 12° 9′.

ROTTINGEN, a town of the duchy of Wurzburg, on the Tauber; 13 miles W.N.W. of Rottenburg.

ROTTL, a river of Austria, which runs into the Danube, six miles above Lintz.

ROTTLERA, in *Botany*, is so called in honour of the Rev. Dr. Rottler, Danish missionary at Tranquebar, who like several of his Brethren in that remote situation, has alleviated his more serious occupations with the study of plants; and, besides acquiring himself a considerable knowledge of botany, has been eminently serviceable to the science, by his communications to his European friends. The original *Rottlera* of Willdenow proving the identical *Trewia nudiflora* of Linnæus, the present, chosen by Dr. Roxburgh, has been received subsequently by Willdenow, as well as in Hort. Kew. Thus the *Rottlera* of Vahl, in his *Enumeratio*, v. 1. 87, is superseded, and if a good genus, must have another name.—Roxb. Coromand. v. 2. 36. Willd. Sp. Pl. v. 4. 832. Ait. Hort. Kew. v. 5. 406.—Class and order, *Dioecia Icosandria*. Nat. Ord. *Tricoccæ*, Linn. *Euphorbiæ*, Juss.

Gen. Ch. Male, *Cal.* Perianth of one leaf; tube short; limb in four deep, ovate, reflexed segments; the two opposite ones rather the smallest. *Cor.* none. *Stam.* Filaments between thirty and forty, capillary, erect, inserted into the tube of the calyx, and about the length of its limb; anthers linear, cloven at each end.

Female, on a separate tree, *Cal.* Perianth inferior, bell-shaped, with four erect teeth. *Cor.* none. *Pist.* Germen superior, ovate, powdery; styles three, reflexed; stigmas feathery. *Peric.* Capsule roundish, powdery, three-lobed, three-celled, three-valved, the partitions from the centre of each valve. *Seeds* solitary, globose.

Ess. Ch. Male. Calyx deeply four-cleft, reflexed. Corolla none. Stamens thirty to forty.

Female. Calyx four-toothed, erect. Corolla none. Styles three. Capsule superior, three-lobed, three-celled. Seeds solitary.

1. R. *tinctoria*. Dyer's Rottlera. Roxb. Corom. v. 2. 36. t. 168.—Native of the inland mountainous parts of the circars of Hindoostan, flowering in the cold season. Dr. Roxburgh never found it any where else. This is a middle-sized, erect, branching *tree*. *Leaves* alternate, stalked, elliptic-oblong, acute, entire, from four to eight inches in length, three-ribbed and veiny; nearly smooth above; downy beneath; furnished at their base with two brown glands. *Footstalks* round, downy, from one to three inches long. *Flowers* small, in clusters, about the tops of the branches, axillary and terminal; the latter branched. *Capsules* the size of a small cherry, clothed with abundance of deep red granular powder, easily rubbed off. This powder is a valuable article of commerce, being much esteemed, especially among the Moors, for dyeing silk of a deep, bright, very beautiful and durable, full-orange or flame-colour. When the capsules are ripe, in February or March, they are gathered, and the powder carefully brushed off. It is preserved without any further process, and is sold to the merchants trading to Hydrabad, and other inland parts. This substance is but little acted upon by water, except with the admixture of alkaline salts, when it gives out a very deep blood-red colour. To spirits it communicates a rich, deep, reddish flame-colour; but in neither instance does it dissolve, the grains remaining entire, like sand. The inhabitants know this powder by the name of *Wassunta-gunda*, and use it in the following manner. To four parts of *Wassunta-gunda* are added one of alum, and two of salt of soda, native barilla. These are rubbed well together, with a portion of expressed oil of *Sesamum*, so small as hardly to be perceived. When well mixed, the whole is put into boiling water, in quantity proportioned to the silk which is to be dyed, and kept boiling smartly, more or less time, according to the shade required. The silk is turned frequently, to render the colour uniform.

ROTTO-

ROTTOCOMB, in *Geography*, a town of Africa, in Bornou; 8 miles S. of Bornou.

ROTTOFREDO, a town of the duchy of Piacenza; 5 miles W. of Piacenza.

ROTTOLO, in *Commerce*, a weight ufed in Italy and the Levant. At Aleppo, and its port Scanderoon, the cantaro contains 100 rottoli, each of which is fubdivided into 12 ounces, or 720 drachms; the great cantaro of Tripoli contains 175 rottoli, and the zurlo confifts of $27\frac{1}{2}$ rottoli. This rottolo, with which moft forts of goods are weighed, weighs 5lbs. avoirdupois nearly. The rottolo with which the filks from Tripoli, and other parts of Syria, are weighed, confifts of 700 drachms, anfwering to $4\frac{7}{8}$ avoirdupois. The rottolo ufed in weighing the Perfian filks contains 680 drachms, or nearly $4\frac{3}{4}$ lbs. avoirdupois. The rottolo of Damafcus, with which brafs, camphor, benzoin, fpikenard, balfam of Mecca, and other drugs are weighed, contains 600 drachms, or $4\frac{1}{5}$ lbs. avoirdupois. Five rottoli, or 3600 drachms, make what is called a *vefno*; which fee. At Saide, in Syria, (the ancient Sidon,) filk and fattin yarn are weighed with the rottolo of Damafcus, of 600 drachms; 100 fuch rottoli anfwering to about 410lbs. avoirdupois. Heavy goods are weighed with the rottolo of Acre, 100 of which are = 482 lbs. avoirdupois. At Conftantinople, the cantaro, or quintal, contains 44 okes, or 100 rottoli; and the cantaro weighs about $123\frac{3}{4}$ lbs. avoirdupois, the oke 2 lbs. 13 oz., and the rottolo $19\frac{4}{5}$ oz., and the chequee $11\frac{1}{4}$ oz. avoirdupois. At Leghorn, the rottolo is 3 lbs. At Naples, the cantaro groffo contains 100 rottoli, each weighing $33\frac{1}{3}$ ounces of the gold and filver weight, or $31\frac{2}{7}$ ounces avoirdupois. Hence 28 rottoli = 55lbs. avoirdupois, and the cantaro groffo = $196\frac{1}{7}$ lbs. avoirdupois. The cantaro piccolo is = 106 lbs. avoirdupois nearly.

In Sicily thefe different weights are ufed, *viz.* the rottolo groffo of 33 ounces, the rottolo fotile of 30 ounces, and the libra, or pound of 12 ounces. 10 lbs. of Sicily = 7 lbs. avoirdupois nearly; and, therefore, 40 rottoli groffi, or 44 rottoli fotile = 77lbs. avoirdupois. A cantaro groffo contains 100 rottoli groffi, or $192\frac{1}{2}$ lbs. avoirdupois; a cantaro fotile is 100 rottoli fottili, and is = 175 lbs. avoirdupois. At Smyrna, the cantaro, or kintal, contains 45 okes, or 100 rottoli. The batman is 6 okes, or 2400 drachms; and the oke is 400 drachms, and the rottolo = 180 drachms. The cantaro of 45 okes weighs 123 lbs. 4 oz. avoirdupois; and, therefore, the oke is = 2 lbs. 11 oz. 13 drs. avoirdupois. At Tripoli, the cantaro weight contains 100 rottoli, each of 6 ounces, or 128 termini; this cantaro anfwers to 168 lbs. pefo fotile of Venice, or about 12 lbs. avoirdupois. At Tunis, the cantaro contains 100 rottoli, each of 16 Tunis ounces, and weighs about 111 lbs. avoirdupois. Kelly's Cambift. See WEIGHT.

ROTULA, in *Anatomy*, the patella or knee-pan. See EXTREMITIES.

ROTULA, *Diflocations and Fractures of*, in *Surgery*. See FRACTURE, and LUXATION.

ROTULA, in *Natural Hiftory*, the name of a genus of the echini marini, of the general clafs of the placentæ. The characters of the rotulæ are, that they are flat fhells in form of a cake, compofed of various flat pieces, and formed into a round, fomething like that of a wheel, but wanting one or more parts of its outer ring, and radiated or dentated; their mouth is fituated in the middle of the bafe, and the aperture of the anus in the third region of the axis, and marked with a cinquefoil flower at the fummit. The great obvious character is, however, the dentated edge. Of this genus there are two known fpecies.

ROTULA, in *Ichthyology*, is alfo a name given by fome to the faber, or doree.

ROTULI *Magni Ingroffator*. See INGROSSATOR.

ROTULORUM CUSTOS. See CUSTOS.

ROTULUS, a roll. See ROLL.

ROTULUS *Contrarientium*. The earl of Lancafter taking part with the barons againft king Edward II., it was not thought fit, in refpect of their power, to call them rebels or traitors, but only *contrarients*; accordingly, we have a record of thofe times called *rotulus contrarientium*.

ROTULUS *Wintoniæ*, an exact furvey of all England, by counties, hundreds, and tithings, made under king Alfred, not unlike that of Domefday.

It was thus called, becaufe anciently kept at Winchefter among other records of the kingdom.

ROTUNDA FENESTRA, in *Anatomy*, an opening of the cochlea into the tympanum. See EAR.

ROTUNDA *Ligamenta Uteri*, two fibrous cords afcending from the uterus, and paffing through the abdominal rings. See GENERATION.

ROTUNDO. See ROTONDO.

ROTUNDUM FORAMEN, in *Anatomy*, an opening of the fphenoid bone. See CRANIUM.

ROTUNDUS, a name given to feveral mufcles from the roundnefs of their body.

Such are the *rotundus major*, called alfo *teres major*, and the *rotundus minor*, called alfo *teres minor*, and *tranfverfalis*.

ROTUNDUS, *Pronator Radii*. See PRONATOR.

ROTZ, in *Geography*, a town of Auftria; 24 miles N. of Tulln.

ROTZHOF, a town of the duchy of Stiria, on the river Muehr; 16 miles S. of Gratz.

ROU, or PULO ROU, a fmall ifland in the Chinefe fea, near the coaft of Malacca. N. lat. 6° 43′. E. long. 102° 10′.

ROUAD. See RUAD.

ROUAGE, *Battery en*. See BATTERY.

ROUAITHA, in *Geography*. See ROAITHA.

ROUALTHA, a town of Arabia, in the province of Hedsjas; 108 miles S.S.E. of Mecca.

ROVANIEMI, a town of Sweden, in the government of Ulea, on the Kemi; 55 miles N.N.E. of Tornea.

ROUARA, a town of South America, in Guiana.

ROVASIO, a town of France, in the department of the Sefia; 15 miles N. of Vercelli.

ROVATO, a town of Italy, in the department of the Mela; 10 miles W.N.W. of Brefcia.

ROUBAIX, a town of France, in the department of the North, and chief place of a canton, in the diftrict of Lille; 6 miles N.E. of Lille. The place contains 8091, and the canton 13,761 inhabitants, on a territory of 40 kiliometres, in four communes.

ROUBAN, a town of Arabia, in the province of Hedsjas; 40 miles S. of Calaat el Moilah.

ROUBBIE′, in *Commerce*, a gold coin of Turkey, which is one-third of the fequin, called Mahbub. See SEQUIN.

ROUCOU, or ROCOU, otherwife called *Annotto* and *Orlean*, is a red dye, formed in maffes, from the pellicles of the feeds of an American tree. That which is commonly met with among us is moderately hard and dry, of a brown colour on the outfide, and a dull red within. Labat informs us, that the Indians prepare a dye of this fort much fuperior to that which is brought to us; of a bright fhining red colour, almoft equal to carmine. For this purpofe, inftead of fteeping and fermenting the feeds in water, they rub them with the hands, previoufly dipt in oil, till the pellicles come off

off and are reduced into a clear paste, which is scraped off from the hands with a knife, and laid on a clean leaf, in the shade, to dry. De Laet, in his notes on Marcgrave's Natural History of Brasil, mentions two kinds of roucou, or annotto; one of a permanent crimson colour, used as a *fucus*, and another which gives a colour inclining more to that of saffron. This last, which is our annotto, he supposes to be a mixture of the first sort with certain resinous matters, and with the juice of the root of the tree. See Annotto.

ROUELLE, in *Geography*, a river of France, which rises near Le Quesnoy, and runs into the Scheldt, at Valenciennes.

ROUEN, a city of France, and capital of the department of the Lower Seine, situated on the Seine; before the revolution the capital of Normandy, and the see of an archbishop; 13 posts S.W. of Amiens. The place contains 87,000, and its six cantons 87,000 inhabitants, on a territory of 15 kiliometres, in one commune. Rouen is large and commercial, has several manufactures, particularly of cotton, and contains 36 parish churches. In the market-place is a statue of the celebrated maid of Orleans, who was burnt here by the English for a witch. In 1117, when the French were defeated by the English in a battle fought here, the city belonged to the king of England, as a part of Normandy; but in the year 1204, it was surrendered to the king of France. In 1418, Henry V. of England commenced a siege which lasted five months; the inhabitants defending the city with persevering firmness and ardour, and enduring the most severe hardships; but they were at last obliged to surrender, on condition of paying 345,000 crowns of gold, and taking an oath of allegiance to the conqueror, who entered on the 19th of January 1419. N. lat. 49° 26′. E. long. 1° 10′.

Rouen, in *Agriculture*, a term made use of to signify after-grass, or the hay made from this sort of grass. It is sometimes written *Rowet*. See After-*Grass*.

This sort of preserved grass is now found by many farmers, in different districts, to be of vast utility and advantage in the spring season for the support of some part of their store-sheep stock, as that of the ewes during the lambing-time, and those other sheep which are to be kept in good condition. In the county of Norfolk, Mr. Bevan has a high opinion of the great value and use of this kind of grass, sometimes preserving the quantity of twenty-eight or thirty acres of it in an excellent state for the ewes and lambs in the early spring. And near Swaffham, in the same county, Mr. Mason is in the practice of keeping grass of this nature from the end of July, and not turning at all into it until early in the spring of the following year, when the fattening bullocks and sheep, which have had hay during the winter, are put into it. The old grass is found to nurse up a great bite of young growth, and both together carry on the bullocks in a very favourable manner; it is also excellent for sheep; nothing at such a season is supposed to equal it. At Burnham, on an exposed piece of thirteen acres of this sort of grass, open to the sea, and the north-east wind, which Mr. Overman kept from Midsummer, ten score and sixteen ewes and their lambs were turned in on the 27th of March, and it kept them well a whole month. It is asserted, that they would have been half starved without it; but that by means of it they were fully supported, to the surprise of many who saw them feeding. This piece was fully *tathed* in every part.

The same system of practice is also found equally useful and important in the county of Essex. Mr. Kitcher, of this district, is in the habit of laying up a pasture of this sort of spring food for his sheep, finding it of such astonishing use, that he is determined not to be without so great a resource. And at Ongar, Mr. Dyer shuts up grass for the use of his sheep, both ewes and lambs, in March and the following month: it is found that the young grass shoots up with it in an extraordinary manner, and that his flock does better on it than on turnips. Also at Gosfield, Mr. Thurlow shuts up a space of grass from the beginning of September to the lambing-time, and finds it of very considerable advantage to his flock.

ROVER. See Pirate.

ROVERBELLA, in *Geography*, a town of Italy; 12 miles N.N.W. of Mantua.

ROVEREDO, or Rovereith, a town of the county of Tyrol, with a strong citadel, built by the lords of Castelbarco; but in the year 1414, it was taken from them by the Venetians, from whom Maximilian I. wrested it again by the sword, and incorporated it with the county of Tyrol. This town has a manufacture of fine silk, and carries on a great trade. The wine produced in this tract is called "Goccia d'oro," or golden drops. On Sept. 4th, 1796, Roveredo was taken by the French, after a battle in which the Austrians lost 7000 prisoners, 25 pieces of cannon, 50 waggons, and 7 standards; 8 miles S.E. of Trent. N. lat. 45° 53′. E. long. 11° 3′.

ROUERGUE, a province of France before the revolution, about 25 leagues in length, and 18 in breadth, bounded on the E. and S. by Languedoc, on the W. by Quercy, and on the N. by Auvergne. The land, though not very fertile, produces much wood, and here are mines of copper, iron, sulphur, vitriol, &c. The principal rivers are the Tarn and the Lot. The capital city was Rhodez. It now forms the department of the Aveyron.

ROVERO, a town of Italy, in the Trevisan; 9 miles E. of Cismone.

ROVERSANO, a town of Italy, in the department of the Rubicon; 20 miles W. of Rimini.

ROVERSCIO, Al, or *Per Roverscio*, Ital. in *Music*, reversed, inverted. See Rivolgimento, and Rivoltare.

ROVES, in *Ship-Building*, small square pieces of iron with a hole punched in the middle, through which the nail goes, where it is clenched, and binds together the boards of pinnaces, yawls, &c.

ROVETTA, Don Giovanni Batista, in *Biography*, a Venetian composer, in great favour in the middle of the 17th century, vice maestro di cappello of St. Mark's cathedral, and composer of five or six operas. He likewise was author of Masses and *Madrigali a sci voci concertati*: in scoring one of them, we found the instrumental parts consisted only of two violins, and a base, wholly different from the voice-parts; but, except an introduction or symphony to each movement, and short ritornels, they had little to do. These madrigals were first published in 1625.

ROUEZ *le Guillaume*, in *Geography*, a town of France, in the department of the Sarthe; 3 miles S. of Sille.

ROUFFACH, a town of France, in the department of the Lower Rhine, and chief place of a canton, in the district of Colmar. The place contains 3292, and the canton 11,882 inhabitants, on a territory of 112½ kiliometres, in eight communes.

ROUFFIGNAC, a town of France, in the department of the Dordogne; 9 miles S.W. of Montignac.

ROUGE′, a town of France, in the department of the Lower Loire, and chief place of a canton, in the district of Chateaubriant. The place contains 2134, and the canton 7349 inhabitants, on a territory of 160 kiliometres, in five communes.

Rouge, *Cape*, or *Red Cape*, a cape on the N. side of the island of St. Domingo; four leagues W. of Point Isabellica.

Isabellica.—Also, a cape called "Ras el Hamrah," on the coast of Algiers. N. lat. 37° 5′. E. long. 7° 42′.

ROUGE *River*, a river of America, in Louisiana, so called from the colour of its waters, which are said to tinge those of the Missisippi in the time of the floods, rises in New Mexico, and after running about 600 miles, joins the Missisippi 187 miles above New Orleans, 56¼ miles below Fort Rosalie, receiving 30 miles from its mouth the Noir, or black river. About 70 leagues up Rouge river the French had a considerable post, called Natchitoches, being a frontier to the Spanish settlements. Tobacco of a superior quality is cultivated at this post in considerable quantities, and sold at New Orleans.

ROUGE *Chapeau*, or *Red Hat*, a cape on the coast of North America. N. lat. 46° 31′. W. long. 55° 26′.

ROUGE-*Croix*, q. d. *Red Cross*. See POURSUIVANTS.

ROUGE-*Dragon*, q. d. *Red Dragon*. See POURSUIVANTS.

ROUGEMONT, in *Geography*, a town of France, in the department of the Doubs, and chief place of a canton, in the district of Baume; seven miles N. of Baume. The place contains 1260, and the canton 8290 inhabitants, on a territory of 170 kiliometres, in 26 communes.

ROUGET, in *Ichthyology*, a name given by the French to the fish called the *lyra* and *capo* by authors. It is a species of the trigla, and is distinguished by Artedi by the name of the trigla with a long bifid snout and tubulous nostrils. See TRIGLA.

ROUGH, ROUGHNESS, in *Mechanics*. See FRICTION, and RESISTANCE.

ROUGH *Casting*. See PLASTERING.

ROUGH *Diamond*. See DIAMOND.

ROUGH *Emerald*. See EMERALD.

ROUGH-*leaved Plants*. See PLANT.

ROUGH *Taste*. See TASTE.

ROUGH-*Tree Rails*, in *Ship-Building*, are rails along the waist and quarters of ships, nearly breast high, to prevent persons from falling overboard. This term originated from the practice in merchant vessels of carrying their rough or spare gear in crutch irons along their waist.

ROUGH *Rider*, a person who is indispensably necessary in every cavalry regiment. He is a sort of non-commissioned officer, and should always associate with the serjeants in preference to the private men.

Rough riders are the assistants of the riding-master, and one should always be appointed to each troop. The necessary qualifications for every rough rider (independently of a thorough knowledge of horsemanship) are activity, zeal, and good conduct.

No rough rider ought to be an officer's servant, as his situation places him above the level of common men.

Rough riders are generally paid five guineas a-year as a compensation for their trouble; they likewise receive 10*s*. 6*d*. from every officer who learns to ride, and from every officer who has a horse broke at the riding school. This money is divided equally amongst them.

Every rough rider must provide himself with a proper jacket for the riding school business, according to the pattern fixed upon in the regiment.

When it is found absolutely necessary to employ non-commissioned officers as rough riders, they must do as much troop duty as they can.

ROUGH *Horses, To*, a word in familiar use among the dragoons to signify the act of breaking in horses, so as to adapt them to military purposes.

ROUGH *it, To*, a cant word used among military men, signifying to face every sort of hardship.

ROUGH *Creek*, in *Geography*, a river of Kentucky, which runs into Green river, N. lat. 37° 12′. E. long. 87° 35′.

ROUGH *Skelly*, a cape on the E. coast of Scotland. N. lat. 56° 36′. W. long. 2° 28′.

ROUGHCAST WASH, in *Rural Economy*, a sort of liquid wash, or application, employed for the purpose of being laid over the surfaces of outside walls, or buildings, of this nature, in order to preserve and ornament them. It is noticed by Mr. Vancouver, in his report of the state of the agriculture of the county of Devon, that a wash of this kind is getting greatly into use in that district. It consists, in this case, of four parts of pounded lime, three of sand, two of pounded wood-ashes, and one of the scoria of iron, intermixed very intimately together, and made sufficiently thin or fluid as to be applied by means of a brush. It is remarked, that when dry, it gives to the work the appearance of new Portland stone, and affords an excellent protection against the penetrating force of the south-westerly storms in that exposed county. It is also found useful for applying over the outsides of stone buildings or walls.

ROUGHING CLOTH. See CLOTH.

ROUGHINGS, in *Agriculture*, a term sometimes applied to latter-grass, or aftermath, and sometimes to coarse pastures. They are always of the coarse rough tufty kinds, when this epithet is applied to them.

ROUGHY, in *Geography*, a river of Ireland, which falls with an impetuous current into the Kenmare river, about two miles E. of Kenmare town.

ROUGIES, a small island on the W. coast of France, being one of the group called the "Seven Islands." N. lat. 48° 54′. W. long. 3° 21′.

ROUGNAT, a town of France, in the department of the Creuse; nine miles S. of Evaux.

ROUHA. See OURFA.

ROUHAMON, in *Botany*, a Caribbean name, retained by Aublet for one of his genera. See LASIOSTOMA.

ROUIA, in *Geography*, a town of Syria, containing seven fine palaces, some of which are entire, and several churches built in a fine style; 36 miles S.S.W. of Aleppo.

ROUJAN, a town of France, in the department of the Herault, and chief place of a canton, in the district of Beziers; six miles N.W. of Pezenas. The place contains 1129, and the canton 5720 inhabitants, on a territory of 135 kiliometres, in 11 communes.

ROVIGNO, or TREVIGNO, a sea-port town of Istria, seated on a rock which projects into the sea, with two harbours capable of containing the largest vessels. It contains about 17,000 inhabitants, chiefly fishermen and boat-builders. In its vicinity are quarries of beautiful marble; 68 miles E. of Venice. N. lat. 45° 10′. E. long. 13° 45′.

ROVIGO, a town of Italy, and capital of the Polesine di Rovigo, on the river Adigetto, the see of the bishop of Adria, to the decline of which town it owes its increase. It was anciently called Buonvico; it is surrounded with walls, turrets, and battlements. The river divides it into the upper and lower towns, and to the E. is a fortified castle. Exclusive of its suburbs, it is about a mile and a half in circumference, and contains six gates, a collegiate and nine other churches, together with several religious houses and hospitals; 37 miles S.S.W. of Venice. N. lat. 45° 4′. E. long. 11° 48′.—Also, a town of Italy, in the Vincentin, on the Adige; 14 miles S.S.W. of Vicenza.

ROUILLAC, a town of France, in the department of the Charente, and chief place of a canton, in the district of Angouleme; 12 miles N.W of Angouleme. The place contains 1168, and the canton 13,531 inhabitants, on a territory of $252\frac{1}{2}$ kiliometres, in 19 communes.

ROUILLE', Peter Julian, in *Biography*, a learned Jesuit, born at Tours in 1681, was educated in the Jesuits college of that city, and made his profession in the society in 1715. He successively taught the languages, philosophy, and mathematics in its seminaries. In 1724 he was called to Paris to assist father Catrou in the composition of his Roman History. To this work he only contributed the dissertations. He also revised and corrected the work of father d'Orleans, on the revolutions of Spain, and had a considerable share in the "Memoires de Trevoux" from December 1733 to February 1737. He had previously to this, in 1716, delivered "A Discourse on the Excellency and Utility of Mathematics," printed at Caen in 1716. He was author of some other works, and died, highly respected and esteemed, in the year 1740.

ROUILLY, in *Geography*, a town of France, in the department of the Vienne; 15 miles W. of Poitiers.

ROUL, Roll, or *Rowl*, in the *Military Art*. Officers of the same rank, who mount the same guard, and take their turns in relieving one another, pursuant to some established roster, as captains with captains, subalterns with subalterns, and command according to the seniority of their commissions, are said to *roul* or *roll*.

ROULADE, Fr. in *Music*, a division or passage in a song of many notes to one syllable. (See Division and Neume.) A roulade is only an imitation of instrumental melody, either to grace a treble part, render an image more obvious, enforce the expression, or, when it is necessary, to suspend the discourse and prolong the melody. But it is likewise necessary that it should be on a long syllable, that the voice should be spirited, active, and capable of allowing the throat full liberty to warble and express with facility and neatness the notes of the division, without fatiguing the organs of the singer, and consequently the ears of the audience. Rousseau.

The vowels most proper for these flights are *a*, *o*, and *e*, open. The *i* and *u* are not sonorous, but distort the mouth: the diphthongs still more. (Rousseau is here considering the vocal properties of the French alphabet.) As to the nasal vowels or syllables, they should never be employed in roulades. The Italian language, in which the *a* and *o* abound, is more fit for inflexions of voice than the French; and these vowels are not spared by Italian composers, but brought into action as frequently as possible. On the contrary, the French, obliged to compose almost all their melodies to syllables instead of vowels, on account of their defects, are constrained to give the notes a slow and heavy motion, or to admit a clash of consonants in accelerating syllables; which necessarily renders the melody languid or harsh. And we join with the citizen of Geneva in confessing, that we trow French vocal music can never surmount these inconveniencies.

"It is a vulgar prejudice to imagine, that divisions are improper in plaintive and pathetic airs; on the contrary, when the heart is moved and affected to an uncommon degree, the voice more easily finds accents of passion, than the mind can furnish words, and thence arise interjections in all languages. (See Neume.) It is equally erroneous to imagine that a division is always proper, whenever a favourable vowel or syllable occurs, without considering the situation of the singer, and whether the sentiment, which he ought to express, authorizes it.

"Roulades are of modern invention. It does not appear that the ancients ever admitted them in their music, or ever gave them more than two notes to a syllable. And this constitutes the difference between the two musics; one of which was subservient to the language, to which the other gives the law."

These reflections are admirable, deep, comprehensive, and convincing; yet, since they occurred to the penetrating author, more changes and refinements have happened in lyric poetry and singing, which make it necessary to extend this article, in order to keep pace with the times.

Till about the middle of the last century, many Italian composers gave divisions to *a*, *e*, and *o*, indiscriminately; all Farinelli's divisions are confined to the vowel *a*. (See a collection of them in Burney's Hist. Mus. vol. iv.) Even the vowel *o* closes the lips and teeth more than the Italian *a*, on which account, we suppose, it has been wholly refused divisions or roulades in its vocal music. See Language, *Euphony of*, where this subject has been fully discussed.

ROULAND l'Eglise, in *Geography*, a town of France, in the department of the Doubs; and chief place of a canton, in the district of Baume; nine miles N.E of Besançon. The place contains 423, and the canton 9066 inhabitants, on a territory of 250 kiliometres, in 33 communes.

ROULERS, a town of France, in the department of the Lys, and chief place of a canton, in the district of Courtnay. The place contains 8063, and the canton 13,587 inhabitants, on a territory of $37\frac{1}{2}$ kiliometres, in two communes.

ROULET, a town of France, in the department of the Charente; eight miles S.W. of Angouleme.

ROUM, *i. e.* the kingdom of the Romans, a name given to Natolia, by Solyman, sultan of the Turks, when he invaded and became master of it, in the 11th century. It is now chiefly applied to a part of Asiatic Turkey, extending from the Mediterranean to the Black sea, eastward of Caramania and Natolia, and westward of Armenia and the government of Diarbekir, including the governments of Sivas, Adana, and Marasch.

Roum *Kala*, a small town and fort of Persia, in the pachalic of Orfa, situated on the western bank of the Euphrates, and inhabited by Turks and Arabs. It was formerly called Zeugma, from a Grecian term signifying a bride, and was the great passage for the Roman armies into Macedonia. There were two small towns, one on each side of the river; the former was called Zeugma, and the latter Apamea. A few miles farther down the river, the caravans travelling from Aleppo to Orfa, pass the Euphrates on a bridge of boats, at a place called "Bir," which, according to M. D'Anville, represents the ancient Bèrtha, 144 miles from Aleppo and 67 from Orfa, in N. lat. 36° 58'. (See Bir.) It is situated on an eminence on the bank of the Euphrates, protected by a citadel and a wall in a dilapidated condition. At this town, the houses of which are in a ruinous state, a tax is levied on all travellers and merchants who cross the Euphrates, which is here deep, rapid, and about 130 yards broad.

ROUMIEU, a town of France, in the department of the Gers; six miles E. of Condom.

ROUND, Rotundus, in *Geometry*. See Circle, Globe, and Sphere.

Round, in *Anatomy*. See Rotundus.

Round, in *Music*. A round in catch-books is sometimes called *a canon in the unison*, and sometimes, but erroneously, *a catch*: but it is distinct from both, being no more than a song of as many strains or sections, as parts; which, instead of being begun together, are performed after each other.

other, always ſinging different words and different notes in harmony with the reſt; till a ſignal is given, by holding up the hand, for finiſhing upon the perfect chord of the key note, where the author has placed this final mark, 𝄐

ROUND is alſo uſed in muſic to denote a ſpecies of fugue. See ROUNDELAY.

ROUND, in *Military Language*, ſignifies a walk or turn, which an officer, commiſſioned or non-commiſſioned, attended with ſome ſoldiers, commonly ſix, takes in a garriſon, or fortified place, *around* the ramparts in the night-time, to liſten if any thing be ſtirring without the works, and to ſee that the ſentinels are watchful, and do their duty, and all things are in good order.

In ſtrict garriſon the rounds go every half hour, that the rampart may be always furniſhed. The ſentinels are to challenge at a diſtance, and to port their arms as the rounds paſs, and let no one come near them. All guards turn out, challenge, exchange the parole, and preſent their arms, &c.

Rounds are ordinary and extraordinary. The ordinary rounds are three; the *town-major's round*, the *grand round*, and the *viſiting round.*

ROUNDS, *Manner of going the.* When the town-major goes his round, he comes to the main guard, and demands a ſerjeant and four or ſix men to eſcort him to the next guard; and when it is dark one of the men is to carry a light.

As ſoon as the ſentry at the guard perceives the round coming, he ſhall give notice to the guard, that they may be ready to turn out when ordered; and when the round is advanced within about twenty or thirty paces of the guard, he is to challenge briſkly; and when he is anſwered by the ſerjeant who attends the round, *town-major's round*, he is to ſay, *ſtand, round!* and port his arms; after which he is to call out immediately, *ſerjeant, turn out the guard! town-major's round.* Upon the ſentry calling the ſerjeant to turn out the guard, he immediately draws up the men in good order with ſhouldered arms, and the officer places himſelf at the head of it, with his ſword drawn. He then orders the ſerjeant and four or ſix men to advance towards the round, and challenge; the ſerjeant of the round is to anſwer, *town-major's round;* upon which the ſerjeant of the guard replies, *advance, ſerjeant, with the parole!* at the ſame time ordering his men to reſt their arms. The ſerjeant of the round advances alone, and gives the ſerjeant of the guard the parole in his ear, that none elſe may hear it; during which period, the ſerjeant of the guard holds the ſpear of his halbert or pike at the other's breaſt. The ſerjeant of the round then returns to his poſt, whilſt the ſerjeant of the guard, leaving his men to keep the round from advancing, gives the parole to his officer. This being found right, the officer orders his ſerjeant to return to his men; ſays, *advance town-major's round!* and orders the guard to port their arms; upon which the ſerjeant of the guard orders his men to wheel back from the centre, and form a lane through which the town-major is to paſs (the eſcort remaining where it was) and go up to the officer and give him the parole, laying his mouth to his ear. The officer holds the point of his ſword at the town-major's breaſt while he gives the parole.

ROUNDS, *Grand,* the rounds which are gone by general officers, governors, commandants, or field-officers. When there are no officers of the day on picquet, the officer of the main guard in garriſon may go the grand rounds.

ROUNDS, *Viſiting,* rounds gone by captains, ſubalterns, and the town-majors of garriſons.

The grand rounds generally go at midnight; the viſiting rounds at intermediate periods, between ſun-ſet and the reveillé. The grand rounds receive the parole, and all other rounds give it to the guards.

There is alſo a ſpecies of baſtard rounds, if we may be permitted the expreſſion, which are gone by a corporal and a file of men; and which are in reality nothing more than a patrole. When challenged, they anſwer *pat. rounds.*

N. B. The governor of a garriſon can order the rounds to go as often as he may judge expedient. Extraordinary rounds are reſorted to when any particular event or occurrence is expected, and in caſes of tumult, &c.

ROUND *Robbin,* a compact of honour which officers enter into, (when they have cauſe of complaint againſt their ſuperior officer) to ſtate their grievances, and to endeavour to obtain redreſs, without ſubjecting one more than another to the odium of being a leader or chief mover. The term is a corruption of *ruban rond,* which ſignifies a round ribbon. It was uſual among French officers when they ſigned a remonſtrance, to write their names in a circular form, ſo that it was impoſſible to aſcertain who ſigned firſt. Hence to ſign a *round robbin* againſt any perſon, is for any ſpecific number of men to ſign, one and all, a remonſtrance againſt him. Colonels of regiments have been ſometimes treated in this manner. Great judgment, directing motives grounded upon ſtrong facts, ſhould always influence on theſe nice occaſions.

ROUNDS, *Way of the.* See WAY.

ROUNDS, *Counter.* See COUNTER-*Round.*

ROUND, *Quarter.* See QUARTER-*Round.*

ROUNDS, among *Maſons,* denote the broken pieces of ſtatues.

ROUND-*Heads.* See WHIG and TORY.

ROUND-*Head Nails.* See NAIL.

ROUND-*Houſe,* in *Ship-Building,* that part of the ſhip abaft, next above the quarter-deck, fitted up with cabins, &c. for the accommodation of the captain.

ROUND-*Houſes* at the head, conveniencies, or ſeats of eaſe, for the officers.

ROUND-*Houſe* alſo denotes a kind of priſon, for the nightly watch to ſecure perſons in, till they can be carried before a magiſtrate. See WATCH.

ROUND-*In,* or *Round-Aft,* at *Sea,* a term belonging to the main and fore-ſail. When the wind largeth, they ſay, *Let riſe the main-tacks,* or *the fore-tacks! Hale aft the fore-ſheet to the cat-head; and the main-ſheet to the cub-bridge-head!* And when theſe ſheets are thus haled down, they keep them from flying up with the paſſarado rope. This work is called *rounding-in,* or *rounding-aft the ſail.*

ROUND *Aft,* in *Ship-Building,* the ſegment of a circle which the ſtern partakes of from the wing-tranſom upward.

ROUND *Stern,* the ſtern of a veſſel whoſe bottom, wales, &c. are wrought quite aft, and unite in the ſtern-poſt. Few Engliſh veſſels are built on this conſtruction, excepting ſmall veſſels, as hoys, &c.

ROUND-*up of the Tranſoms,* the ſegment of a circle to which they are ſided, alſo of the beams and rails of the ſtern, to which they are moulded.

ROUND *Niche, Roof, Seam, Shot, Splice, Table, Top.* See the ſubſtantives.

ROUND, in the *Academies,* denotes a circular piſte or tread.

ROUND *a Horſe, To,* is a general term for all ſorts of maneges, upon a volt, or circular tread.

Hence, to round a horſe upon a trot, gallop, &c. is to make him carry his ſhoulders and haunches roundly or compactly, upon a larger or ſmaller circle, without traverſing or bearing to a ſide.

Round *Table*, the circular table at which the knights of old, who assembled together from different countries to perform the martial exercises of the tournament, were accustomed to eat, on such occasions, to prevent disputes about precedency. Such a table is seen fixed to the eastern wall of the county-hall at Winchester, being vulgarly called "Arthur's Round Table," though it does not appear to be more ancient than the reign of king Stephen. From the use to which these tables were appropriated, the diversion itself of the tournament, or tilting, was called the round table. "Illustris miles, Rogerus de Mortuo-mari apud Kenilworth ludum militarem quem vocant rotundam tabulam centum militum ac tot dominarum constituit." Th. Walsingham, Hist. p. 49.

Round *Towers*, those tall slender towers which are almost peculiar to Ireland (some few being found in Scotland), rising to the height of from 50 to 100 feet, or more, and containing not more than five or six feet in diameter in their upper chamber. They have a single entrance-door, of from five to fifteen feet from the ground, and a loop-hole, to give light to each story, of which there are generally six or seven in each round tower. The uppermost story, however, which was the usual dwelling-place of the solitary inhabitant, was furnished with four loop-holes or windows, corresponding with the four cardinal points of the compass. From the nature and situation of these singular structures, they being always very near to the scite of an ancient church, it appears that each of them was built for the habitation of a single *Inclusus*, or hermit, who, living in the highest chamber of it, enjoyed his beloved solitude as much as if he had dwelt in a desart. It appears from Giraldus Cambrensis, that Ireland was full of these towers in the 12th century, and there is reason to ascribe the erection of them to the sixth, seventh, and eighth centuries, namely, before the Danish invasions, and during the period of the Irish transmigration into various countries in quest of solitudes. The idea of them and their use were evidently borrowed from the columns and stylites of the East. See Stylites.

Round *Bay*, in *Geography*, a bay with good anchorage, on the W. coast of St. Lucia.

Round, *Cape*, a cape on the coast of Patagonia, in the straits of Magellan. S. lat. 53° 47'. W. long. 71° 32'.

Round *Hill*, an island in the North Pacific ocean, near the E. coast of Labrador. N. lat. 53° 25'. W. long. 55° 16'.

Round *Hill Bluff*, a cape on the N. coast of Jamaica, W. of Montego bay. N. lat. 18° 29'. W. long. 77° 58'.

Round *Heads*, Indians of North America, inhabiting the territory on Round river. The number of warriors is about 2000.

Round *Island*, a small island of England, in Pool harbour.—Also, a small island near the E. coast of Borneo, in the bay of Gunong Tellu. S. lat. 0° 28'. E. long. 123° 30'.

Round *Key*, a small island near the coast of West Florida, which is well timbered. N. lat. 30° 15'. W. long. 88° 28'.

Round *Rock*, one of the Virgin islands, in the West Indies. N. lat. 18° 10'. W. long. 62° 53'.

ROUNDELAY, or Roundo, a kind of ancient poem, thus called, according to Menage, from its form; and because it still turns back again to the first verse, and thus goes round.

The word is formed from *round* and *lay*. The French call it *rondeau*; the Spaniards *gloses*.

The common roundelay consists of thirteen verses, eight of which are of one rhyme, and five in another. It is divided into couplets; at the end of the second and third of which, the beginning of the roundelay is repeated; and that, if possible, in an equivocal or punning sense.

The roundelay is a popular poem among the French, but little known among us. Marot and Voiture have succeeded the best in it.

Rapin observes, that if the roundelay be not very exquisite, it is intolerably bad. In all the ancient roundelays, Menage observes, that the verse preceding has a complete sense, and yet joins agreeably with that of the close; without depending necessarily on it. This rule, well observed, makes the roundelay more ingenious, and is one of the finesses of the poem.

Some of the ancient writers speak of the roundelay, or roundel, as a kind of air appropriated to dancing; and in this sense the term seems to indicate little more than dancing in a circle, with the hands joined. See Rondeau.

ROUNDELET. See Rundlet.

ROUNDING, in *Sea Language*, denotes certain old ropes wound firmly and closely about that part of a cable which lies in the hawse, or under the ship's bow, or athwart the stem. It is used to prevent the surface of the cable from being chafed or fretted in those places.

Rounding-*in* generally implies the act of pulling upon any rope which passes through one or more blocks, in a direction merely horizontal; as round-in the weather-braces, &c. It seems to be derived from the circular motion of the rope about the sheave or pulley through which it passes.

Rounding-*up* is expressed of a tackle which hangs in a perpendicular position, without sustaining or hoisting any weighty body; in which case it is the operation of pulling the blocks closer to each other, by means of the rope which passes through them, to compose the tackle; and is opposed to over-hauling, by which the blocks are drawn farther asunder.

ROUNDNESS, Rotundity, in *Physics*. See Sphericity.

ROUNDO, or Roundelay, in *Music*, a kind of burden or ritornello; where the beginning of each couplet is repeated at the end of it.

ROUNDSTONE Bay, in *Geography*, a harbour of the county of Galway, Ireland, in Ballinahinch. It is separated from Birterbui bay by the island of Inishkeele, lying on the west of it.

ROUNREAK, a town of Pegu, on an island formed by the Ava; 42 miles S. of Lundsay.

ROUP, in *Commerce*, a silver coin of Turkey, containing 10 paras, the para being equal to 3 aspers, and 40 paras being equal to the dollar or piastre.

Roup, in *Poultry*, is a filthy boil or swelling upon their rumps, known by the staring, or turning back of the feathers.

The roup, if not soon remedied, will corrupt the whole body; to prevent which, the feathers are to be pulled away, the swelling laid open, and the matter pressed out; after which the part is to be washed with salt and water, or brine.

ROUPALA, in *Botany*, a name of Aublet. See Rhopala.

ROUPEYROUX, in *Geography*, a town of France, in the department of the Aveyron; 7 miles S.E. of Villafranche.

ROUPIA, or Rupee. See Rupee.

ROUREA, in *Botany*, a name of Aublet's. See Robergia.

ROUSAY, in *Geography*, one of the Orkney iſlands, Scotland, is ſituated to the north-weſt of the Mainland of Orkney, from which it is ſeparated by a ſtrait about a mile in breadth. It conſiſts chiefly of a ridge of lofty hills declining on all ſides towards the coaſt. The beſt cultivated parts of this iſland are its eaſtern and ſouth-weſtern ſides; but there is a narrow ſtrip of arable land extending round the whole ſhore. The hills are moſtly covered with heath, intermixed with various kinds of graſſes, which afford ſuſtenance to a great number of ſheep, ſwine, and black cattle. Oppoſite to the Mainland, in a romantic ſituation, ſtands the houſe of Weſtneſs, which in remote ages was the abode of the celebrated earl Sigard, who fell in the famous battle of Clontarf in Ireland, and is ranked by hiſtorians among the greateſt heroes of his age. On a flat tract of land, cloſe to the ſhore, about a quarter of a mile weſtward from the place, are ſeveral "immenſe piles of ſtones, evidently the ruins of ſome ancient ſtructure, around which are to be ſeen graves formed with ſtones ſet on edge, as in ſome other places; and the name of Swendrow, which it bears, points it out, with great probability, as the ſcene of the capture of earl Paul, by Swein, the ſon of Aſleif, and the ſlaughter of his attendants, when he was, with the baſeſt intention, carried a priſoner into Scotland." The ridge known by the whimſical name of the camp of Jupiter Fring, is ſituated about two miles eaſtward from Weſtneſs. Several ſtanding ſtones are to be met with in different parts of the iſland; and there are ſome tumuli on the ſouth ſide, near the Froit, alſo a few Picts-houſes.

Contiguous to Rouſay, on the north-weſt, is the ſmall iſland of Eagleſhay, which yields to none of the Orkney iſles in beauty of appearance, or conveniency of ſituation. This iſland is about two miles long and one broad, and, in conjunction with Rouſay, forms one pariſh; which, according to the population cenſus of 1811, contained 189 houſes, and 965 inhabitants. Eagleſhay is remarkable in hiſtory for having been the ſcene of the unjuſt and barbarous murder of St. Magnus, the tutelary ſaint of the Orkney iſlands. The church, which is very ancient, is ſaid to occupy the ſpot on which the aſſaſſination was committed. Owing to the natural attractions of this iſland, ſeveral of the counts of Orkney made it their uſual place of reſidence, and their example was followed in later times, when it became the property of the Douglaſes and the Monteaths. Hiſtory of the Orkney Iſlands, by the Rev. Dr. Barry, 2d edit. by the Rev. James Headrick, 4to. London, 1808.

ROUSE *up a Hare*, among *Hunters*. See HUNTING.

ROUSE, *To*, among *Falconers*, is when a hawk lifts up and ſhakes himſelf.

ROUSHOLM HEAD, in *Geography*, a cape on the S.W. coaſt of the iſland of Stronſa. N. lat. 58° 56′. W. long. 2° 34′.

ROUSSE, *Grand* and *Petit*, rocks in the Engliſh Channel; 5 miles N.E. from the iſland of Jerſey.

ROUSSEA, in *Botany*, was ſo called by the writer of the preſent article, in memory of the celebrated Jean Jacques Rouſſeau. Botany had ſpread a charm over the latter years of this diſtinguiſhed man, and ſoothed their real or imaginary ills. Whenever he touches on this favourite ſubject, he communicates the ſame charm to his readers. Such has been the effect of his example, perhaps above all others, that he would now no longer have to deplore "the groſs ignorance and barbariſm" of the French, who, about fifty years ago, ſtared at a botaniſt with ſovereign contempt. His letters on the ſcience have rendered the Linnæan ſyſtem popular all over Europe. He correſponded with Linnæus, who had dedicated a genus to his name; which the younger Linnæus, through miſapprehenſion, publiſhed as *Ruſſelia*, and which is now called *Vahlia*, there being already a *Ruſſelia*, named by Jacquin. What we are about to deſcribe was therefore ſelected as a very fine and ſingular genus, and it has been generally adopted, both in France and elſewhere.—Smith Plant. Ic. faſc. 1. 6. Schreb. Gen. 792. Willd. Sp. Pl. v. 1. 607. Mart. Mill. Dict. v. 4. Juſſ. in Sims and Kon. Ann. of Bot. v. 2. 568. Lamarck Illuſtr. t. 75.—Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Campanaceæ*, Linn. Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in four deep, equal, widely ſpreading, tongue-ſhaped, permanent ſegments. *Cor.* of one petal, externally rugoſe; tube nearly globular, almoſt as long as the calyx; limb in four equal, lanceolate, acute, revolute ſegments. *Stam.* Filaments four, erect, equal, linear, flattened, ſomewhat tapering upwards, longer than the corolla; anthers terminal, ſmall, arrow-ſhaped. *Piſt.* Germen ſuperior, pyramidal, quadrangular; ſtyle terminal, ſquare, permanent, the length of the ſtamens; ſtigma funnel-ſhaped. *Peric.* Berry? pyramidal, quadrangular, of one cell? with a coriaceous coat. *Seeds* very numerous, lenticular, imbedded in pulp.

Eſſ. Ch. Calyx in four deep ſegments. Corolla bell-ſhaped, four-cleft, inferior. Berry? quadrangular, with many ſeeds.

1. R. *ſimplex*. Sm. Ic. t. 6. Willd. n. 1.—Gathered by Commerſon in the iſland of Mauritius, and communicated by Thouin to the younger Linnæus, with about 1500 fine plants beſides. This appears to be a *ſhrub*, of a fleſhy habit, climbing over moſſy rocks, or ſtems of trees, in moiſt ſituations. The *ſtem* is thick and knotty. *Leaves* oppoſite, in pairs croſſing each other, ſtalked, ſimple, obovate, rather fleſhy, diſtantly toothed, pointed, quite ſmooth on both ſides, with a ſolitary rib, and many fine tranſverſe veins; their length about three inches; breadth one, or one and a half. *Footſtalks* an inch long, even, channelled, ſmooth. *Stipulas* oppoſite, between the footſtalks, triangular, acute, membranous. *Flowers* ſolitary, axillary, large, fleſhy, on drooping round *ſtalks*, rather ſhorter than thoſe of the leaves, accompanied at the baſe of the ſtalk by ſeveral crowded, membranous, acute *bracteas*, very like the *ſtipulas*. *Calyx* ſmooth, an inch long. *Corolla* ſomewhat downy at the outſide; of its colour we have no means of judging. The *fruit* appears to be a coriaceous berry, about an inch in diameter, but we have not ſeen it fully formed, nor has Commerſon left any note reſpecting the qualities of the plant. In the texture, and external downineſs, of the *corolla*, this genus accords not ſo much with *Campanula* itſelf, as with others of the ſame order, *Goodenia*, *Scævola*, &c. To ſome of theſe the form of its *ſtigma* approaches, while the *anthers*, ſo widely differing among themſelves in this order, are, in the preſent inſtance, very unlike moſt of the other genera. The oppoſite *leaves*, and intermediate *ſtipulas*, evince, as M. de Juſſieu obſerves, an approach in habit to the natural order of RUBIACEÆ. See that article.

ROUSSEAU, JOHN BAPTIST, in *Biography*, a French poet, of conſiderable celebrity, was born at Paris in 1671. His father, though only a ſhoe-maker, contrived to give him a liberal education. By his literary talents he obtained, while very young, admiſſion among perſons of rank and taſte. In 1688 he attended the French ambaſſador to the court of Denmark, in quality of page. After this he went with marſhal Tallard to England, where he contracted an intimacy with Saint Evremond. In 1703 he was domiciliated with M. Rouille, director of the finances, whom he accompanied to court, and elſewhere, living in tranquillity

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in the midſt of ſplendour, and cultivating the Muſes, to the neglect of thoſe opportunities which occurred to him of making his fortune. When he was at the height of his reputation, he involved himſelf in an affair which put an end to his happineſs, and rendered him wretched for the remainder of his life. A number of men of letters were accuſtomed to meet at a coffee-houſe in Paris, among whom were Rouſſeau and La Motte, when, in 1708, the opera of Heſione made its appearance. Rouſſeau wrote ſome verſes upon the authors of the words, the muſic, and the ballet of the piece, which were highly ſatirical. Theſe were anonymous, and were imputed to Rouſſeau, who not only denied them, but attempted to fix the blame upon M. Saurin, a man of ſcience and letters, who, from a Calviniſt miniſter, had become a convert to Popery, and reſided in Paris. The nature of this diſcuſſion it is not neceſſary to go into, it is ſufficient to ſay, that by an arrêt of parliament, in 1712 Rouſſeau was condemned to perpetual baniſhment from the kingdom, not only as a ſuborner in the accuſation of Saurin, but as the author and diſtributor of the ſatirical verſes. He had already retired to Switzerland, where he was protected by the count de Luc, the French ambaſſador to the Cantons. He publiſhed in Soleure the firſt edition of his collected works, in the preface to which he ridiculouſly gives himſelf the air of one who wrote verſes for mere amuſement, although it was by his poetry alone he obtained public notice and the favour of the great. When De Luc went to Baden, in 1714, as plenipotentiary for concluding peace with the emperor, Rouſſeau accompanied him. He there became known to prince Eugene, and by him was taken to Vienna. Here he reſided three years, but not being able to reſtrain himſelf from exerciſing his ſatirical talent, he was obliged to quit that capital for Bruſſels, in haſte. At Bruſſels he became acquainted with Voltaire, with whom he formed a confidential intimacy, which however did not laſt very long: jealous of each other's fame, they became bitter enemies, not only endeavouring to blacken each other's moral character, but each, at the expence of his own judgment, depreciating the literary merit of his adverſary. Rouſſeau longed much to reviſit Paris, and made interceſſion with the regent duke of Orleans, who granted him letters of recall, but the poet inſiſted upon a previous reviſion of his trial, which he could not obtain. In 1721 he came to England, where he prepared a new edition of his works. This was publiſhed in 1723, in two vols. 4to. and produced him 10,000 crowns, which he placed in the fund of the Oſtend company. The failure of this company ſunk all his fortune, and he was reduced, in the decline of life, to ſubſiſt on the benevolence of his friends. Boutet, a notary of Paris, ſupplied his moſt urgent wants, but he met with more effectual aſſiſtance from the duke d'Aremberg, who, when he quitted Bruſſels in 1733, ſettled upon him a handſome penſion, beſides giving him an apartment and his table in his palace. Rouſſeau diſpleaſed this patron, by calumniating Voltaire, and determined to go to Paris, with the hope of finally obtaining a repeal of his baniſhment. He had prepared his way by two epiſtles to perſons of weight in that city, and by an ode to the praiſe of cardinal Fleury on the peace. His efforts were, however, unſucceſsful. He could not even obtain a ſafe-guard for paſſing a ſingle year in Paris: he accordingly returned to Bruſſels, where he died in March 1741, at the age of 70. In his laſt moments he declared he was not the author of the couplets for which he had been baniſhed. The eſtimate of his moral character depends ſo much on the belief of his guilt or innocence, in the points reſpecting which he was accuſed, that nothing can be more different than its ſtatement by his friends and enemies. There is more agreement in the opinions of his countrymen relative to his poetical character, and it is pretty generally acknowledged that he ſtands at the head of the ode writers in the French language. "To theſe compoſitions," adds his biographer, "he brought great fire and force of expreſſion, copiouſneſs, and grandeur of imagery, and all the harmony of which his language is capable; but the ſentiment is generally common, and nothing indicates a ſoul of the ſuperior order." Of his "Odes" there are four books, of which the firſt conſiſts of ſacred topics, taken from the Pſalms. He wrote two books of "Epiſtles" in verſe; "Cantatas;" "Allegories;" "Epigrams;" "Miſcellaneous Poems;" "Four Comedies in Verſe and three in Proſe;" and a "Collection of Letters." Theſe are ſaid to give an unfavourable idea of his temper, but ſome allowance ſhould be made for a man who was ſo long an object of the perſecution of his enemies, and of whom it was ſaid in his epitaph, that "thirty years he was an object of envy, and thirty of compaſſion." M. Seguy, in concert with M. the prince of la Tour Taſſis, has given a beautiful edition of his works, agreeably to the poet's laſt corrections. This edition was printed at Paris in 1743, in three vols. 4to. and in four vols. 12mo. containing nothing but what the author acknowledged as his own. Ferron ſpeaks of Rouſſeau as uniting in himſelf the excellencies of Pindar, Horace, Anacreon, and Malherbe. He was in habits of correſpondence with the abbè d'Olivet, the two Racines, the celebrated Rollin, and other illuſtrious French characters.

Rousseau, Jean Jacques, was born at Geneva in the year 1712. His father was a watch-maker. At his birth, which, he ſays, was the firſt of his misfortunes, he endangered the life of his mother, and he himſelf was for a long time in a very languiſhing ſtate of health; but as his bodily ſtrength increaſed, his mental powers gradually opened, and afforded the happieſt preſages of future greatneſs. His father, who was a citizen of Geneva, was a well-informed man, and in his ſhop, he always kept by him ſome literary works of authority, among which were Plutarch's Lives, with which he intermixed ſuch converſations as might be expected from an ardent republican. In his "Confeſſions," to which all the biographers of Rouſſeau muſt go for information, he has recorded ſeveral circumſtances, which, in his opinion, exerted a laſting influence upon his character; but it is more probable that his ruling propenſities were determined by his bodily conſtitution. This he repreſents as of the warmeſt kind, burning with ſenſuality from his very birth. His ſchool education was very imperfect, and he grew up in habits of idleneſs, and in the vices of a weak unſteady temper. He was firſt put apprentice to an attorney, who ſoon diſcharged him for his negligence: after this he was put out to an engraver, who diſguſted him by his harſhneſs. The fear of chaſtiſement, which he probably well merited, rendered him a fugitive from his maſter, when he was in his 15th year, at which time he was a reſtleſs diſcontented being, conſumed with deſires of which he knew not the object, and careſſing his fancies for want of realities. He went into Savoy, where he was hoſpitably entertained by a pariſh prieſt, who pleaſed himſelf with the idea of making a proſelyte from the Genevan reformed church. For this purpoſe he ſent the youth to Annecy, to a Madame de Warrens, an ingenious and very amiable lady, who had, in 1726, left part of her wealth, and the Proteſtant religion, in order to throw herſelf into the boſom of the church. This generous lady ſerved in the triple capacity of a mother, a friend, and a lover to the new proſelyte, whom ſhe regarded as her ſon. For farther inſtruction ſhe ſent him to a ſeminary at Turin, where his converſion was completed, and

and he got twenty florins in exchange with his new religion. When this money was fpent, he found no better refource than to enter into the fervice of a countefs: here he committed a crime, which he acknowledges, in his "Confeffions," with the moft heartfelt remorfe. He ftole a ribbon, and when it was found in his poffeffion, he not only denied the theft, but charged an innocent and amiable young woman in the houfe with it, to whom, in fact, he meant to have prefented the ribbon. After the death of the countefs, he entered into the family of a nobleman, whofe fon, a literary man, took pains to inftruct him, and treated him rather as a companion or pupil than a fervant. But the flattering profpects opened to him by this connection he deftroyed by his imprudence and mifconduct, and being turned out of doors, after paffing fome time as a vagabond, he returned to Madame de Warrens. This lady had found means to ally her devotional turn of mind with the indulgence of amorous propenfities, of which young Rouffeau was an object, though not the only one. Through her intereft he obtained a place as fecretary to a commiffion, appointed by the king of Sardinia for furveying lands, and in this employ he continued two years, during which he applied himfelf to the ftudy of arithmetic and geometry. Mufic, however, became his paffion, and growing difgufted with his other occupation, he renounced it, and took up the profeffion of mufic-mafter at Chamberry. Here he paffed eight years, intimately connected with Madame de Warrens, though not without following her example of occafional deviations to other favourites. At length a coldnefs took place, and Rouffeau was recommended by her to the office of tutor to the children of M. Mably, at Lyons. He did not retain this fituation very long, but went to Paris, where he lived in obfcurity till 1743, when he obtained the appointment of fecretary to the French ambaffador to the republic of Venice. It was not long before he quarrelled with his fuperior, and returning to Paris, with an improved knowledge and tafte in mufic, he lived by it, at the fame time employing his leifure in the ftudy of natural philofophy and botany. He was for fome time clerk to a farmer-general, and with part of the profits which he gained in this fituation he repaid fome of the pecuniary affiftance he had received from Madame de Warrens, who now ftood in need of it. In 1748 he began to feel the attacks of a painful diforder, which troubled him during the remainder of his life, and by incapacitating him for active employments, might perhaps be a remote caufe of his literary fame. The year 1750 was the commencement of his literary career. The academy of Dijon had propofed the following queftion, "Whether the revival of the arts and fciences has contributed to the refinement of manners." Rouffeau, it is faid, at firft inclined to the affirmative fide of the queftion; but by the perfuafion of Diderot he was induced to fupport the negative, as moft likely to attract notice. His difcourfe againft the advantages of the fciences accordingly having been found to be the beft written, and replete with the deepeft reafoning, was publicly crowned with the approbation of this learned body, and was generally read with the intereft ufually infpired by a fplendid paradox. Several anfwers appeared againft it, one of which was written by Staniflaus, king of Poland: it was enough for Rouffeau to have made his name known with fo much diftinction in the literary world. The part which he took feems to have made a lafting impreffion upon him, in preference of the favage to the civilized life, which was fo frequent a fubject of his declamation. Among other attacks which this difcourfe drew upon him, was that of being ridiculed on the ftage of Nancy, by Paliffot, in his "Comedié des Philofophes." The king of Poland, then duke of Lorraine, was fo much difpleafed with this infult, that he caufed a letter of apology to be written to Rouffeau, at the fame time acquainting him that he had deprived Paliffot of his place at the academy of Nancy, and it is highly to the credit of the philofopher, that he immediately interceded for him and obtained his reftoration.

In 1752 Rouffeau wrote a comedy, entitled "Narciffe, ou l'Amant de lui-même." He alfo compofed a mufical entertainment of "Le Devin du Village," which was reprefented with the greateft fuccefs at Paris. His next piece was "Lettre fur la Mufique Françoife," which was to prove that the French had no fuch thing as vocal mufic, and that, from the defects in their language, they could not have it. The letter was written with much tafte, and fhewed a deep knowledge of the fubject of which he was treating, but it brought down upon his head a ftorm of refentment, even to the burning of him in effigy. In 1754 he returned to Geneva, where he abjured the Catholic faith, and was reftored to the rights of citizenfhip. For this favour he made a return by the patriotic, and truly eloquent dedication to the republic, of his "Difcours fur les Caufes de l'Inégalité parmi les Hommes, et fur l'Origine des Sociétés." No one could give better advice to his fellow-citizens than Rouffeau has done in his dedication. The work itfelf is full of almoft unintelligible maxims and wild ideas; and was written with a view to prove that mankind are equal; that they were born to live apart from each other; and that they have perverted the order of nature in forming focieties. He beftows the higheft praife on the ftate of nature, and deprecates the idea of every focial compact. It is, however, rhetorical rather than argumentative, and is over-run with much idle declamation in praife of a favage, and depreciation of a civilized ftate, which the author repeated fo often till he probably believed the paradox. Our author did not remain long at Geneva, but returned to France, and lived fome time at Paris, after which he retired to Montmorency, as a ftudious folitary, and publifhed, in 1758, his "Lettre" to M. D'Alembert on the defign of eftablifhing a theatre at Geneva. This tract is written with great force of reafoning, and fhews that the author had made the moft profound obfervations on life and manners; and he feems to have carried his point in proving that a theatre could not be neceffary in a place circumftanced as Geneva was. This work is thought to have laid the foundation of that hatred which Voltaire never ceafed to entertain for the Genevan philofopher. Replies were written by D'Alembert and Marmontel.

In 1760 Rouffeau publifhed his celebrated novel, entitled "Lettres de deux Amans, &c." but generally known by the title of "Julie, ou la Nouvelle Héloife." This epiftolary romance, of which the plot is ill-managed, and the arrangement bad, like all other works of genius, has its beauties as well as its defects. Some of the letters are, indeed, admirable, from the force and the warmth of expreffion, from an effervefcence of fentiments, from the irregularity of ideas which always characterize a paffion carried to its height. By one critic it has been affumed that none of the perfonages of this novel are really interefting. "That of St. Preux is weak, and often forced. Julia is an affemblage of tendernefs and pity, of elevation of foul, and of coquetry, of natural parts and pedantry. Wolmar is a violent man, and almoft beyond the limits of nature. In fine, when he wifhes to change his ftyle, and adopt that of the fpeaker, he does not long fupport it, and every attempt embarraffes the author and cools the reader. In the Heloife, Rouffeau's talent of rendering every thing problematical, appears very confpicuous, as, in his arguments in favour of, and againft, duelling, which afford an apology for fuicide, and a juft condemnation

demnation of it; of his facility in palliating the crime of adultery, and his ſtrong reaſons to make it abhorred; on the one hand, in declamations againſt ſocial happineſs, on the other in tranſports in favour of humanity; here in violent rhapſodies againſt philoſophers; there by a rage for adopting their opinions; the exiſtence of God is attacked by ſophiſtry, and Atheiſts confuted by the moſt irrefragable arguments; the Chriſtian religion combated by the moſt ſpecious objections, and celebrated by the moſt ſublime eulogies." In the preface to this work the author attempts to juſtify his conſiſtency; he ſays public ſpectacles are neceſſary for great cities, and romances for a corrupted people. "I have," he adds, "viewed the manners of my age, and have publiſhed theſe letters. Why did I not live at a time when I ought to have thrown them into the fire." He affects alſo to ſay that they were not intended for an extenſive circulation, and that they will ſuit but few readers. With regard to their effects on the female ſex, he pretends to ſatisfy his conſcience with ſaying "No chaſte young woman ever reads romances; and I have given this book a deciſive title, that on opening it a reader may know what to expect. She who, notwithſtanding, ſhall dare to read a ſingle page is undone; but let her not impute her ruin to me—the miſchief was done before." This is mere rant, and the extreme of vanity. Rouſſeau rendered his work as ſeductive as poſſible, and would have been mortified beyond meaſure could he have believed that it could readily have been laid aſide by any one who had opened it. Beſides, had he been that moral man which he would affect to be, he ought, knowing its tendency, to have committed it to the flames, inſtead of ſending it to the preſs. In truth, he aſſumes in it the tone of a moral teacher of the higheſt order, nor will it be denied that, amidſt much improper matter, it contains many leſſons of domeſtic prudence and exalted virtue. "In warmth of painting, and eloquence of ſentiment, it muſt be allowed to have no ſuperior in its claſs; in moral inconſiſtency and improbability, ſcarcely an equal. With a profound knowledge of the human heart, it joins great ignorance of life and manners; with much ſober and uſeful truth, all the extravagance of exaggerated feeling. It is a dangerous work, but has been the parent of others ſtill more dangerous, becauſe affording eaſier objects of imitation."

Rouſſeau's next work was entitled "Du Contrât Social, ou Principes du Droit Politique," which was ſaid to be a mere extract from one on a much larger ſcale, which he had commenced, but which he had long ſince abandoned as beyond his powers. In this he is the fearleſs and intrepid vindicator of republicaniſm, and is ſuppoſed to have done much to excite the late diſaſtrous French revolution. The work was prohibited in France and Switzerland; and from its publication may be dated that warfare between the author, and the ſupporters of exiſting eſtabliſhments, civil and religious, which expoſed the remainder of his life to perſecution.

In 1762 Rouſſeau publiſhed his "Emilie, ou de l'Education," which may be regarded as his principal work, as it was that in which he moſt boldly attacked or oppoſed the commonly received opinions, and, in conſequence, excited againſt himſelf the greateſt maſs of hoſtility. The fundamental idea of Rouſſeau in education is to ſuffer the youthful mind to develope by itſelf, rather preventing it from imbibing any thing miſchievous, than haſtening to impreſs it with leſſons of preceptive inſtruction; preſenting to it objects of nature rather than of art, and regulating the conduct more by reſtraints of neceſſity than of principle, till a foundation is laid for the operation of reaſon unbiaſſed by habit and prejudice. Rouſſeau's pupil is to follow nature in every thing; the precepts of the philoſopher are expreſſed with the force and dignity of a mind full of the leading truths of morality. If he himſelf has not always been virtuous, nobody has felt its force more, or made it appear to more advantage; and he merits great applauſe for the manly and independent ſpirit, the contempt for luxurious indulgencies and idle parade, which he every where inculcates. The author excited againſt himſelf almoſt all the religious world, by the manner in which he ſpoke of the attempts to furniſh the youthful mind with theological ideas. Yet no one could more eloquently extol the morals of the goſpel and the character of its founder than he has done; by this praiſe, and his ſentiments of piety, he diſpleaſed the French philoſophers, ſo that there was ſcarcely any party of men to whom he did not ſtand in oppoſition. Of theſe, however, the moſt formidable of his antagoniſts were thoſe poſſeſſed of authority. The French parliament condemned this book in 1762, and entered into a criminal proſecution againſt the author, which forced him to a precipitate retreat. He directed his ſteps to his native country, but Geneva ſhut her gates againſt him. Both at Paris and Geneva, the "Emile" was burnt by the common hangman: ridiculous attempt of ridiculous governments to ſtop the circulation of opinions! The book ſtill exiſts, and, notwithſtanding the many and ſerious objections to which it is liable, deſerves to exiſt, while its tyrannical perſecutors have long ſince been forgotten, and their puny efforts laughed at by every man poſſeſſed of an underſtanding ſuperior to that of an idiot. Rouſſeau was for a time allowed to take ſhelter in Switzerland, where he was moſt hoſpitably treated by marſhal Keith. He there publiſhed a letter to the archbiſhop of Paris, in anſwer to his *Mandement* for the burning of the "Emile:" and alſo his "Lettres de la Montagne," which contained a ſevere remonſtrance againſt the proceedings of the republic of Geneva in his condemnation, the citizenſhip of which ſtate he formally renounced. That he thought very highly of this work is evident from the following paſſage: "How," ſays he, "can I enter into a juſtification of this work? I who think that I have effaced by it the faults of my whole life; I, who place the evils it has drawn upon me as a balance to thoſe which I have committed; I who, filled with confidence, hope one day to ſay to the ſupreme Arbiter, 'Deign in thy clemency to judge a weak mortal:' I have, it is true, done much ill upon earth, but I have publiſhed this writing." In theſe letters he again expreſſed his ſentiments concerning revealed religion, in a manner that excited againſt him great indignation among the clergy of Neufchatel. A conſiſtory was aſſembled to take his opinions into conſideration, but government interfered to ſtop its proceedings. The protection of the government was not, however, ſufficient to reſcue him from the obloquy which the clergy excited againſt him. They preached againſt the philoſopher, and their ſermons excited an uproar among the people. In September 1765, ſome miſguided zealots attacked his houſe and his perſon, and he ſought an aſylum in Berne, which was denied him. Neither the broken ſtate of his health, nor the approach of winter, could ſoften the hearts of his enemies: he entreated them to ſhut him up in their common priſon, which favour they even denied, and he was under the neceſſity of ſetting out on a long journey, in the beginning of a very inclement ſeaſon; he contrived, however, to reach Straſburg in a very deſtitute condition. He received from marſhal de Contade, who was then commander of that place, every accommodation that could be expected from humanity, compaſſion, and generoſity. Here he waited till the weather became more auſpicious, when he ſet out for Paris, where he appeared in the habit of an Armenian. The celebrated Hume was at this

this time a resident in that capital, as chargè d'affaires from the English court, and having been applied to in favour of Rousseau, who was desirous of making England his asylum, he willingly undertook to conduct him thither in the beginning of the year 1766. "At this period," says one of his biographers, "the persecutions which he had undergone, the hostility which he had experienced, and with which he had been hunted from place to place; the acrimony of his numerous opponents, and the ferment which his presence had excited in the different places of his residence, had so agitated his susceptible mind, and inflamed his vanity, that he imagined himself not only the most important, but almost the only important personage in Europe, and fancied that a general confederacy was formed against him of all sects and parties. This notion filled him with absurd suspicions, and rendered him prone to view every thing in a wrong light, and to magnify trifles into matters of great moment. In short, he was under the influence of a perversion of temper and intellect, nearly amounting to mental derangement: a malady which, indeed, in a certain degree, seems to have attended him through life, and which alone can account for his singularities and inconsistencies." Without this clue, his conduct to Mr. Hume must appear the extreme of baseness and ingratitude. This gentleman, sensibly affected with his various misfortunes, procured for him an agreeable situation in England, but Rousseau was not long satisfied with the new place. He had wished for peace, but peace and quiet he was utterly incapable of enjoying. He did not make such an impression upon the minds of the English as he had done upon the inhabitants of other countries. The freedom of his opinions, and the settled melancholy of his temper, were not deemed very remarkable or singular here. He was regarded only as an ordinary man: in the public prints he was satirized; his principles and conduct were represented as quite adapted to a modern Diogenes. He was rather regarded as an object of ridicule than of terror to any of the prevailing parties in England. Rousseau now imagined there was a plot between Hume and the French philosophers to destroy his glory. He sent a letter to him, filled with the most violent abuse, and at the same time refused to accept a pension from the crown, which had been obtained through the interest of Mr. Hume. He did not remain long in England after this, but went to France in the year 1767, where he met with various protectors, with whom he passed his time in different provinces. At this period he published his "Dictionnaire de Musique," which, though an excellent work, brought upon the author much severity of criticism. In the following year he resumed his botanical pursuits, by collecting and studying the plants which he found on the mountains of Dauphinè. In the year 1769, he married a lady with whom he had lived many years, and by whom he had already had five children, all of whom he had basely sent to the orphan hospital. This has been justly esteemed in this country as one of the greatest stains upon his character, though his foreign biographers take little notice of it, and seem to think he was justified by the indigence in which he lived. But how could a man venture to talk of morality, and write upon education, who had abandoned his own children? Notwithstanding his other merits, he must in this respect be held in abhorrence by every feeling mind. During the year 1770, he appeared at a coffee-house in Paris in his ordinary dress, and took much pleasure in the plaudits of the surrounding crowd. Though he affected the love of solitude, yet he was never easy unless he could in some way or other occupy the public attention. He could neither accommodate himself to the world, nor be content to live out of it. Nevertheless, some of his latter years he seems to have passed more tranquilly than any former period of his life, having, in a good measure, renounced all farther discussion of those controverted topics which had involved him in so many difficulties, and determined to keep his philosophy for his own use. Still he suspected that a confederacy was making against him, and he gladly accepted, in May 1778, an invitation from the marquis de Girardin, to retire with his wife to a small house near his beautiful seat of Ermenonville, where he died in the month of July in the same year, at the age of 66. His friend and patron, the marquis, erected a monument for him in the Isle of Poplars, in his pleasure grounds, with an inscription, to which Rousseau was by no means entitled: "Ici repose l'Homme de la Nature et de la Verité."

After the death of this philosopher, his "Confessions" were published, which give a minute account of every thing that happened to him till the 30th year. This singular piece of biography is itself a striking exemplification of character, for there is hardly any work in which circumstances so degrading and humiliating are related with so little reserve, while the air of importance given to the most trivial incidents in which he was any way concerned, and the contempt of shame implied by exhibiting himself thus naked to the world, prove it to have been dictated more by vanity and self-importance than by contrition. He would have passed for a better man if this work had not been published, but then he could not have had any pretext for talking so much of himself. "His Confessions," says M. Sennebier, author of the Literary History of Geneva, "appear to me a very dangerous book, and paint Rousseau in such colours as we should never have ventured to apply to him. The excellent analyses which we meet with of some sentiments, and the excellent anatomy which he gives of some actions, are not sufficient to counterbalance the detestable matter which is found in them, and the unceasing obliquities every where to be met with." There is no doubt that he has done much mischief to the interests of morality by these "Confessions," as well by the baseness of the vices which he has disclosed, as by the manner in which he united them with the virtues. Among the other pieces of Rousseau, not already noticed, and which were published after his death in a new edition of his works, are, 1. The Reveries of a solitary Wanderer, being a journal of the latter part of his life. In this he confesses that he preferred sending his children into hospitals destined for orphans, than to take upon himself the charge of their maintenance, and endeavours to palliate this shameful dereliction of duty. 2. Considerations upon the Government of Poland. 3. The Adventures of Lord Edward, a novel, being a sort of supplement to his Heloise. 4. Various memoirs and fugitive pieces, with a great number of letters. 5. Emilia and Sophia. 6. An opera and a comedy. 7. Translations of the first book of Tacitus' History, &c. &c. Like all the other writings of Rousseau, there are in these posthumous pieces many admirable and useful things; but at the same time they abound with contradictions, paradoxes, and ideas very unfavourable to religion. In his letters especially, we see a man chagrined with misfortunes, which he never attributes to his own want of conduct: he is suspicious of every body about him, calling and believing himself a lamb amidst wolves. All his works are marked with a peculiar warmth and energy of style, and with great vigour of thinking. He was one of the first writers who exercised the greatest influence upon the opinions of the age, and in the early periods of the French revolution, they were referred to as of the highest authority in political matters, and his memory was almost deified. His reputation has since been much in the wane; but as long as the French language

language remains, he muſt be regarded as one of its great authors. The beſt edition of his works collectively is in 27 vols. 4to. The principal authorities for the life of Rouſſeau, independently of his own Confeſſions, are Sennebier Hiſt. Lit. de Geneve, and Nouv. Dict. Hiſt.

In 1768, Rouſſeau's animated and inſtructive Muſical Dictionary was publiſhed, collected chiefly from his muſical articles in the Encyclopédie; and as he gave no quarter in it to French muſic, the admirers and defenders of that muſic have treated his opinions with equal ſeverity. It is, however, the buſineſs of true critics not only to point out the errors of a work, but, if it has any, the merit. There may be miſtakes in Rouſſeau's Dictionary, but are there no *good* articles, no marks of refined taſte and nice obſervation in ſpeaking of dramatic muſic? No ſhort, clear, and happy definitions of muſical technica? And is every thing he has ſaid of French muſic thought ſo abſurd and paradoxical at preſent, even in France, as it was thirty years ago? The abbé Rouſſier, and his diſciple M. de la Borde, who treat as *abſurd* and ſtupid whatever ſeems unfavourable to their doctrines, were awed perhaps by the thunder of Rouſſeau's eloquence, while alive; but no ſooner were they ſure that the lion was dead, than they plucked up a courage, and boldly attacked him at all points.

We muſt add, in juſtice to Jean Jacques, that more good taſte, intelligence, and extenſive views are to be found in his original articles, not only than in any former muſical dictionary, but in all the books on the ſubject of muſic which the literature of France can boaſt. And his "Lettre ſur la Muſique François," may be ſafely pronounced the beſt piece of muſical criticiſm that has ever been produced in any modern language.

It muſt, however, be confeſſed, that his treatment of French muſic is very ſarcaſtic, not to ſay contemptuous; but the muſic, the national character *avantageux*, and excluſive admiration of their own muſic, required ſtrong language. It had been proved long ſince, that they were not to be laughed out of their bad taſte in any one of the fine arts: the national architecture, painting, and ſculpture, were, in general, bad, and not what a traveller returning from Italy could bear to look at: though there have been now and then individual French artiſts of every kind, who have travelled and ſtudied antiquity as well as the great maſters of the Italian ſchool; and it is now ſaid, that at the Inſtitute they are trying ſeriouſly to correct their errors, and to eſtabliſh a claſſical taſte throughout the empire.

Yet, after all our ſincere encomiums on Rouſſeau as a muſical critic, particularly in the melodrama, and though we ſubſcribe to moſt of his muſical opinions, and defend them, yet we muſt leave him in the hands of his enemies with reſpect to Blainville's *new mode*, in recommending which he is totally indefenſible. But in the year 1751 he was young in muſical theory, and the laws of compoſition; he had read little, and not ſtudied much; but in 1768, after working ſo long for the Encyclopédie, in which labour to teach others he muſt have educated himſelf, nothing but the ſtate of war between him and the intolerant adherents to Rameau and the old ſchool, could have blinded him ſo far as not to ſee the abſurdity of Blainville's pretenſions to the merit of having invented a new mode, or third key in muſic, different from the major and minor modes in common uſe.

It may perhaps be alleged, even by the friends and admirers of his muſical writings, that he was more unwilling, than ſo acute and perſpicacious a logician ought to have been, to relinquiſh his new ſyſtem of *muſical notation*, which he publiſhed under the title of "Diſſertation ſur la Muſique moderne," in 1743, when very young, and his knowledge of muſic ſuperficial. Forty years had not weaned him from his partiality for this juvenile production; for he not only republiſhed it in 1768, in his Muſical Dictionary, but near the end of his life, in 1778, he ſtill perſiſted in explaining and recommending its adoption: as Fontenelle, at near 100, wrote and publiſhed a tract in favour of the Carteſian, and Troubillons againſt Newton's ſyſtem of gravitation.

Lord Stanhope, and Mr. Baldwyn of Cheſhire, are now (1804) at work on a new method of notation, expreſſing by letters of the alphabet what Rouſſeau did by numerical figures, with great confidence of ſucceſs. But neither Rouſſeau, nor ſubſequent ingenious framers of a new muſical notation, could or would ſee the inconvenience and even miſchief it would occaſion to the art, if ever it was generally adopted, by rendering all former muſic unintelligible, unleſs every muſician and muſical ſtudent were at the pains of learning two gamuts, or ſyſtems of muſical notation, inſtead of one.

Muſic is at preſent an univerſal language throughout Europe. All nations uſe the ſame characters, and write and read them with equal facility. Suppoſe a tyrant in any one kingdom only, were to inſiſt upon the inhabitants relinquiſhing at once their native language, and adopting another of which they were utterly ignorant, it is hardly poſſible to imagine that his mandate would or could be obeyed; but if the deſpot's will were attempted to be complied with in his particular dominions, would all the reſt of Europe burn their books, and ſet about learning a new alphabet, a new ſpelling-book, a new grammar, and the art of writing this new language? nothing but its general and univerſal adoption could render it uſeful to any one nation upon earth.

ROUSSEL, William, a learned French Benedictine monk of the congregation of St. Maur, was born at Conches, a ſmall town within the dioceſe of Evreux, in Normandy in the year 1658. He became a member of the congregation in the year 1680, and directed his attention principally to thoſe ſtudies which would qualify him for the office of a preacher. Having fine talents, he became very popular, and the general theme of commendation at Paris, but preferring retirement, he withdrew to Rheims, and afterwards to Argenteuil, where he ſpent the remainder of his life in devotion and ſtudy. He died in the year 1717. He publiſhed an excellent tranſlation of the Letters of St. Jerome, in 3 vols. 8vo. the firſt two of which appeared in 1704; and the third, containing the critical letters of that father on the Holy Scriptures, in 1707. They are accompanied with a preface and learned notes. He was author of an *éloge* on father Mabillon. He had employed many years of his life in making preparations for compoſing "A Literary Hiſtory of France," but death put an end to his labours, and his papers were placed in the hands of father Rivet, a member of the ſame congregation, who made uſe of them without acknowledging his obligation.

ROUSSELAER, in *Geography*, a town of France, in the department of the Lys, ſituated on the river Mandel; 10 miles S. of Bruges.

ROUSSIER, the *abbé*, in *Biography*, a profound writer on the theory of muſic, was born at Marſeilles in 1716. He is author of a conſiderable number of muſical tracts, of which the following are the titles:

1. A Treatiſe on Chords and their Succeſſion, 1764.
2. Obſervations on different Points of Harmony, 1765.
3. Memoir on the Muſic of the Ancients, 1770.
4. A Letter, in two parts, to the author of the Journal of the Arts and Sciences, concerning the diviſion of the zodiac, 1770. The ſecond part to the ſame concerning the Inſtitution of the Planetary Week, 1771.

5. Prac-

5. Practical Harmony, or Examples in Illustration of the Treatise on Chords, 1776.

6. He was engaged, in 1779, as editor of a memoir on the music of the Chinese, by the abbé Amiot, missionary at Pekin. The learned abbé has enriched this memoir with a great number of notes, observations, and a copious index. See CHINESE *Music*.

All this profound writer's treatises are built upon the principles of Rameau, but Rameau sublimed. The abbé's favourite discovery and systematic principle is the triple progression, upon which he endeavours to prove that the musical systems of the Egyptians, Greeks, and Chinese were founded. By triple progression is meant a series of perfect fifths, so that the word temperament equally disturbs his system and his temper. It is to be feared that the good abbé in this particular, and in his principles in general, is too rigid and inflexible a theorist for the fanciful melody, and licentious modulation of modern composers.

The French are always to have champions, *une homme armé*, to combat the music and musical writers of all other countries. At the beginning of the last century, Bonnet was the redoubted champion of the votaries of Lulli in the middle of that century. The abbé Roussier, with less fury, but more intelligence, threw down the gauntlet for Rameau and his basse fondamentale; and at the end of the century, the abbé Faitu, the most valourous and invincible of them all, has not only bid defiance to the enemies of Lulli and Rameau, but to the whole universe: a perfect Drawcansir, that spares nor friend nor foe, who dares be of a different opinion from himself.

ROUSSILLON, in *Geography*, a province of France before the revolution, once belonging to Spain, bounded on the N. by Languedoc, on the E. by the Mediterranean, on the S. by Catalonia, and on the W. by the Pyrenees, about 18 leagues in length, and 12 in breadth, and consisting of land that is generally fertile. Its principal rivers are the Tet and the Tech, and its capital is Perpignan. It now forms the department of the Eastern Pyrenees.

ROUSSILLON, a town of France, in the department of the Isere, and chief place of a canton, in the district of Vienne; 9 miles S. of Vienne. The place contains 963, and the canton 11,107 inhabitants, on a territory of 225 kiliometres, in 21 communes.—Also, a town of France, in the department of the Saone and Loire; 9 miles N.N.W. of Autun.

ROUSSIN, in the *Manege*, is a strong well-knit, well-stowed horse, such as are commonly brought into France from Germany and Holland.

ROUSSING, in *Sea Language*, is the act of pulling together upon a cable, hawser, &c. without the assistance of tackles, capsterns, &c. It is particularly used in the exercise of removing a ship from one place to another, by means of ropes and anchors.

ROUT, ROUTE, a public road, highway, or course; especially that which military forces take.

The word is French, *route*, formed from the Latin *rupta*, or *ruta;* or the French *roux*, an old word for *horse;* or rather from the old Celtic *rout*, *road*.

Sanson and Ogilby have made maps of the routs and post-roads of France and England. Soldiers are prohibited going out of their routs. Routs are frequently cut in parks, forests, &c. both for ornament, and for the conveniencies of hunting.

Some use route for a path cut across a wood; in opposition to *way*, which is a great road.

ROUT, in *Navigation*. See COURSE.

ROUT is also used for the defeat and flight of an army.

ROUT, in *Law*, is an assembly or combination of three or more persons, upon a common quarrel, going forcibly to commit an unlawful act: such as breaking down fences upon a right claimed of common, or of way, though they do not actually perform it.

If they go, ride, or move forwards, after their meeting, thus making some advances towards the execution of their purpose, it is a rout, though they do not put their purpose in execution; if they do, it is a riot.

A rout, therefore, seems to be an unlawful assembly; and a riot the disorderly fact committed thereby.

Two things, however, there are in common to *rout*, *riot*, and *unlawful assembly;* the one, that there be at least three persons together; the other, that, being together, they disturb the peace, either by words, shew of arms, turbulent gesture, or actual violence.

For the punishment incurred by routs, &c. see RIOT.

ROUT *of Wolves*, among *Hunters*, denotes a herd of those wild beasts.

ROUTIER, in *Navigation*. See WAGGONER.

ROUTOT, in *Geography*, a town of France, in the department of the Eure, and chief place of a canton, in the district of Pontaudemer; nine miles E. of it. The place contains 1169, and the canton 14,721 inhabitants, on a territory of 110 kiliometres, in 21 communes.

ROUTOU, a town of Thibet; 255 miles E.N.E. of Latac.

ROUVRAY, a town of France, in the department of the Côte d'Or; 11 miles S.W. of Semur en Auxois.

ROUVRE, a town of France, in the department of the Upper Marne; 15 miles S.W. of Langres.

ROUVRES, a town of France, in the department of the Vosges; four miles W. of Mirecourt.

ROUVROY, a town of France, in the department of the Somme; 15 miles E. of Peronne.

ROU-WADDE. See RUAD.

ROUX, CAPE, a cape of Africa, on the coast of Tunis. N. lat. 37° 10'. E. long. 8° 22'.

ROUXIERE, LA, a town of France, in the department of the Lower Loire; eight miles N.E. of Ancenis.

ROUY, a town of France, in the department of Nievre; 15 miles E. of Nevers.

ROW, a town of Scotland, in the county of Dumbarton; nine miles W. of Dumbarton.—Also, a town of Hindoostan, in Bahar; 20 miles S. of Bahar. N. lat. 24° 55'. E. long. 85° 52'.

ROW-*Culture*, in *Agriculture*, that method in which the crops are sown in rows or drills, and afterwards cultivated according to that system. See DRILL *Husbandry*.

This sort of cultivation is commonly divided into the narrow and distant kinds, the former comprising all sorts of grain, and some other kinds of crops, which are sown in rows at not more than six, eight, ten, and twelve inches apart; the latter, all those which have large spaces or intervals between the rows, as from a foot to a foot and a half, two feet and more, such as beans, peas, turnips, cabbages, beets, potatoes, carrots, parsneps, and many others. They all require to be wrought between suitable tools, such as hoes and ploughs, at different times, while they are growing upon the ground.

ROW-*Galley*, a long, low, flat-built vessel, furnished sometimes with a deck, and navigated with sails and oars, particularly in the Mediterranean.

ROWAH, in *Geography*, a town of Hindoostan, in Bahar; eight miles N.W. of Bettiah.

ROWALE, or KOWALE, a town of the duchy of Warsaw; 36 miles S. of Wladislaw.

ROWAN, a county of America, and one of the most populous

populous of North Carolina, in Salifbury diftrict; bounded N. by Iredell, and S. by Cabarrus, and containing 21,543 inhabitants.

ROWE, Elizabeth, in *Biography*, a lady greatly diftinguifhed for her piety and poetical talents, was daughter of the Rev. Walter Singer, a diffenting minifter near Frome, in Somerfetfhire. Under the difgraceful reign of Charles II. this gentleman was imprifoned on account of his non-conformity at Ilchefter, where he married, and where his daughter Elizabeth was born in 1674. From her childhood fhe difcovered a paffion for reading, together with a devotional turn of mind. At the age of twelve, fhe began to write verfes, and practifed mufic and drawing. Her poetical talents excited notice in the neighbourhood, and gave her an introduction to lord vifcount Weymouth, by whofe fon, the honourable Mr. Thynne, fhe was inftructed in the French and Italian languages. In her 22d year, at the requeft of her friends, fhe publifhed a volume of mifcellaneous poems, by which fhe is advantageoufly known. Poffeffing an agreeable perfon, and a large fhare of the accomplifhments of her fex, fhe attracted the attentions of many admirers, but fhe appears to have been in no hurry to marry, and it was not till 1710 that fhe gave her hand to Mr. Thomas Rowe, a very amiable man, a fcholar, and a poet, with whom fhe lived in the enjoyment of a large portion of conjugal felicity. This happinefs was not lafting; Mr. Rowe, who was of a confumptive habit, died at Hampftead in 1715, and left his widow overwhelmed with grief, which nothing but her fentiments of pious refignation could enable her to fupport. From this time fhe paffed her days, for the moft part, in retirement at Frome, but making occafional vifits to the countefs of Hertford. Her manners and attainments rendered her perfectly fuited to the beft company; and though fhe adhered to the laft to the principles of the Diffenters, fhe was entirely free both from narrownefs of fentiment, and from any forbidding aufterity of behaviour. Mrs. Barbauld has, in a few lines, given the manner in which fhe employed herfelf, and the perfons with whom fhe affociated.

"Yet in no ufelefs gloom fhe wore her days,
She loved the work, and only fhunned the praife:
Her pious hand the poor, the mourner, bleft;
Her image lived in every kindred breaft,
Thynne, Carteret, Blackmore, Orrery approved,
And Prior praifed, and noble Hertford loved.
Seraphic Kenn, and tuneful Watts were thine,
And Virtue's nobleft champions filled the line."

Mrs. Rowe compofed feveral works in her retreat, efpecially thofe letters from the dead to the living, which her own heavy lofs doubtlefs had fuggefted. She was bleffed with a good conftitution, and paffed through life with very little interruption of health. She died fuddenly in February 1737, in the 63d year of her age. A pious book was found lying open by her, and in her cabinet were found letters to feveral of her friends, which fhe intended for them after her death. Her works were, "The Hiftory of Jofeph," an heroic poem; "Friendfhip in Death," &c.; "Devout Exercifes of the Heart;" "Mifcellaneous Works," in two volumes. Few characters have been more juftly efteemed than that of Mrs. Rowe. With refpect to her poetical works, the general character is correct and melodious verfification, flowing language, and tender elevated fentiments. Among her profe compofitions the moft popular was that entitled "Friendfhip in Death, in twenty Letters," fuppofed to be written from the dead to the living. Thefe are the works of a lively and a feeling heart, exercifed in pious meditations, and they are always read with pleafure by the young, and thofe who are fufceptible of good impreffions. They have paffed through many editions, and are ufually accompanied by other pieces of the author's of a moral and religious kind. All her writings, though not calculated to ftand the teft of exact criticifm, infpire a favourable idea of the writer.

Rowe, Thomas, the hufband of the foregoing, was the fon of a diffenting minifter, who afforded him all the advantages of an excellent education, and he would probably have become a diftinguifhed literary character, had not his early marriage been followed by a premature death. He wrote fome excellent pieces of poetry, one of which was a tender ode to his wife, fome years after their marriage. Hiftory was his favourite purfuit, and he formed a defign of writing the lives of illuftrious characters in antiquity, omitted by Plutarch, of which eight were finifhed, and were publifhed after his death. He died in 1715, at the age of 28. Some of his original poems and tranflations were printed with Mrs Rowe's "Mifcellaneous Works."

Rowe, Nicholas, an eminent Englifh poet, the fon of John Rowe, efq. ferjeant at law, was born in 1673, at Little Berkford, in Bedfordfhire. After a preliminary education at Highgate, he was placed in Weftminfter fchool under the noted Dr. Bufby, as a king's fcholar, and purfued claffical ftudies with eagernefs and fuccefs. His poetical exercifes in Latin and Greek were particularly admired. He was removed from fchool at the age of 16, and entered a ftudent in the Middle Temple, and proceeded fo far in the purfuit of the law, as to be called to the bar; but the death of his father, when he was only 19, gave him liberty to follow his own inclination, and he devoted himfelf to poetry and polite literature. At the age of 25 he produced his firft tragedy, entitled "The Ambitious Step-mother;" the ftory of which appears to be founded on that of Solomon elevated to the throne by the machinations of his mother Bathfheba, but the fcene and circumftances are totally different. It was acted at Lincoln's Inn-Fields, and was very fuccefsful, which is faid to have rendered the author a decided deferter from the law. His next dramatic work was "Tamerlane," which was acted in 1702. This was intended to convey important political impreffions: the tyrant and defpot Bajazet being intended as the type of Lewis XIV., then confidered as the enemy of liberty, civil and religious, and the Tartar Tamerlane was metamorphofed into a perfect prince, intended to characterize the immortal William III. of England. In all the portraits there was much exaggeration, but the purpofe of the piece, and its many elevated and liberal fentiments, caufed it to be received with great applaufe. It was frequently acted during that and the following reign, till the year 1710, when different political opinions coming into fafhion, it was for a time intermitted, but the acceffion of the houfe of Hanover reftored it to the ftage, and it was for a great number of years reprefented on the anniverfary of king William's landing. In 1703, Mr. Rowe produced his "Fair Penitent," which is thought to be his moft ftriking piece; it is highly interefting, and abounds with poetry and fine fentiments. Mr. Rowe made an attempt at comedy in 1706, but did not fucceed. From this time to 1715, he brought out, in fucceffion, the tragedies of "Ulyffes;" "The Royal Convert;" "Jane Shore," and "Lady Jane Gray." Of thefe, the two laft have furvived on the ftage. Jane Shore is now occafionally acted; always when performed engages fome of the beft actors, and never fails to be viewed with the deepeft intereft. During this interval he appeared as an editor of Shakfpeare's plays, prefixing to this edition an account of the life of that tranfcendant genius. Rowe was not exclufively engaged in literary purfuits, he he was a man of bufinefs, and did not neglect thofe opportunities of entering into public life, which his reputation and connections afforded. He had joined the Whig party, and when the duke of Queenfberry was made fecretary of ftate, he was appointed by that nobleman his under fecretary. This poft he held about three years, when the duke died, and his fervices were no more required during the reign of queen Anne. It is faid he went, one day, to pay his court to the lord-treafurer Oxford, who afked him if he underftood the Spanifh language. He replied in the negative, but added, that he did not doubt but he could make himfelf mafter of it, fuppofing his lordfhip intended to give him employment at the court of Madrid. The earl feemed to approve his intention of ftudying the language: Rowe took his leave, and retired a few weeks or months to learn it, and then waited on his lordfhip to acquaint him with what he had done: "then, fir," replied the courtier, "I envy you the pleafure of being able to read Don Quixote in the original," and difmiffed him. On the acceffion of George I. the place of poet laureat was conferred upon him, and he was alfo made one of the land furveyors of the cuftoms of the port of London. The prince of Wales conferred upon him the clerkfhip of his council, and the lord chancellor Parker made him his fecretary for the prefentations. The emoluments of thefe offices, with his own fortune, enabled him to fupport a very refpectable ftation in fociety, but he did not live long to enjoy thefe acceffions to his fortune. He died in 1728, at the age of 45, and was interred among the poets in Weftminfter-Abbey. Mr. Rowe was twice married, and had a fon by his firft wife and a daughter by the fecond. He was a handfome and genteel man; and his mind was as amiable as his perfon. He lived beloved, and at his death was lamented by Pope, in an epitaph which is to be found in Pope's works, though it is not affixed on the monumental marble at Weftminfter. Mr. Rowe is chiefly known to the public as a tragic poet; if he does not poffefs in a very high degree the principal parts of tragic invention, fuch as the nice difcriminations of character, and the fkilful developement and varied play of paffion; his diction is poetical without being bombaftic or affected, his verfification is fingularly fweet, and his plays abound with fentiments, given with fuch force and elegance as are calculated to dwell upon the mind. In his Jane Shore he profeffes to be the imitator of Shakfpeare, but nothing can be more diffimilar than the mode and colour of writing in the two poets, as nothing could be lefs refembling than their genius. Mr. Rowe is well known alfo by his poetical tranflations. He gave verfions of the Golden Verfes of Pythagoras, and of the firft book of Quillet's "Callipædia," fee QUILLET; but his chief labour in this way was a tranflation of Lucan's "Pharfalia," which was not publifhed till 1728, ten years after the tranflator's death, and which Dr. Johnfon calls "one of the greateft productions of Englifh poetry;" but if critically compared with the original, it will be found frequently very diffufe. The "Poetical Works" of Mr. Rowe, confifting of his plays and mifcellaneous poems, were publifhed collectively in three vols. 12mo. in 1719; and his tranflation of the Pharfalia was publifhed foon after his death, with a dedication to the king by his widow.

ROWE, in *Geography*, a townfhip of America, in the N.W. corner of Hampfhire county, Maffachufetts, bounded N. by Vermont; watered by Deerfield river, and containing 839 inhabitants; 115 miles N.W. of Bofton.

ROWEL, among *Farriers*, a kind of iffue, made by drawing a fkain of filk, thread, hair, or the like, through the nape of the neck, or other part of a horfe; anfwering to what in furgery is called a *feton*.

The ROWELLING *of Horfes* is a method of cure frequently had recourfe to, in cafes of inward ftrains, efpecially about the fhoulders or hips; as alfo for hard fwellings not eafily to be refolved.

The operation is thus: a little flit being made through the fkin, about a hand's breadth below the part aggrieved, big enough to put a fwan's quill in; the fkin is raifed from the flefh, the end of the quill put in, and the fkin blowed from the flefh upwards, and all over the fhoulder.

Then the hole being ftopped by the finger, the place blown is beaten with a hazel ftick, and the wind fpread with the hand all over, and then let go.

This done, a fkain of horfe-hair, or red farfenet, half the thicknefs of the little finger, is put in a rowelling needle feven or eight inches long; the needle is put into the hole, and drawn through again fix or feven inches higher; then the needle is drawn out, and the two ends of the rowel tied together; anointing it every day, as well as before the putting it in, with fweet butter and hog's greafe, and drawing it backwards and forwards in the fkin, to make the putrid matter difcharge itfelf more plentifully.

Others, difliking thefe rowels, as making too great a fore and fcar, ufe the French rowel, which is a round piece of ftiff leather, with a hole in the midft, laying it flat between the flefh and fkin, the hole of the rowel juft againft that in the fkin; fewing it with a needle and thread drawn through the hole in the fkin; cleaning it once in two or three days, and then anointing it afrefh.

ROWELS *of a Spur*. See SPUR.

ROWEN, in *Geography*, a town of Bohemia, in the circle of Chrudim; 10 miles S.E. of Chrudim.

ROWEN-*Tree*, in *Hufbandry*, a term improperly applied to the mountain afh.

ROWENSKO, in *Geography*, a town of Bohemia, in the circle of Boleflaw; 6 miles S.E. of Turnau.

ROWET, a name fometimes applied to rouen. See ROUEN.

ROWETY-WOOL, among wool-dealers, a term applied to the young wool of fome forts of fheep, which rifes below the old fleece.

ROWING, is the action of impelling a boat or veffel along the furface of the water by oars, which are managed in a direction nearly horizontal. See OAR, BOAT, &c.

ROWING-*Guard*. See GUARD-*Boat*.

ROWLE, in a *Ship*, is a round piece of wood or iron, in which the whip goes, being made to turn about, that it may carry over the whip the eafier from fide to fide.

ROWLEY, in *Biography*, a monk, who is faid to have flourifhed at Briftol in the 15th century, and whofe poems, or thofe attributed to him, were publifhed, many years ago, by the unfortunate CHATTERTON. See his article.

ROWLEY, WILLIAM, who ftands in the third clafs of dramatic writers, lived in the reign of James I., and was one of the company of players belonging to the prince of Wales. Little is known of him, except that he was in clofe connection with all the principal wits and poetical geniufes of that age, with fome of whom he joined in their writings. By Wood he is ftyled "the ornament for wit and ingenuity of Pembroke-hall, Cambridge." He was a confiderable benefactor to the Englifh ftage, having left five plays of his own compofing, and lent his affiftance to feveral authors in the compofition of many others. The titles of all thefe are given in the Biographia Dramatica; which fee.

ROWLEY, in *Geography*, a town of Hindooftan, in Oude; 18 miles S. of Bahraitch.

ROWLEY, a townfhip of America, in Effex county, Maffachufetts;

fachufetts; the inhabitants, amounting to the number of 1682, are moftly farmers; incorporated in 1639, and fituated 4 miles N.W. by W. of Ipfwich.

ROWLEY *Rag*, in *Mineralogy*, a bafaltic ftone from Rowley, near Dudley, in Staffordfhire. It is ufed for polifhing in fome of the manufactures of Birmingham, and has been particularly recommended for grinding the fpecula of reflecting telefcopes. On this variety of bafalt, the fine-grained grunftein of Werner, fome moft interefting experiments were made by the late Mr. Gregory Watt, to determine the important queftion refpecting the igneous or aqueous origin of bafaltic rocks. Perhaps few experiments in the laft fifty years throw more light on fome of the myfterious operations of nature in the mineral kingdom, and have a better claim to the profound attention of philofophers, or are more deferving of being repeated and diverfified. (See Phil. Tranf. for 1804, p. 279.) Before a fhort account of thefe experiments, it may be proper to give a defcription of the ftone itfelf. Rowley rag is a fpecies of fine-grained bafalt, of a confufed cryftallized texture; its fracture, in fmall pieces, is uneven; in the large, conchoidal. Its hardnefs is fuperior to common glafs, but inferior to felfpar; its tenacity is confiderable; its action on the magnetic needle is ftrong, but without figns of polarity; its fpecific gravity is 2.868. The general colour of Rowley rag is a very dark grey, approaching to black: it reflects light from a variety of brilliant points, fome of which feem to be felfpar, the others hornblende. According to the analyfis of Dr. Withering, 1000 parts contain 475 filex, 325 argillaceous earth, and 200 of the oxyd of iron. The magnetic property of thefe rocks was firft obferved by Dr. Plott, who fays they turned the needle 6° from its proper direction. The fame power of affecting the magnet has fince been difcovered in feveral bafaltic mountains, particularly in the Giant's Caufeway in Ireland. This ftone is fimilar to the bafalt of the Clee hills, in Shropfhire, and the bafaltic ftones in various parts of Great Britain. In its characters and chemical compofition it nearly refembles fome of the compact lavas from Ætna and Teneriffe. It is eafily fufible into an opaque black glafs, which, however, tranfmits light through very minute fragments. The texture of this glafs is completely vitreous, with a few air-bubbles. Its fracture is conchoidal and undulated; the hardnefs is fuperior to felfpar, but inferior to quartz. This glafs poffeffes fcarcely any action on the magnetic needle. The fpecific gravity is 2.749.

For the purpofe of afcertaining the effect of a high degree of temperature on a confiderable quantity of this ftone, one of the common reverberatory furnaces, ufed in iron founderies for the fufion of pig-iron, was ftrongly heated by a fire maintained feveral hours. About feven hundred-weight of amorphous Rowley rag was broken in fmall pieces, and depofited gradually on the elevated part of the interior of the furnace, between the fire and the chimney; from whence, as it melted, it flowed into the deeper part, in which, in ordinary operations, the iron is collected. It was obferved by the perfons attending, that it did not require half the quantity of fuel to fufe the bafalt that would have been neceffary to melt an equal weight of pig-iron. When the whole was melted, it formed a liquid glafs, rather tenacious, from which a large ladleful was taken, which, being allowed to cool, retained the characters of perfect glafs. The fire was maintained, though with gradual diminution, for more than fix hours; after which time, the draught of the chimney was intercepted, the furface of the glafs was covered with heated fand, and the furnace was filled with coals, which were confumed very flowly. It was eight days before the mafs in the furnace was fufficiently cool to be extracted, and even then it retained confiderable heat.

The form of the mafs being given by the bottom of the furnace, approached to the fhape of a wedge. It was nearly three feet and a half long, and two feet and a half wide; about four inches thick at one end, and above eighteen inches at the other. Owing to this inequality of thicknefs, and alfo to the unequal diftribution of heat in the furnace, Mr. Watt ftates that the cooling of the mafs had been too irregular to permit it to attain an homogenous texture; but this circumftance fortunately difclofed fome very remarkable peculiarities in the arrangement of the particles of bodies, paffing from a vitreous to a ftony ftate.

Thefe peculiar changes were difcovered, by infpecting the various parts of the wedge-fhaped mafs, which had progreffively cooled, as they were more remote from the fire, and nearer to the fmall extremity. This circumftance, not being very diftinctly ftated by Mr. Watt, has led fome of the readers of the paper to believe that the changes were obferved by taking a portion of the fubftance out of the furnace at different times, during the procefs: hence they have not fufficiently attended to a moft important fact which this experiment difclofes, namely, that the particles of bodies in a folid ftate, and at a temperature much below that of fufion, are capable of a kind of internal motion, and of affuming a cryftalline arrangement, in all the various ftages from fluidity to a perfectly folid ftate.

The tendency towards arrangement in the particles of the fluid glafs is firft developed by the formation of minute globules, which are generally nearly fpherical, but fometimes elongated, and which are thickly diffeminated through the mafs. The colour of thefe globules is confiderably lighter than that of the glafs; they are commonly greyifh-brown, fometimes inclining to chocolate-brown; and when they have been formed near the interior furface of the cavities in the glafs, they project and refemble a clufter of fmall feeds. Their diameter rarely exceeds a line, and feldom attains that fize; as, in general, they are fo near to one another, that their furfaces touch before they can acquire confiderable magnitude. In the procefs of cooling, they adapt their form to their confined fituation, fill up every interftice, and finally prefent a homogenous body, wholly unlike glafs, and equally unlike the parent bafalt. When the union of the little globules has been imperfectly effected, the fracture of the mafs indicates its ftructure, by numerous minute conchoidal fractures, which difplay the form of each globule. But if the arrangement has extended a little farther, all thefe fubdivifions are entirely loft; the mafs becomes perfectly compact, has an even or a flat conchoidal fracture, is nearly of the fame hardnefs as the glafs, is commonly of a chocolate colour, graduating into a brownifh-black, and the intenfity of the colour increafes in proportion to the degree to which the arrangement has extended. Its afpect is rather greafy; and it much refembles fome varieties of jafper, in the compactnefs of its texture, and its opacity. Its magnetic action is extremely feeble. Its fpecific gravity appears to be 2.938. From this refemblance to jafper, Mr. Watt denominates the mafs in this ftate jafpideous.

If the mafs were now rapidly cooled, it is obvious, fays Mr. Watt, that the refult would be the fubftance I have juft defcribed; but if the temperature adapted to the farther arrangement of its particles be continued, another change is immediately commenced; by the progrefs of which it acquires a more ftony texture, much greater tenacity, and its colour deepens as thefe changes advance, till it becomes abfolutely black. Sometimes this alteration is effected

effected by a gradual transition, the limits of which cannot be assigned; but more generally by the formation of secondary spheroids, in the heart of the compact jaspideous substance. These spheroids differ essentially from those first described: the centres of their formation are more remote from each other, and their magnitude is proportionably greater, sometimes extending to a diameter of two inches, and seeming only to be limited by contact with the peripheries of other spheroids. They are radiated with distinct fibres: sometimes the fibres resemble those of brown hæmatites, and sometimes they are fasciculated irregularly, so as to be very similar in appearance to the argillaceous iron ores, rendered prismatic by torrefaction. They are generally well defined, and easily separable from the mass they are engaged in; and often the fibres divide at equal distances from the centre, so as to detach portions of the spheroid in concentric coats. The transverse fracture of the fibres is compact and fine-grained; the colour black; and the hardness somewhat inferior to that of the basaltic glass. When two of the spheroids come in contact by mutual enlargement, no intermixture of their fibres seems to take place: they appear equally impenetrable; and as neither can penetrate, both are compressed, and their limits are defined by a plane, at which a separation readily takes place, and each of the sides is invested with a rusty colour. When several spheroids come in contact on the same level, they are formed by mutual pressure into pretty regular prisms, whose division is perfectly defined; and when a spheroid is surrounded on all sides by others, it is compressed into an irregular polyhedron.

The transition from this fibrous state to a different arrangement, seems to be very rapid, for the centre of most of the spheroids becomes compact before they attain the diameter of half an inch. As the fibrous structure propagates itself by radiating into the unarranged mass, the compact nucleus, which supplies its place, gradually extends till it finally attains the limits of the spheroids; and the same arrangement pervades the matter comprehended between them. The mass has now assumed a compact stony texture, and possesses great tenacity. Its hardness is somewhat inferior to that of the glass from which it was formed. Its action on the magnetic needle is very considerable. Its specific gravity is 2.938. Its colour is black, inclining to steel grey; it is absolutely opaque, and only reflects light from a few minute points. Though the divisions between the spheroids are rendered imperceptible to the eye, they are not obliterated, and their rusty surfaces are often disclosed by an attempt to fracture the mass.

A continuation of the temperature favourable to arrangement speedily induces another change. The texture of the mass becomes more granular, its colour rather more grey, and the brilliant points larger and more numerous; nor is it long before these brilliant particles arrange themselves into regular forms; and finally the whole mass becomes pervaded by thin crystalline laminæ, which intersect it in every direction, and form projecting crystals in the cavities. The hardness of the basis seems to continue nearly the same; but the aggregate action of the basis and of the imbedded crystals on the magnetic needle, is prodigiously increased. It appears to possess some polarity, and minute fragments are suspended by a magnet. Its specific gravity is somewhat increased, as it is now 2.949. The crystals contained in it, when examined by a microscope, appear to be fasciculi of slender prisms, nearly rectangular, terminated by planes perpendicular to the axis; they are extremely brilliant, but their colour is greenish-black; they are harder than glass, and fusible by the blowpipe; they are suspended by the action of a magnet. They are arranged nearly side by side, but not accumulated in thickness, so that they present the appearance of broad thin laminæ; they cross one another at all angles, but always on nearly the same plane; and the laminæ thus formed are often three or four lines long, and from a line to a line and a half broad, but extremely thin.

It seems obvious that an equalized temperature would have rendered the whole similar to the substance last described; and it may be fairly inferred, that by a continuance of heat the minute crystals would have been augmented in their dimensions by the accession of similar particles still engaged in the basis, or by the union of several crystals, till they acquired sufficient magnitude for their nature to be absolutely determined by the usual modes of investigation. It is possible, however, if such precautions had been taken as might have secured this degree of perfection in the ulterior result, that the mass would only have exhibited an uniform aspect, and that the interesting initial phenomena would not have been discovered.

The appearances here described seem deserving of consideration in several points of view. Few things can be more at variance with commonly received opinion, than the diversified succession of changes of structure which this glass exhibits in its passage to a crystallized state. The generation of the globules which unite to form the jaspideous substance, is what we might be prepared to expect by observing the cooling of a common iron furnace slag. But it appears not very obvious to common apprehension that the species of arrangement requisite to form this intermediary substance, could be compatible with any fluidity permitting farther motion of the ultimate particles of the mass; yet immediately after the completion of this arrangement, they receive a new disposition, and the radiated fibrous structure commences. Sometimes this pervades even the unaltered glass; but Mr. Watt presumes this only to happen where the minute globules first formed were scattered so far asunder that their centres became fibrous before their peripheries came into contact. This view of the subject is justified by the analogous operation of the formation of crystals similar to those described in the heart of the radiated spheroids, while their exterior still retained the fibrous texture.

If it be considered as extraordinary that a change should be effected, converting an apparently solid and homogeneous mass into an accumulation of radiated spheroids, and that these radii should lose their fibrous structure, and assume the texture, aspect, and tenacity, of a compact, hard, and homogenous stone, it is certainly much more extraordinary that this stone should permit farther arrangement to proceed, and should enable the crystalline molecules which it contains in a state of confused aggregation, to arrange themselves, and to form regular crystals, which, although minute, are equal, in the perfection of their forms, and in the brilliancy of their natural polish, to the most precious products of crystallization. It is also well deserving of observation by how regular a march the magnetic influence of the substance keeps pace with the perfection of its arrangement, till it becomes so powerful that fragments of the regenerated stone are suspended by the magnet.

It has been most justly remarked by Mr. Smithson, that solution, far from being necessary to crystallization, effectually prevents its commencement; for while solution subsists, crystallization cannot take place. It may remain a question whether previous solution be essential as a preparatory means of obtaining, by subsequent evaporation or cooling, the small parts of bodies disengaged, so that they may unite to form regular crystals. If, by solution be only meant that simple action of heat, or water, which merely counteracts

teracts the force of aggregation, and relieves the molecules from their bonds of union with each other, it certainly is a requisite; but if by solution be meant that action of affinities, by which not only the force of aggregation is overcome, but the combinations which constitute the molecules are destroyed, it obviously is not only unnecessary, but prejudicial, to crystallization. Mechanical suspension in a fluid medium of such density that the crystalline polarity may be enabled to counteract the power of gravity, is, with justice, considered by Mr. Smithson the only requisite for the formation of crystals. The circumstances here detailed appear an additional confirmation of this remark, and perhaps go still farther, by shewing that even the fluidity (in the common sense of the word) of the suspending medium is not an indispensible condition. For it appears impossible to annex the idea of fluidity to the union of the minute globules which form the jaspideous substance, still less to that substance when formed, or to those spheroids whose obstinate impenetrability is so strongly defined. And if, by any power of imagination, these can be supposed to be fluid at the time they retain this conformation; how can it be supposed that the compact, hard, tenacious stone into which they are changed, could retain these characters in a fluid state? Yet the subsequent formation of crystals proves that either all these contradictions must be, or that the particles of bodies apparently solid, must be capable of some internal motion, enabling them to arrange themselves according to polarity, while they are solid and fixed, as far as they have reference to the ordinary characters of fluidity.

Instances, even more remarkable, of the motion of the particles of bodies in a solid state, have very long been known and authenticated, though perhaps they have not been generally regarded with the attention they deserve. Glass vessels are well known to be convertible into Reaumur's porcelain by the internal arrangement of their particles without losing their external form, and consequently at a temperature very much below that requisite for their fusion. The change of glass into Reaumur's porcelain does not arise from an evaporation of the alkali, as has been alleged, but from a regular arrangement of the particles of the glass. It commences by the formation of fibres perpendicular to the surface of the glass, and penetrating into it. At nearly the same time small radiated globules are formed in the interior of the glass, and the union of these with the fibres, by their mutual increase, forms the whole into a new substance; and if the requisite temperature be longer maintained, the fibres disappear, and the whole becomes fine-grained and almost compact. This substance, from the improved state of its aggregation, is much stronger and more tenacious than before, and is not fusible at a heat sufficient to fuse the glass it was formed from; but if that aggregation be once destroyed, the glass resulting from its fusion is equally fusible with the original glass; and a repetition of the process will again form Reaumur's porcelain, which may be again fused, and so on repeatedly; for the quantity of alkali evaporated during the operation is extremely small. The hardness and brittleness of metals rapidly cooled, contrasted with the softness and tenacity resulting from their gradual refrigeration, are all analogous instances; and all the processes in which annealing is employed, and more remarkably the tempering of steel, offer strong proofs of the internal motions and arrangements of the particles of matter at temperatures very much below the heat requisite for their fluidity. Mr. Watt further adduces the structure and texture of calcareous stalactites as offering proofs of the internal motion of the particles of solid bodies at the common temperature of the atmosphere. Successive depositions of calcareous carbonate form a stalactite which at first is fibrous. A continuance of the process causes the fibrous structure to disappear, and the stalactite becomes irregularly crystalline. The irregularities afterwards vanish, and it becomes perfect calcareous spar, divisible into large rhomboids, with the form peculiar to that mineral, and all the gradations may be found in the same specimen. For a more particular account of these experiments, and the ingenious observations of Mr. Watt, we must refer the reader to the volume of the Philosophical Transactions above cited. The proofs and illustrations of the arrangements which take place in the internal particles of solid bodies, offer the only plausible explanation, which has yet been given, of the formation and decomposition of crystals under various circumstances in which they occur in mineral veins, and also of the prismatic forms observable in currents of lava, and in basaltic and other rocks. See TRAP, and VOLCANIC *Products*.

ROW-LOCKS, among *Ship-Carpenters*, small spaces left in the gunwale, where two thoals are let in, at such a distance from each other, as to admit the oar, at the end of the loom, to lie on to row the boat.

In the sides of the smallest vessels of war, a number of little square holes, called *row-ports*, are cut for this purpose parallel to the surface of the water.

ROWNING, JOHN, in *Biography*, an English mathematician and philosopher of considerable ingenuity, was fellow of Magdalen college, Cambridge, and afterwards rector of Anderby, in Lincolnshire. He was chiefly known for mechanical contrivances and inventions. In 1738 he published a compendious system of natural and experimental philosophy, in 2 vols. 8vo. which was frequently referred to thirty or forty years ago, and which has passed through many editions, but is now superseded by many other similar works of more value. He has likewise two pieces in the Philosophical Transactions, one containing a description of a barometer, in which the scale of variation may be increased at pleasure; the other, giving directions for making a machine for finding the roots of equations universally. He published likewise "A Preliminary Discourse on the Fluxionary Method." Mr. Rowning died in November 1771, in the 72d year of his age.

ROWRAH, in *Geography*, a town of Hindoostan, in the circar of Gohud; 10 miles S. of Raat.

ROWS *of Trees*. See PARALLELISM.

ROWSING, in *Sea Language*, denotes pulling upon a cable or rope, without the assistance of capsterns, &c.

ROWT, in *Rural Economy*, a term signifying to low as cattle.

ROWTEE, in *Geography*, a town of Hindoostan, in the circar of Sumbul; 15 miles S.S.W. of Nidjibabad.

ROWTOMPOUR, a town of Hindoostan, in Oude; 16 miles S.S.W. of Kairabad.

ROWTY, in *Agriculture*, a term signifying over-rank, or too strong.

ROXBOROUGH, in *Geography*, a township of Philadelphia county, in Pennsylvania.

ROXBURGH, a village in Roxburghshire, Scotland, was formerly a place of considerable importance, as may be conjectured from the circumstance of its having given name to the county. It was for several centuries a royal burgh; and was regarded as one of the first towns in the Scottish kingdom, for opulence, and magnificence of appearance. It was totally destroyed by king James II., and never afterwards recovered; and as its scite is now converted into arable fields, the plough has nearly obliterated all traces of its existence. Some remains of its ancient castle, however, are yet visible about two miles eastward from the village. These

These occupy the summit of a bold eminence, which rises from the plain, near the junction of the Tweed and the Teviot. This fortress, in ancient times, was of great strength, and was accounted the most important strong-hold on the Scottish borders. It was environed by a deep ditch, which could be filled at pleasure by the garrison with the waters of the Teviot, and over which a drawbridge was thrown. Interior to the ditch was a wall, of which only a few fragments are standing, but enough to attest its prodigious thickness and solidity. Roxburgh castle, Pennant informs us, in his Tour in Scotland, was anciently called Marchidon, Marchmont, or the Hill on the Marches. The name of its founder is unknown, as is the period of its erection. The earliest mention of it in history occurs in 1132, when a treaty of peace is stated to have been concluded here, between king Stephen of England and king David I. of Scotland. In 1174, after king William the Lion was made a prisoner by the English, this castle, with four others, was delivered up to king Henry II. as a security for his royal hostage doing homage for his crown on his release from captivity. The successor of Henry restored it to the Scots, but it was again taken by king Edward I. in 1296. It was recovered doubtless by king Robert I., but appears to have been soon after possessed by the English, as it is recorded to have been surprised, in 1342, by sir Alexander Ramsay, who was appointed governor; an honour which the envious Douglas did not allow him to enjoy long. The Scots again lost this fortress in the reign of Edward III., who twice celebrated his birth-day here. After this period it was taken and retaken several times; but the most distinguished siege was that by king James II., when it was captured by the Scots; though, previous to the victory, the king was killed by the bursting of a piece of ordnance. A hollow tree is said to stand on the spot where the monarch fell, on the north side of the Tweed, and at a short distance below Fleur's house. The queen, who was with the army when this event took place, observing that the soldiers were disheartened, and that the commanders were disposed to raise the siege, used every exertion to excite their courage; and, among other things, told them, that though their king had fallen, he was but one man, and that she would soon give them another king, her son, James III., who next day arrived in the camp, and was crowned at Kelso, in the 7th year of his age. This heroic and well-timed address produced the desired effect; the spirits of the whole army were roused, and the attack having been renewed with redoubled ardour, the garrison surrendered in a few days. From that period the castle has remained in ruins, though it was in some degree repaired by the lord protector, Somerset, in the reign of Edward VI. of England.

The parish of Roxburgh extends eight miles in length, and about four in breadth. The general appearance is flat and sloping, and the soil is generally a rich loam, well calculated, either for the growth of wheat, or for the turnip husbandry. According to the parliamentary returns of 1811, it contains 225 houses, and 946 inhabitants. The Statistical Account of Scotland, by sir John Sinclair, bart. vol. x. 1797. Pennant's Tour in Scotland, vol. iii. 4to. 1779. Beauties of Scotland, vol. ii. 8vo. 1805.

ROXBURGHIA, in *Botany*, received that name, at the suggestion of the right honourable sir Joseph Banks, from the pen of the late Mr. Dryander, in just commemoration of the discoverer of this genus, Dr. William Roxburgh, F.L.S., member of the Asiatic Society. The researches of this indefatigable and enthusiastic observer of nature, among the botanical treasures of Hindoostan, and his liberal communications to his friends at home, have added very extensively to our knowledge of Indian plants. The East India Company have published his *Coromandel Plants* in a style worthy of the materials. From the remote situation of the author, many genera and species were left by him for the determination of his learned editor, to whom all the sources of literary information in Europe were open. But as the name of this editor is entirely kept out of sight, a French writer, De Theis, has been led into the mistake of charging Dr. Roxburgh with the unexampled arrogance of dedicating a genus to his own honour. No man can be further, than our candid and unassuming friend, from such presumption, and we feel it a duty to wipe away the unmerited reproach.—Dryand. in Rox. Coromand. v. 1. 29. Willd. Sp. Pl. v. 2. 321. Ait. Hort. Kew. v. 2. 347. Sm. Exot. Bot. v. 1. 111.—Class and order, *Tetrandria Monogynia* (*Octandria;* in Hort. Kew.) Nat. Ord. *Sarmentaceæ*, Linn. *Asparegi*, Juss.

Gen. Ch. *Cal.* none, unless the corolla be taken for such. *Cor.* Petals four, inferior, lanceolate, equal, ribbed, coloured chiefly on the upper side, permanent. *Stam.* Filaments four, opposite to the petals, and nearly as long, awl-shaped, fleshy, with a double cell at their inner side, near the base; anthers two-lobed, oblong, lodged in the cells of the filaments, and each crowned with a simple lanceolate appendage, much shorter than the naked summit of the filaments. *Pist.* Germen superior, small, sessile, ovate; style none; stigma roundish. *Peric.* Capsule of one cell, with two concave valves. *Seeds* numerous, erect, cylindrical, furrowed, each supported on a stalk clothed with little vesicles.

Eff. Ch. Petals four, spreading. Filaments lanceolate, keeled, bearing the anthers on their inside, near the base, crowned with an appendage. Capsule superior, of one cell, with two valves, and many seeds.

1. R. *viridiflora.* Green-flowered Roxburghia. Sm. Exot. Bot. v. 1. 111. t. 57. (R. gloriosoides; Dryand. in Ait. Hort. Kew. v. 2. 348. Roxb. Coromand. v. 1. 29. t. 32? R. gloriosa; Curt. Mag. t. 1500. Ubium polypoides album; Rumph. Amb. v. 6. book 9. 364. t. 129.)—Native of low moist woods and thickets in the valleys of Hindoostan and Amboyna, flowering in the cold season. Roots being sent by Dr. Roxburgh to the late lady Amelia Hume, they bore flowers in April 1805, for the first time in Europe. Each *root* consists of many oblong fleshy knobs. The *stem* climbs spirally to the height of many feet, without tendrils, and is branched, angular, smooth and leafy. Lower *leaves* alternate to the height of five feet, the rest opposite; all spreading, on smooth, channelled *footstalks*, ovate or partly heart-shaped, pointed, entire, smooth, thin and pliable, with about seven or nine ribs, and innumerable fine transverse veins. *Stipulas* none. *Flower-stalks* axillary, solitary, shorter than the leaves, smooth, deflexed, racemose, each bearing two, three, or four flowers. *Bracteas* lanceolate, solitary, under each partial stalk. *Flowers* ascending, large, fetid like corrupted water, or the Stinking Morel. (See Phallus.) *Petals* near two inches long, coriaceous, green, with purplish ribs, especially on the upper side. *Stamens* violet in the lower part; their points green. The *pollen*, consisting of highly polished globules, falls to the bottom of the flower, rolling about like quicksilver.

The figure given by Dr. Roxburgh differs from our plant, in having much smaller *flowers* with tawny *petals*, and yellow *anthers*. He thinks it likely that there may be more than one species of this genus, which he did not distinguish in India. Rumphius describes two, his *Ubium polypoides album* and *nigrum*. The former seems best to agree with our plant, except that his figure has solitary *flowers*. He says its *stems* extend to the length of 100 fathoms, and that the *roots*,

roots, previously prepared with lime-water, are candied with sugar, and taken with tea. Their flavour is insipid.

Our friend Dr. Sims, in Curtis's Magazine, while he follows the ideas of preceding authors respecting the characters and affinities of this singular plant, avows a preference for the very different view which we have taken; and we derive much confidence from his sanction. It is to be regretted, that, with the best possible intention, he has been misled by the French botanists, to change a faulty specific name much for the worse. The word *gloriosa*, whether designedly or not, serves but to perpetuate their unjust ideas of Dr. Roxburgh, as having, by an unexampled instance of *vain-glory*, inscribed a genus to himself. We most wonder at Dr. Sims's continuing to apply a specific name which, by his own confession, appears to belong to a different plant, whose flowers are "hardly half the size." For this, the original species, we would, as the least evil that presents itself, retain the name of *gloriosiformis*, which is at least correct, and very expressive. We had long ago detected Rumphius's synonym. It agrees best with our *viridiflora*.

ROXBURGHSHIRE, in *Geography*, one of the southern counties of Scotland, is situated between N. lat. 55° 7', and 55° 42', and between W. long. 1° 39', and 2° 36', from the meridian of London. It is bounded on the south by Cumberland and Northumberland, in England; on the east by the latter county only; on the north and north-east by Berwickshire; and on the west and northwest, by the counties of Dumfries, Selkirk, and Mid-lothian. In point of shape, it is so extremely irregular, that it is difficult to define its extent. Its greatest length, from the junction of the Mare-burn with the Liddel, to the junction of Carham-burn with the Tweed, is 41 miles; and its greatest breadth, on a line intersecting the above at right angles, is 29 miles. Its medium length is about 30, and its medium breadth a little more than 22 miles, making its contents about 672 square miles, or 430,080 square acres; of which, at the time of the last survey, in 1796, nearly three-fifths were in sheep pasture, and the remainder in arable cultivation, or occupied by woods, pleasure-grounds, towns, and villages. Politically speaking, this county comprehends twenty-nine entire parishes, and a portion of five others, which, united, contain, according to the parliamentary returns of 1811, 6518 houses, and 37,230 inhabitants.

Historical Events.—To narrate all the military transactions which history and tradition affirm to have occurred within this county, would be to occupy our pages with an almost endless detail of petty conflicts and depredatory excursions. Roxburghshire being a border district, and uniting, for above 60 miles, with England, was, for several centuries, a perpetual scene of border warfare; so that there is scarcely a spot throughout its whole extent, where some feat of valour, or deed of destruction, has not happened. Every parish presents, to the discerning eye of the antiquary, some relic of those wretched days when the restraints of law were set at defiance, and rapine and butchery constituted the chief delight both of the lord, and of his vassal peasantry. Of those events which do not bear the character of predatory warfare, the most prominent are the siege of Roxburgh castle, by king James II., before-mentioned, and the battle of Jedburgh, in which the Scots were completely defeated by the English under the earl of Surrey. The latter event happened in the year 1523.

General Aspect of the County.—The surface of Roxburghshire is finely diversified, and exhibits many scenes that are truly beautiful, but few that are romantic or sublime. It is commonly considered as divided into four natural districts; Hawick, Jedburgh, Kelso, and Melrose. Of these, the district of Hawick is the most mountainous; and there is also a chain of hills along the southern boundary of the county. The other divisions present to the eye a succession of hills and vallies. The hills have mostly sloping sides, and are covered with a green sward to their very summits. Very few of them are bleak, and none of them rugged or tremendous. The prospects from their highest points are extensive, variegated, and delightful. The numerous vales, whether of narrow, or of wide extent, are all watered by limpid streams; many of them naked, and others fringed with wood. Some afford excellent pasture, and others are in high cultivation. They are in general inclosed by very gentle declivities, though several are hemmed in by steep banks, over-run with brush-wood, or adorned with lofty trees, which form a scenery rather agreeable than magnificent. In a county so extensive, and, on the whole, so much elevated, the proportion of heath and moss is very inconsiderable, but cannot be calculated with any degree of exactness, as they are scattered every where in portions of unequal size. In Liddesdale, where improvement has made the least progress, patches of moss are seen by the edges, and even in the middle of fertile vales. There are indications of this having been formerly the case in other parts of the county, on which industry has now wrought a happy change.

Mineralogy.—Roxburghshire derives little importance from its mineral products. Coal has been discovered in several places, but is wrought only in one spot, near the southern extremity of the district of Liddesdale. Hence the county labours under the serious disadvantage of a want of fuel, which must be brought from Northumberland, or Mid-lothian, by land-carriage. Throughout the whole shire lime-stone is abundant, but little of it is calcined for sale, except in the neighbourhood of the Liddesdale collieries. Free-stone also is plentiful. The principal stratum extends in a north-east direction from the farthest point of Liddesdale to the neighbourhood of Spronstoun, where it is of a fine, hard, and durable nature. Different kinds of whinstone appear every where on the surface, in the beds of brooks, and in inexhaustible quarries. Vast beds of shell marle lie scattered throughout the contiguous parishes of Roberton, Ashkirk, Wilton, Minto, Lilliesleaf, Bowden, Galashiels, and Selkirk. There are likewise large marle pits at Eckford and Ednam; and some less considerable ones in various places. Pebbles are found in vast multitudes in the vicinity of the Cheviot hills. In the parish of Hobkirk, there is a place called Robert's Linn, where there are large rocks of pebbles, which are manufactured into seals and buttons of various kinds. Most parts of these rocks are of a light blue colour; but some portions of them are finely varied with streaks of red and yellow; and so much are they esteemed, that great numbers of them are conveyed to Sheffield, Birmingham, and other towns.

Rivers, &c.—No county in Great Britain can boast of more numerous, or more beautiful rivers and brooks. One flows through, and enlivens every little vale. The principal of them are, the Teviot, the Jed, Tweed, Rule, Kale, Oxnam, Gala, Slittridge, Ale, Catta, Borthwick, Ednam, Bowmont, Allan, Leader, Ettrick, Hermitage, and Liddel. The two last are discharged into the Esk, which runs into the Solway frith; the others fall into the Tweed, which empties itself into the sea. This river holds a majestic course along banks which, in several places, are steep and bold, jutting out, at Old Melrose, into a promontory, and forming around Dryburgh abbey a peninsula. It partly bounds, and partly intersects, the county; receiving on the north the Gala, which is the boundary with Selkirkshire and Mid-lothian for five miles; the Leader, which, for nearly the

the ſame ſpace, is the boundary with Berwickſhire; the Allan, a paſtoral rivulet; and the Eden, which takes its riſe in Berwickſhire, but runs a conſiderable way along the ſkirts, and through the lower diſtrict of this county. Ettrick, alſo a boundary of Selkirkſhire for two miles, falls into the Tweed on the ſouth. Teviot riſes in the weſtern part of the county, in a very elevated diſtrict, and deſcends at firſt from the mountains with a rapid courſe; but it afterwards flows with many delightful windings through a ſucceſſion of rich, extenſive, and well cultivated vallies, till it loſes itſelf in the Tweed between Roxburgh caſtle and Kelſo, one of the moſt enchanting ſpots which can be well imagined. The Ale and Borthwick are the northern branches of Teviot. Both of them have their ſources in Selkirkſhire, and in ſome places bound that county and Roxburghſhire. On the ſouth the Teviot is augmented by the Oxnam, the Jed, and the Kale. The two laſt iſſue from the border hills. The Kale frequently overflows the greater part of an expanded and valuable plain, adorned by clumps of trees; while the Jed, ruſhing along a rocky channel, through narrow and thick wooded vales, waſhes the bottom of ſeveral high precipices, winds round the town of Jedburgh, and terminates another, and ſtill more extenſive plain, called Crailinghaughs, through the centre of which the Oxnam finds its way to Teviot. Nearer to its ſource, the laſt-mentioned river receives the Rule, the Slittridge, and the Allan, all of which riſe on the confines of Liddeſdale. In the number and value of its trees, Rule may vie with "Silvan Jed," though not in wild and pictureſque ſcenery. Slittridge is not without the beauties of green hills, natural wood, and hollow vales. Southern Allan, like the ſtream of the ſame name north of Tweed, flows entirely through ſheep-walks. Bowmont, alſo a paſtoral river, has its ſource in the ſouth-eaſt diſtrict of the county, and after a rapid courſe of nine or ten miles, enters England. But of all the waters in Roxburghſhire, none are more indebted to nature, or might be more improved by art, than Hermitage, which riſes in the ſouthern declivity of the ſame ridge, whence the Allan and the Slittridge iſſue in different directions, and tumbling over a bottom of rough, ſhapeleſs ſtones, amidſt green hills, whoſe baſes are generally ſkirted with copſe-wood, loſes itſelf in the Liddel, and imparts its natural ornament to that larger ſtream which is celebrated by Armſtrong in the following ſtrains:

" ——————————— Such the ſtream
On whoſe Arcadian banks I firſt drew breath,
Liddel, till now, except in Doric lays,
Tun'd to her murmurs by her love-ſick ſwains,
Unknown in ſong; tho' not a purer ſtream
Through meads more flowery, more romantic groves,
Rolls towards the weſtern main. Hail ſacred flood!
May ſtill thy hoſpitable ſwains be bleſt
In rural innocence; thy mountains ſtill
Teem with the fleecy race; thy tuneful woods
For ever flouriſh; and thy vales look gay
With painted meadows, and the golden grain."

There are no lakes of any great extent in this county, but there are ſeveral pre-eminent for the beauty of their ſcenery, and the abundant ſupply of fine perch and pike which they contain. Alemuir-loch, which ranks firſt among the Roxburghſhire lakes, is ſomewhat more than two miles in circumference. Trouts of various ſizes and flavour abound in all the rivers, and the Tweed and Teviot, but particularly the former, are crowded with grilſe and ſalmon.

Climate.—In a county of ſuch extent as Roxburghſhire, the climate muſt of courſe be extremely various. In proportion to the elevation of the ground, the air is more moiſt and ſharp. The warmeſt and dryeſt months of the year are July and Auguſt, but prodigious thunder ſhowers are very frequent. In September and October the weather admits of every poſſible variation. It is often ſerene and pleaſant; but exceſſive rains, winds, and froſts, and even hail and ſnow, are by no means uncommon; and frequently do incredible damage to the crops. November is nearly of the ſame complexion; and what ſeems ſingular, in December the weather in general is moderate and uniform. Froſt and ſnow are ſeldom ſevere or of long duration before Chriſtmas. January and February are the months when ſnow is moſt common, and froſt moſt intenſe. With ſome ſhort interruptions they very frequently remain till diſſipated by the ſun in March. Cold eaſterly winds prevail much in April and May, and often even in June, either bringing conſtant rain for a ſucceſſion of days, or exhaling moiſture ſo rapidly from the earth, as to ſtint the tender ſtalks both of corn and graſs. But theſe aſſertions, though generally true, are at times reverſed. After an open and ſoft winter, great quantities of ſnow have fallen in March, April, and May. In other years April has been wonderfully mild, May and June the warmeſt, July and Auguſt the wetteſt, and September and October the moſt ſettled months.

Soil.—In the paſture diſtrict of Roxburghſhire the ſoil is dry, wet, or heathy. To the eaſtward of Jed Water, the hills are chiefly compoſed of red granite, and covered with a rich ſward of ſweet graſs: there is very little heath: the marſhes are few and not extenſive, and are interſected by numerous drains. To the weſt of Jed Water, including Liddeſdale, the dry ſoil either reſts upon lime-ſtone or gravel. In this diſtrict are many moſſes and much fenny land; likewiſe a large tract of ſtrong clayey ſoil, lying on a cold tilth, or hard clay, which is impervious to water. In the arable diviſion of the county the ſoil is partly light and partly heavy. The light conſiſts of a rich loam, or mixture of loam and ſand, of loam and gravel, of ſand, or gravel and clay, in every various proportion. The heavy ſoil is chiefly clay of different depths and degrees of ſtiffneſs or mixtures, where clay prevails placed on tilth, or other matter retentive of water. In very few ſpots this ſurface lies on a dry bottom; and not unfrequently different and oppoſite ſoils are ſtrangely blended in the ſame field. The light ſoil, however, is in general formed on low and level lands, near the beds of rivers, and their branches, and alſo on ſeveral eminences of conſiderable extent, eſpecially in the pariſhes of Linton, Crailing, Ancrum, Maxton, and Melroſe. The heavy ſoil rarely appears in the vallies, and chiefly occupies the higher grounds. The largeſt tract of it lies immediately ſouth of Eildon Hills, including nearly the whole pariſhes of Minto, Lillieſleaf, and Bowden, a portion of Melroſe, St. Boſwell, Ancrum, Maxton, and Roxburgh pariſhes. It comprehends in all about 10,000 acres, of which at leaſt one half is ſhallow, cold, and unkindly, difficult to labour and uncertain in its produce; on which many acres of it have been planted with trees. In the other half there is much rich and fertile land, which bears luxuriant crops both of corn and graſs, and not a little of a middle nature between theſe extremes. In the pariſhes alſo north of the Tweed, the heavy ſoil is rather moſt prevalent, and is, in general, of a good quality. Another conſiderable portion of it runs along the higher grounds ſouth of the Tweed, in the pariſhes of Spronſtoun, Kelſo, Roxburgh, and Exford, and there are detached fields of it in other parts of the diſtrict. In the boſom, or deeply indented into the fides of thefe clayey tracts, are pieces of dry land of an admirable quality for producing either white or green crops. Of the arable diftrict at large, at leaft two-thirds may be defignated light and dry.

Agriculture.—Farms in Roxburghfhire are of every fize, from 50 to 6000 acres; yielding from 50*l.* to nearly 3000*l.* annual rent. The arable farms include, in general, from 200 to 500 acres, but there are fome far lefs and fome much more extenfive. One tenant frequently poffeffes two or three farms, and there are inftances of the fame perfons leafing both an arable and a fheep farm, to obtain the double profit arifing from rearing fheep to a larger fize, by wintering them on after-grafs and turnips, and fattening both them and their lambs earlier, and better, for the market. With the breeders of that valuable animal, turnips have been for many years a greater object than formerly, and hence fome farmers have engaged more deeply in arable hufbandry, inftead of accumulating, as before, pafture farms. The character of farmers in this county, like the extent of the farms, admits of much variety: but it may be truly faid, that the greater part of them are men of refpectability and of agricultural enterprize. Rents are in every cafe paid in money. One or two clergymen, who have a right to tythes, have been accuftomed from time immemorial to accept of a fmall fum in lieu of them. Leafes differ in duration and conditions in the pafture and arable diftricts. In the former they extend only from feven to fifteen years; but in the latter they are given for nineteen or twenty-one years.

Confiderable tracts of land here, particularly in the extenfive diftrict of Liddefdale, remain in a ftate of nature. The cold wet foil, already noticed, and the expofed fituation, afford no encouragement for attempting agricultural improvements. This large tract is therefore wholly under fheep pafturage, except a few ftrips of land on the banks of the Hermitage and the Liddel. The moft ancient agriculture in this county would appear to have been very different from the prefent. The marks of the plough, and of regular ridges, are ftill every where to be feen upon lofty mountains, where no grain can now be produced, and upon a foil which has ceafed to be regarded as entitled to the appellation of arable land. Thefe facts prove that the furface of the country muft have formerly been in a very different ftate from that in which it now appears. The modern improvements in agriculture are all adopted here by the arable farmers. The firft perfon who fet the example of fpirited exertion was William Dawfon, efq. a farmer's fon, who, after receiving a liberal education, was fent by his friends into England, for the purpofe of obtaining a knowledge of the practical agriculture of that part of the united kingdom. He returned to his native country in 1753, and immediately introduced the practice of the turnip hufbandry. At firft his improvements were confidered as rafh and fpeculative, but his fuccefs foon effected a change of opinion. Mr. Dawfon's neighbour perceiving the advantages of the new plan, became eager to underftand and adopt it. The hinds which had once been in his fervice, were fure to find employment; his ploughmen were in the utmoft requeft; they were tranfported to Eaft Lothian and even to Angus, and every where diffufed the improved practice of that valuable art. Roxburghfhire became the fcene of the moft active agricultural enterprifes; and Mr. Dawfon, independently of having acquired a large property, had the fatisfaction to live to fee himfelf regarded, and hear himfelf called, the father of agriculture in the fouth of Scotland.

The rotation of crops ufed in this county have nothing peculiar, or particularly requiring notice. On a dry foil, it is confidered an object of importance to throw a large quantity of land under turnip or grafs, efpecially after lime. One part of Roxburghfhire has long been celebrated for an early fpecies of oats, denominated Blainfly oats, from the circumftance of their having been cultivated for time immemorial at Blainfly, a large diftrict in the parifh of Melrofe, near the northern extremity of the county: the average produce there is fix to one, but when they are grown on a rich dry foil, it is fometimes 16 or 18 to one. They are fold at an average of 3*s.* 6*d.* *per* boll dearer than common oats, and are only objectionable in one point of view, *viz.* that they are apt to fhake out. Abundant crops of wheat are reared in the lower and more fertile diftricts of the county. Bear is likewife raifed in confiderable quantities; but the culture of peas and beans has become very limited, fince the practice of turnip feeding has been fo generally introduced. Of potatoes, comparatively few are cultivated; neither are great crops of hay frequent in this county, on account of the want of towns in which they might find a ready fale. Little flax is grown, except as an object of domeftic manufacture. It is a remarkable fact, and a fubject of curiofity in agricultural hiftory, that this county was at one time likely to have become noted for the cultivation of tobacco. It was introduced by Mr. Thomas Mann, and was tried both at Newftead and at Kelfo with fuch fuccefs, that the legiflature deemed it requifite to interfere, and put an end to its culture.

Live Stock.—Very confiderable numbers of cattle are fed in Roxburghfhire, but fheep is the ftaple animal of the county. The latter are eftimated at nearly 300,000 in number, and are moftly of the Cheviot breed. A large quantity of ewe-milk cheefe, of the beft quality, has long been an object of manufacture here, but the practice is now on the decline. The horfes employed and bred here are either of the Englifh or of the Lanarkfhire breed. Swine are reared by almoft every cottager and farm-fervant who is married; alfo vaft quantities of poultry. Several cart-loads of the eggs of dunghill fowls are weekly collected by "egglers," who fell them in Berwick for the London market.

Inclofures.—A very fmall proportion of the lands in this county are inclofed. The fence chiefly ufed is ditch and hedge, of which there are two kinds, namely, the double and the fingle. The double confifts of two ditches, having a hedge planted in the embankment between them. Where ftones can be eafily procured, ftone-dike inclofures are preferred to the hedge and ditch. One of the moft fubftantial fences of this kind in the county inclofes about 600 acres, called the "Deer park of Holydean," on the Roxburgh eftate. It is traditionally ftated to have been conftructed before the year 1500. It is about four feet high, and though built of whinftone only, without lime or mortar, continues to be a good fence. In a few places dikes are formed of alternate layers of ftone and turf.

Towns, Villages, and Fairs.—There is only one royal borough in this county, that of Jedburgh, which, along with the boroughs of Haddington, Lauder, Dunbar, and North Berwick, elects a member to ferve in parliament. This place is the county town, and makes a confiderable figure in the hiftory of the border wars. (See JEDBURGH.) The other principal towns and villages are, Hawick, which is fituated at the confluence of the Teviot and Slittridge, near the lower part of the upper, or moft mountainous diftrict of the county; Kelfo, which ftands on the northern bank of the Tweed; and Melrofe, celebrated for its abbey, each of which the reader will find defcribed under their refpective names.

The greateft fair in the county is held in the parifh of Leffudden, Leſſudden, or St. Boſwell, whence it is called St. Boſwell's fair. It takes place on the 18th of July, and is the principal mart for ſheep and lambs in the ſouth of Scotland; but horſes, linen, and woollen cloths, are likewiſe ſold in conſiderable quantities. The cuſtoms of this fair belong to the duke of Buccleugh, and may be eſtimated at about 50*l.* *per annum.* Another great fair is held in the vicinity of Kelſo. It is called St. James's fair, from the circumſtance of its being holden within the ancient pariſh of that name, which is now merged in the pariſh of Kelſo.

Antiquities.—The veſtiges of ancient times ſtill viſible in Roxburghſhire are numerous. Mutilated encampments, and ruinated buildings of ſtrength, are diſcovered in a great variety of ſituations, and particularly in the high diſtrict of the county. In the pariſhes of Cavers, Hawick, and others, remnants may be traced of what is called the Cat-rail, which is conjectured to have been a boundary rampart, ſimilar to the Wanſdike and Offa's dike in England; but whether erected by the Romans, Saxons, or Britons is uncertain; though Whitaker, in his Hiſtory of Mancheſter, contends ſtrongly that it is of Britiſh origin. In the pariſh of Roberton, near the ſource of the Teviot, is a large ſquare encampment, which is ſtill denominated *Africa*, and in the vicinity are ſeveral ſmaller ſemi-circular intrenchments. There are likewiſe encampments on the Eildon hills, on Carberry hill, Sidehill, at Ancrum, and on the farm of Flight, in the pariſh of Clintwood. In the ſame pariſh are likewiſe numerous fortifications, called Picts' works, which are of a circular form, and conſtructed of large ſtones. On the farm of Millburn is a ſmall circle of nine upright ſtones, ſurrounded by a ditch, which is ſuppoſed to have been a Druidical temple. Cairns appear in different parts of the county. Of theſe, the moſt remarkable is at Whiſgills. The quantity of ſtones is immenſe, and they are moſtly of a very large ſize. Near it is a large upright ſtone, called the "ſtanding ſtone." This cairn is ſituated in the centre of an extenſive and deep moſs, where not a ſtone is to be diſcovered except thoſe employed in its conſtruction. Another immenſe cairn is placed on an eminence between the pariſhes of Caſtleſtown and Canonby. It is eighty-ſix yards long, and conſiſts of maſſes of free-ſtone, of great magnitude. A ſtanding ſtone, thirteen feet in circumference, and ſeven feet above ground, is fixed at the north end of it; and there are five other ſmaller ones, forming, with the larger ſtone, a circle round the cairn forty-five yards in diameter. How theſe enormous maſſes were originally collected, or for what purpoſe, it is very difficult to determine. At Milnholm, in the pariſh of Canonby, ſtands an ancient croſs, formed of one ſtone, eight feet four inches high, on which are ſculptured a ſword and ſome ancient writing; but the latter is ſo much mutilated, that it cannot be read. On the banks of the Ale Water, near Ancrum, is a ſeries of caves, ſome of which ſtill preſerve veſtiges of fire-places, and holes for the paſſage of ſmoke. Similar caves are diſcovered on the banks of the Jed.

Roxburghſhire formerly abounded with towers, or petty fortreſſes, erected by the border chieftains, for the defence of the country from the incurſions of the Engliſh borderers. Few of theſe, however, now remain; indeed the only ones entire are Delphiſtone tower, and another at Moſsburnford. Of the larger caſtles, the principal are Clintwood caſtle, Goldieland caſtle, Goſsford caſtle, and Roxburgh caſtle, the laſt of which is mentioned under Roxburgh. In this county are ſituated the ruins of three monaſteries, among the moſt important in Scotland, *viz.* Melroſe, Kelſo, and Jedburgh abbies. See Melrose, Kelso, and Jedburgh.

Eminent Natives.—Roxburghſhire boaſts to have been the birth-place of ſeveral characters diſtinguiſhed in the annals of literature and military glory. Of theſe, the moſt noted were Thomſon, author of the Seaſons; Armſtrong, author of the "Œconomy of Love," and various miſcellaneous poems; Gavin Douglas, who tranſlated ſeveral of the works of the Latin poets into Scottiſh verſe; and general Elliot, afterwards lord Heathfield, the gallant defender of Gibraltar, when it was attacked in 1786, by the combined powers of France and Spain. Beauties of Scotland, vol. ii. 1805. Agricultural Survey of the Counties of Roxburgh and Selkirk, by Robert Douglas, D.D., 8vo. 1800.

ROXBURY, a pleaſant town of America, in Norfolk county, Maſſachuſetts; 1 mile S.W. of Boſton. It is now divided into three pariſhes, and was ſettled in 1630. The three pariſhes contain 3669 inhabitants. The firſt of theſe pariſhes has been lately connected with Boſton harbour by a canal. The famous John Eliot, called the apoſtle of the Indians, was the firſt miniſter who ſettled in this place. He tranſlated the Bible, and other pious books, into the Indian language; and founded many religious ſocieties among the Indians. Some few remain to this day. He died in 1670, after being paſtor 60 years.—Alſo, a townſhip in the W. part of Orange county, Vermont, containing 361 inhabitants.—Alſo, a townſhip of Morris county, New Jerſey, on Muſconecunk river, 25 miles from its confluence with the Delaware, and 45 miles N. of Trenton; containing 1563 inhabitants. Near it is a mineral ſpring.—Alſo, a town in Litchfield county, Connecticut, containing 1217 inhabitants.—Alſo, a townſhip of Waſhington county, in the ſtate of Ohio, containing 408 inhabitants.

ROXCESTER. See Wroxeter.

ROXEN, a lake of Sweden, in Eaſt Gothland; 100 miles W.S.W. of Stockholm.

ROXO, Cape, a cape on the S.W. coaſt of Porto Rico. N. lat. 18° 1′. W. long. 65° 50′.—Alſo, a cape of Spain, on the coaſt of Valencia. N. lat. 37° 53′. W. long. 0° 50′.—Alſo, the S.E. point of a ſmall iſland in the gulf of Mexico, ſituated before the mouth of the river Panuco. N. at. 22° 30′. W. long. 100° 11′.—Alſo, a cape on the W. coaſt of Africa. N. lat. 12° 15′. W. long. 16° 35′.

ROY, Louis le, in *Biography*, a learned profeſſor, born at Conſtance, in Normandy, about the beginning of the 16th century. After having ſtudied in Italy and other places, he ſettled at Paris, where, in 1570, he was appointed to the profeſſorſhip of Greek. After this he ſtudied the law four years at Toulouſe; he frequented the bar at the parliament of Paris, in which he exerciſed ſome kind of magiſtracy. He ſometimes followed the armies; and had viſited the courts of the emperor, and king of England. His inattention to domeſtic affairs reduced him at laſt to depend upon the liberality of others for his daily ſubſiſtence. He died at an advanced age in the year 1571, leaving behind him, as monuments of his learning, many works in the Latin and French languages. In the former he gained conſiderable reputation, by an elegantly written life of the learned Budæus. He gave good tranſlations into the French of the works, or part of them, of Plato, Ariſtotle, and Demoſthenes, which he enriched with learned commentaries.

Roy, Julien-David le, an architect and antiquary, born at Paris in 1728, was the ſon of Julien le Roy, a celebrated mechaniſt, who excelled particularly in the art of watchmaking, ſo much ſo, that his time-pieces acquired the ſame celebrity in France as thoſe of Graham in England; he died at Paris in 1759, at the age of 74, leaving four ſons; of whom Julien, the ſubject of this article, was educated for the profeſſion of an architect, in which he became eminent. He is well known in the literary world by the following works;

works; "Ruines des plus beaux Monumens de la Grèce;" this obtained for the author admiſſion into the Academy of Inſcriptions; "Hiſtoire de la Diſpoſition et des Formes differentes des Temples des Chretiens;" "Obſervations ſur les Edifices des anciens Peuples;" "De la Marine des anciens Peuples." He publiſhed two other works on the conſtruction of the ſhips of the ancients; and a memoir on cutting maſts in the Pyrenées. This ingenious man died at Paris in the year 1803, at the age of 75.

ROY, PETER, brother of the above, was watch-maker to the king, and publiſhed memoirs for the clock-makers of Paris,—Etrennes Chronometiques—Treatiſe on the Labours of Harriſon and le Roy for the Diſcovery of Longitude at Sea. He died in 1785. It is well known, ſays a contemporary biographer, that the Engliſh, on account of their numerous diſcoveries in this art, had enjoyed ſuch a reputation for the excellence of their clocks and watches, that they found every where a market, in preference to any others, and that the French themſelves were obliged to come to England for their time-pieces. Julien le Roy, the father, had the honour of removing, in part, this pre-eminence, and of transferring it to the French. He made many diſcoveries in the conſtruction of repeating-clocks and watches: in ſecond and horizontal watches he invented an univerſal compaſs with a ſight;—an extremely uſeful and ſimple contrivance for drawing a meridional line, and finding the declination of the needle; and alſo a new univerſal horizontal dial. It is to him we are indebted for the method of compenſating for the effects of heat and cold in the balances of chronometers, by the unequal expanſion of different metals, a diſcovery which has been brought by our Engliſh artiſts to a ſtate of great perfection, although it had been thrown aſide by the inventor's ſon, Peter.

ROY, in *Geography*, a town of Sileſia, giving name to a lordſhip in the principality of Teſchen; 6 miles N. of Teſchen.

ROYA, EL, a town of Spain, in Old Caſtile; 10 miles N.N.W. of Soria.

ROYAL, *regal*, ſomething relating to a king.

The word is French, formed from the Latin *regalis*, of *rex*, *king*.

In this ſenſe we ſay, the royal family, the royal blood, royal line, &c.

In England, the prince and princeſs of Wales, the king's brothers, &c. are addreſſed under the title of *royal highneſs*.

ROYAL *Abbey*, denotes an abbey founded by a king, or by a prince who is ſucceeded by a king.

ROYAL *Academy of Arts*. See LONDON.

ROYAL *Academy of Sciences*, &c. See ACADEMY.

ROYAL *Academy of Muſic*. See OPERA.

ROYAL *Antler*, among *Hunters*, expreſſes the third branch of the horn of a hart or buck, that ſhoots out from the rear or main horn above the back-antler.

ROYAL *Army*. See ARMY.

ROYAL *Aſſent*, is that aſſent or approbation which the king gives to a thing done by others; as the election of a biſhop by dean and chapter, or to a bill paſſed in both houſes of parliament.

The royal aſſent in parliament being given, the bill is indorſed with theſe words, *Le roy le veut;* that is, *it pleaſes the king*. If he refuſes it, thus, *Le roy s'aviſera*, q. d. *the king will adviſe upon it*. See PARLIAMENT.

ROYAL *Boroughs*. See BOROUGH.

ROYAL *Crown*, is that worn by kings. See CROWN.

ROYAL *Charter*. See CHARTER.

ROYAL *African Company*. See COMPANY.

ROYAL *Exchange*, the burſe or meeting-place of the merchants in London.

It was firſt built in 1566, at the charge of ſir Thomas Greſham; and in a ſolemn manner, by herald with ſound of trumpet, in preſence of queen Elizabeth, proclaimed the Royal Exchange. Till that time the merchants met in Lombard-ſtreet.

It was built of brick, yet then eſteemed the moſt ſplendid burſe in Europe. A hundred years after its building, at the great fire, it was burnt down; but it was ſoon raiſed again in a ſtill more magnificent manner, the expence of it amounting to 50,000*l*.

One half of this ſum was diſburſed by the chamber of London, the other by the company of mercers; who, to reimburſe themſelves, let to hire a hundred and ninety ſhops above ſtairs, at twenty pounds each; which, with other ſhops, &c. on the ground, yielded a yearly rent of above four thouſand pounds; yet the ground it ſtands on does not exceed three-fourths of an acre; whence it is obſerved to be much the richeſt ſpot of ground in the world.

It is a quadrangular building, with walks around, in which the merchants of the reſpective countries aſſociate themſelves. In the middle of the area, or court, is a fine marble ſtatue of king Charles II., in the habit of a Roman Cæſar, erected by the ſociety of merchant-adventurers; the workmanſhip of Grinlin Gibbons. Around are ranged the ſtatues of the ſeveral kings ſince the Norman Conqueſt. See LONDON.

ROYAL *Fiſhes* are whales and ſturgeon, and ſome add porpoiſes too; which the king, by his prerogative, is to have, whenever caſt on ſhore, or wrecked, in all places of the realm; unleſs granted to ſubjects by expreſs words.

ROYAL *Foot*, *Fort*, *Franchiſe*, *Hoſpital*. See the ſubſtantives.

ROYAL *Oak*, was a fair-ſpreading tree at Boſcobel, in the pariſh of Donnington, in Staffordſhire, the boughs of which were all covered with ivy; in the thick of which king Charles II. ſat in the day-time with colonel Careleſs, and in the night lodged in Boſcobel-houſe; ſo that they are miſtaken who ſpeak of it as an old hollow oak; it being then a gay flouriſhing tree, ſurrounded with many more. The poor remains of it are now fenced in with a handſome wall, with this inſcription over the gate, in golden letters: FELICISSIMAM ARBOREM, QUAM IN ASYLUM POTENTISSIMI REGIS CAROLI II. DEUS OP. MAX. PER QUEM REGES REGNANT, HIC CRESCERE VOLUIT, &c. Phil. Tranſ. N° 310.

ROYAL *Oak*, *Robur Carolinum*, in *Aſtronomy*, one of the new ſouthern conſtellations, the ſtars of which, according to Sharp's Catalogue, annexed to the Britannic, are 12. See CONSTELLATION.

ROYAL *Officers*. See OFFICER.

ROYAL *Parapet*, or *Parapet of the Rampart*, in *Fortification*, is a bank about three fathoms broad, and ſix feet high, placed upon the brink of the rampart, towards the country; to cover thoſe who defend the rampart.

ROYAL *Poop*. See POOP.

ROYAL *Port*. See PORT *Royal*.

ROYAL *Society of England*, is an academy, or body, of perſons of eminent learning; inſtituted by king Charles II. for the promoting of natural knowledge.

This illuſtrious body had its original in an aſſembly of ingenious men, reſiding in London, who, being inquiſitive into natural, and the new and experimental philoſophy, agreed, about the year 1645, to meet weekly on a certain day, to diſcourſe upon ſuch ſubjects. Theſe meetings, it is ſaid, were ſuggeſted by Mr. Theodore Haak, a native of the Palatinate in Germany; and they were held ſometimes at Dr. Goddard's lodgings in Wood-ſtreet, ſometimes at a convenient place in Cheapſide, and ſometimes in or near

Greſham

Gresham College. This assembly seems to be that mentioned under the title of the "Invisible, or Philosophical College," by Mr. Boyle, in some letters written in 1646 and 1647. About the years 1648 and 1649, the company, which formed these meetings, began to be divided: those in London continued to meet there as before; and those who were removed to Oxford occasionally joined them. The latter, *viz.* Dr. Wilkins, Dr. Wallis, and Dr. Goddard, in connection with others, continuing their assemblies in Oxford, brought the study of natural and experimental philosophy into fashion there; meeting first in Dr. Petty's lodgings, afterwards at Dr. Wilkins's apartments in Wadham College, and, upon his removal, in the lodgings of the honourable Mr. Boyle. The greatest part of the Oxford society coming to London about the year 1659, they met once or twice a week in term-time, at Gresham College, till they were dispersed by the public distractions of that year, and the place of their meeting was made a quarter for soldiers. Upon the Restoration, in 1660, their meetings were revived, and attended with a larger concourse of persons, eminent for their character and learning.

They were at length taken notice of by the king, who was pleased to grant them an ample charter, dated the 22d of April 1663, by which they were erected into a corporation, "consisting of a president, council, and fellows, for promoting natural knowledge."

Their manner of electing fellows is by ballotting. Their council are in number twenty-one, including the president, vice-president, treasurer, two secretaries, and secretary for foreign correspondence; eleven of which are continued for the next year, and ten more added to them; all chosen on St. Andrew's day. Each member, at his admission, subscribes an engagement, that he will endeavour to promote the good of the society; from which he may be freed at any time, by signifying to the president, that he desires to withdraw.

The charges are five guineas paid to the treasurer at admission; and thirteen shillings *per* quarter, so long as the person continues a member; or, in lieu of the annual subscription, a composition of twenty-six guineas in one payment.

Their design is, to "make faithful records of all the works of nature or art, which come within their reach; so that the present, as well as after-ages, may be enabled to put a mark on errors which have been strengthened by long prescription; to restore truths that have been neglected; to push those already known to more various uses; to make the way more passable to what remains unrevealed," &c.

To this purpose they have made a great number of experiments and observations on most of the works of nature; eclipses, comets, meteors, mines, plants, earthquakes, inundations, springs, damps, subterraneous fires, tides, currents, the magnet, &c. Also numbers of short histories of nature; arts, manufactures, useful engines, contrivances, &c. The services they have been of to the public are very great. They have improved naval, civil, and military architecture; advanced the security and perfection of navigation; improved agriculture; and put not only this kingdom, but also Ireland, the plantations, &c. upon planting.

They have registered experiments, histories, relations, observations, &c. and reduced them into one common stock; and have, from time to time, published some of the most immediate use, under the title of Philosophical Transactions, &c. and laid the rest up in public registers, to be nakedly transmitted to posterity, as a solid ground-work for future systems. See TRANSACTIONS.

They have a library adapted to their institution; towards which Mr. Henry Howard, afterwards duke of Norfolk, contributed the Norfolcian library, and which is, at this time, greatly increased by a continual series of benefactions. The museum, or repository, of natural and artificial rarities, given them by Daniel Colwal, esq., and since enriched by many others, is now removed to the British Museum, and makes a part of that great repository. Their motto is, NULLIUS IN VERBA; and their place of assembling is Somerset-place, in the Strand. Sir Godfrey Copley, bart., left five guineas to be given annually to the person who should write the best paper in the year, under the head of experimental philosophy. This reward, which is now changed to a gold medal, is the highest honour the society can bestow. It is conferred on St. Andrew's day.

ROYAL *Society of Musicians.* See *Musical* FUND, and *Royal* SOCIETY *of Musicians.*

ROYAL *Spanish Academy.* See ACADEMY.

ROYAL *Sugar.* See SUGAR.

ROYAL, in *Sea Language*, is a name given to the highest sail which is extended in any ship. It is spread immediately above the top-gallant sail, to whose yard-arms the lower corners of it are attached. The sail is never used but in light and favourable breezes.

ROYAL *Stay.* See STAY.

ROYAL *Yard.* See YARD.

ROYALS, in *Artillery*, are a kind of small mortars, which carry a shell, whose diameter is five inches and a half. See MORTAR.

ROYAL *Bay*, in *Geography*, a bay on the N.E. of the island of Georgia, between Cape George and Cape Charlotte.—Also, a bay on the N. coast of Antigua, a little to the E. of Peyersan's Point.

ROYAL, or *Minong*, *Island*, an island about 35 miles long, and 12 wide, in the N.W. part of lake Superior. N. lat. 47° 52′. W. long. 89°.—Also, a small fertile island in the river St. Lawrence, 60 miles below lake Ontario. N. lat. 44° 46′. W. long. 75° 24′.

ROYAL *Reach*, a channel in the straits of Magellan, extending from Fortescue bay to Passage Point.

ROYAL *Sound*, a large bay on the coast of Kerguelen's land, between Cape George and the Prince of Wales's Foreland.

ROYAL'S *River*, a river of America, in Cumberland county, Maine, which runs into Casco bay, in the township of North Yarmouth.

ROYALSTON, a township of Worcester county, Massachusetts; 40 miles N.W. by N. of Worcester; incorporated in 1665, and containing 1415 inhabitants. Miller's river traverses this town from the east.

ROYALTIES, REGALITIES, the rights of the king; otherwise called the *king's prerogative*, and the *regalia*. See PREROGATIVE and REGALIA.

Of these, some the king may grant to common persons; others are inseparable from the crown.

ROYALTON, in *Geography*, a township of Windsor county, in the state of Vermont, N.W. of Hartford, on White river, containing 1748 inhabitants.

ROYAMUNGAL, a river of Bengal, which runs into the bay of Bengal, N. lat. 21° 35′. E. long. 89° 18′.

ROYAN, a town of France, in the department of the Lower Charente, on the Garonne; fortified by the Huguenots, and defended so vigorously against Louis XIII. in the year 1621, that he was compelled to withdraw his troops; but he afterwards avenged his disgrace, by demolishing it so entirely, that the present place is only the suburbs of the former; 12 miles S. of Marennes.

ROYAUMEIX, a town of France, in the department of the Meurte; 6 miles N. of Toul.

ROYBON, a town of France, in the department of the Isere, and chief place of a canton, in the district of St. Marcellin; 7 miles N.N.W. of St. Marcellin. The place contains 2412, and the canton 7373 inhabitants, on a territory of 190 kiliometres, in 11 communes.

ROYE, a town of France, in the department of the Somme, and chief place of a canton, in the district of Montdidier; 15 miles S.S.W. of Peronne. The place contains 3176, and the canton 14,027 inhabitants, on a territory of 195 kiliometres, in 39 communes. N. lat. 50° 8'. E. long. 2° 52'.

ROYENA, in *Botany*, named by Linnæus in honour of Adrian Van Royen, professor of Botany in the university of Leyden, who died in 1779, aged 74, and was succeeded by his nephew David, who died in 1799.—Linn. Gen. 221. Schreb. 299. Willd. Sp. Pl. v. 2. 631. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 61. Thunb. Prodr. 80. Juss. Gen. 156. Lamarck Dict. v. 6. 320. Illustr. t. 370. Gærtn. t. 94.—Class and order, *Decandria Digynia*. Nat. Ord. *Bicornes*, Linn. *Guaiacanæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, urn-shaped, five-cleft, permanent. *Cor.* of one petal; tube the length of the calyx; limb spreading, revolute, deeply cloven into five, ovate segments. *Stam.* Filaments ten, very short, springing from the corolla; anthers oblong, acute, twin, erect, as long as the tube. *Pist.* Germen superior, ovate, terminating in two styles, a little longer than the stamens; stigmas simple. *Peric.* Berry invested with the coriaceous calyx, fleshy, of four cells, two of them often abortive. *Seed.* Nuts solitary, ovate, somewhat triangular.

Eff. Ch. Calyx urn-shaped. Corolla of one petal, with a revolute limb. Berry of four cells, two of them mostly abortive.

1. R. *lucida*. Shining-leaved African Bladder-nut. Linn. Sp. Pl. 568. (Staphylodendron africanum sempervirens, foliis splendentibus; Commel. Hort. v. 1. 187. t. 96.)—Leaves ovate, roughish with hairs.—Native of the Cape of Good Hope, as indeed are all the remaining species. It flowers in May and June.—The *stem* of this evergreen *shrub* is eight or ten feet high, branched in all directions. *Leaves* generally alternate, on short stalks, ovate, pointed. *Flowers* axillary, along the branches, very inconspicuous. *Berry* red, and fleshy like an apple.

2. R. *villosa*. Heart-leaved Royena. Willd. n. 2.—Leaves heart-shaped, oblong, downy beneath.—It flowers in June and July.—Very similar to the last in habit, but its *branches* are more villous. *Leaves* elliptic or oblong; heart-shaped at the base; on short, hairy stalks. *Flowers* axillary, nodding, solitary, on villous stalks. *Bracteas* two, opposite, ovate, pointed, downy, large, deciduous.

3. R. *pallens*. Pale Royena. Willd. n. 3.—"Leaves longish-obovate, obtuse, smooth."—It flowers in June and July.—We know not of any description or figure of this species which stands on the authority of Thunberg, Aiton, and Willdenow, who merely give its specific character.

4. R. *glabra*. Myrtle-leaved African Bladder-nut. Linn. Sp. Pl. 568. (Vitis idæa æthiopica, buxi minoris folio, floribus albis; Commel. Hort. v. 1. 125. t. 65.)—Leaves lanceolate, smooth.—Flowers in September.—*Stem* shrubby, five or six feet high, sending out numerous slender, leafy, evergreen *branches*, covered with a purplish *bark*. *Leaves* rather small, ovate, pointed, entire, bright green. *Flowers* axillary, along the branches, white. *Berry* roundish, purple, ripening in our greenhouses in the winter.

5. R. *hirsuta*. Hairy-leaved African Bladder-nut. Linn. Sp. Pl. 568. "Jacq. Collect. suppl. 110. t. 13. f. 1. fragm. t. 1. f. 2."—Leaves oblong-lanceolate, rather villous.—Flowers in July.—*Stem* strong and woody, seven or eight feet high, alternately branched, with a grey *bark*. *Leaves* an inch long, covered with soft hairs. *Flowers* on short stalks, axillary, small, of a faded purple colour.

6. R. *polyandra*. Oval-leaved Royena. Linn. Suppl. 240. Willd. n. 6.—Leaves elliptical. Flowers polyandrous, polygamous.—Time of flowering unknown.—The *stem* has knotty, irregular *branches*. *Leaves* somewhat obovate, coriaceous, finely downy on both sides. *Flowers* in short, axillary, downy clusters.

7. R. *angustifolia*. Willow-leaved Royena. Willd. n. 7.—Leaves lanceolate, acute, somewhat hairy beneath. It flowers in June and July.—This species is adopted on the authority of Willdenow, who observes, that it differs from all the foregoing ones, in having narrow, lanceolate *leaves*, sharp at both ends, and somewhat hairy underneath.

Royena is very nearly allied to Diospyros; the chief points of difference consisting in the latter genus having from six to twelve cells in the fruit, and sometimes five or six divisions in the calyx. Linnæus's description of the fruit of *Royena* is erroneous. See Diospyros.

Royena, in *Gardening*, contains plants of the shrubby evergreen exotic kind for the greenhouse, of which the species cultivated are; the shining-leaved royena, or African bladder-nut (R. lucida); the heart-leaved royena, or African bladder-nut (R. villosa); the myrtle-leaved royena, or African bladder-nut (R. glabra); the hairy-leaved royena, or African bladder-nut (R. hirsuta).

Method of Culture.—These plants are often rather troublesome in raising, but their culture may be attempted by cuttings and layers. The cuttings should be made from the young shoots, and be planted in the early spring in small pots filled with a loamy earth, plunging them in a very moderate hot-bed, covering them carefully with hand-glasses, refreshing them often with water in small proportions. When they have stricken roots, and are begun to shoot, inure them gradually to the open air, and when they are well rooted remove them into separate small pots, managing them afterwards as other rather tender greenhouse plants, such as the orange-tree, &c.

And the layers may be made from the young bottom shoots, laying them carefully down by slitting them as for carnations, watering them often in the warm season, but very moderately in the cold. When they are become well rooted, take them off and plant them in separate pots in the same manner as the cuttings, giving them the same sort of management afterwards.

The last sort often sends up suckers from the roots, and may sometimes be increased by planting in the same way as the cuttings. They afford variety among other greenhouse plants.

ROYERRE, in *Geography*, a town of France, in the department of the Creuse, and chief place of a canton, in the district of Bourganeuf; 9 miles S.E. of Bourganeuf. The place contains 1476, and the canton 6675 inhabitants, on a territory of 290 kiliometres, in 11 communes.

ROYMATLA, a river of Hindoostan, which is one of the mouths of the Ganges.

ROYMUNGUL, one of the mouths of the Ganges.

ROYOC, in *Botany*. See Roioc.

ROYON, in *Geography*, a town of France, in the department of the straits of Calais; 10 miles N.W. of St. Pol.

ROYPOUR, a town of Hindoostan, in Oude; 25 miles N.W. of Manickpour.—Also, a town of Bengal; 30 miles

miles N.N.W. of Midnapour.—Alſo, a town of Hindooſtan, in the circar of Boggilcund; 20 miles E. of Rewah.

ROYSTON, a town ſituated partly in Cambridgeſhire, and partly within that of Hertford, is ſeated at the bottom of a hill, among the chalk downs. The name appears to have been derived from a croſs, erected in the beginning of the twelfth century by a lady Roiſe, or Roiſia, and thence called "Roiſe's Croſs;" near to which a monaſtery for Auſtin canons was afterwards built: the canons being competently endowed, houſes and inns were erected, and in time formed a town, called Roiſe's Town, which was afterwards contracted to Royſton. At the time of the Domeſday Survey, the town was ſituated in five pariſhes, and ſo continued till the 32d year of king Henry VIII., when it was conſtituted a diſtinct pariſh: and the church of the diſſolved priory being made parochial, was, agreeably to the letter of the ſtatute, denominated "The Pariſh Church of St. John Baptiſt in Royſton." The eſtates granted to the priory by the founders appear to have included nearly all the land on which the town now ſtands. In the firſt year of Richard I. the canons obtained the liberty of holding a weekly market, and alſo an annual fair during the whole of Whitſun week. Henry III. inveſted them with many additional privileges: and under theſe grants the trade and population of the town rapidly increaſed. The greater part of the houſes were deſtroyed by fire in the reign of Henry IV.; but the convenient ſituation of the place as a corn-market contributed to its ſpeedy reſtoration: and in the time of Henry VI., according to Hollinſhed, wheat was ſo plentiful here as to be ſold for twelve-pence the quarter. Camden mentions this town as being famous for the great reſort of maltſters and other dealers in grain; and for the incredible quantity of corn to be ſeen every market day on the adjacent roads. It is ſtill celebrated for its corn trade, notwithſtanding the great alteration which has taken place in the modes of traffic. The ſcite of the priory with its appurtenances and liberties, and three annual fairs, were granted by Henry VIII., in conſideration of 1761*l.* 5*s.* 0*d.* to Robert Cheſter, eſq. whoſe poſterity continued to poſſeſs the ſame for ſeveral generations: but theſe are now the property of the honourable Thomas Brand. Only a few remains of the priory buildings are now left, excepting the church, which conſiſts of a nave, chancel, and aiſles, with a low tower. Beſides the priory, there were two other religious foundations in this town. One of them, an hoſpital dedicated to St. Nicholas, was founded ſo early as king John's reign; but no particulars of it are now known. The other, which was alſo an hoſpital or free chapel, was dedicated to St. John and St. James, and was in exiſtence in the twelfth year of Henry III., as Walter de Gray, archbiſhop of York, then granted indulgences to ſuch as ſhould contribute to the ſupport of its ſick and weak brethren. Some remains of this hoſpital are yet extant in a dwelling-houſe. King James I. built a manſion here, as an occaſional reſidence for enjoying the amuſements of hawking and hunting. At the commencement of the civil wars Charles I. removed from Hampton-Court to this houſe. It is ſtill called the king's houſe, but is fallen to decay. Beneath the market-place is a *Cave,* or ſubterranous crypt or oratory, which has been dug out of the ſolid chalk, and had originally a perpendicular aperture riſing to the ſtreet, and communicating with the upper part of the cavity. This was of a circular form, about two feet in diameter, and had been cloſed by a mill-ſtone, which was accidentally diſcovered in Auguſt 1742. This aperture, or deſcent, had holes for the feet cut into the chalk on each ſide; but as the lower part of the crypt was found to be filled with looſe earth and rubbiſh, this paſſage was quickly enlarged, the curioſity of the town's-people being ſtrongly excited by the hope of diſcovering ſome concealed treaſure. About two hundred loads of earth were drawn out; but the zeal of the labourers was only repaid by finding a ſkull, and other human bones, greatly decayed. The interior of this ſingular ſubterraneous apartment is completely circular, finiſhed in a kind of dome above, broken only by the original entrance. Round the lower part of the ſides is a ſeries of rude carving of the crucifixion, ſeveral ſaints, and various other ſubjects from ſacred and profane hiſtory. The bottom of this cell is ſurrounded by a raiſed ſeat about one foot high, and between two and three wide, but divided on the eaſt ſide by a hollow place, called the Grave. The preſent entrance is by a regular deſcent or paſſage, nearly one hundred yards in length, formed in the chalk from an adjacent houſe. The diameter of the crypt is about twenty-five feet; and the height is between thirty and forty. The Roman road, called Ichnield Way, paſſed by this town. According to the population returns of the year 1811, the number of houſes in this pariſh was 284, containing 1309 inhabitants. The market is held on Thurſdays; and here are five annual fairs. Royſton is ſituated 20 miles N.E. from Hertford, and 37 miles N. from London. Beauties of England and Wales, vol. vii. by E. W. Brayley and J. Britton. Lyſons's Magna Britannia, Cambridgeſhire. Stukeley's Palæographia Britannica.

ROYTON, a chapelry or townſhip in the pariſh of Preſtwich-cum-Oldham, and county of Lancaſter, England, is two miles N. of the town of Oldham. This place abounds with cotton manufactories, which appear to have been ſettled here in conſequence of the abundance of coal obtained. According to the population report of 1811, this townſhip contained 625 houſes, and 3910 inhabitants. Royton-hall is the ſeat of Joſeph Pickford, eſq. but formerly belonged to the Byron family, who poſſeſſed conſiderable landed property in the neighbourhood. The houſe is ſeated in a deep valley, ſurrounded by high hills. Beauties of England, &c. vol. ix. by J. Britton.

ROZANNA, a town of Lithuania, in the palatinate of Novogrodek; 48 miles S.W. of Novogrodek.

ROZANS, a town of France, in the department of the Higher Alps, and chief place of a canton, in the diſtrict of Gap; 10 miles W. of Serres. The place contains 900, and the canton 5024 inhabitants, on a territory of 195 kiliometres, in 11 communes.

ROZAS, Las, a town of Spain, in New Caſtile; 10 miles N.W. of Madrid.

ROZE, Nicolas, in *Biography,* muſic-maſter of the church of the Holy Innocents at Paris, was born at Bourgneuf, in the dioceſe of Chalons-ſur-Saône, in 1745. At ſeven years old he was received as a choriſter in the collegiate church of Beaune, in Burgundy. Soon after, he had inſtructions from the abbé Rouſſeau of Dijon, muſic-maſter of Tournay. He had the misfortune to loſe this amiable maſter in two years time, who had taught him to ſing ſeveral motets or anthems in that ſhort period. He was afterwards a conſiderable time totally without inſtructions. And what was ſtill worſe, he was under the authority of perſons who prevented him from attempting compoſition.

The abbé Hornet, nephew to the maitre de chapelle of Notre-Dame, gave him leſſons in ſinging, but he was abſolutely forbidden compoſition by this maſter, for fear his application ſhould injure the fine voice which nature had given him. At twelve years old he again found himſelf without an inſtructor, and going to the college of Beaune to to finish his classical studies, and afterwards to the seminary of Autun, where, during two years' residence, he composed the chief part of the chants which at present are adopted almost throughout the diocese.

At twenty-two years old he went into orders at Beaune. In 1669, as soon as he was admitted into priest's orders, he composed a mass, which he carried to Paris and presented to M. d'Auvergne, master of the king's band. This able professor encouraged him to pursue composition, and made him compose under his own eye a motet for the Concert Spirituel.

It was at this period that the abbé Roze began to make himself known; and this motet procured him the place of maitre de chapelle of the cathedral of Angers, which he retained five years.

In 1775 he was appointed to the Holy Innocents, and from that time he has continued to furnish the Concert Spirituel with motets; and though his style is modern, he has never deviated from the grandeur and solemnity befitting sacred music.

The abbé Roze is one of the best singing masters, in point of taste, at Paris.

He has published a system of harmony, or accompaniment, in which he modestly pretends to no more than to assist the students in harmony with methodical elementary principles, so clear, that children of eight years old shall find no difficulty in them. It often happens that able composers are unable to teach children the first elements of music for want of a well digested method. This the abbé Roze's system will be found, with respect to accompaniment. He has traced the chords from the fundamental base or key-note, through all the combinations of harmony allowable by ancient rules in one key. Laborde, 1788.

ROZESTVEN, in *Geography*, a town of Russia; 32 miles S. of Petersburg. N. lat. 52° 20'. E. long. 29° 50'.

ROZESTVENSKOI, a town of Russia, in the government of Tobolsk; 16 miles S.E. of Kemskoi.—Also, a town of Russia, in the government of Archangel, on the Pinega; 4 miles S.E. of Pineg.

ROZETT, Cape, a cape on the western coast of France. N. lat. 49° 28'. W. long. 2°.

ROZIER, Francis, in *Biography*, an eminent writer in economics, was born at Lyons in 1734. His father, who was engaged in commerce, dying while he was young, and without property, he entered into the ecclesiastical order, though his taste led him to agricultural and botanical pursuits. He obtained the place of director of the school of Lyons. In this situation he joined La Tourette in publishing, in 1766, "Elementary Demonstrations of Botany," a work that passed through many editions. In 1771 we find him at Paris, where he began to publish the "Journal de Physique et d'Histoire Naturelle," which was conducted a considerable time with great reputation. In this work he gave clear and interesting accounts of all new discoveries in physics, chemistry, and natural history. Through the recommendation of the king of Poland, he was presented to a valuable priory, when, being completely at his ease, he turned his attention to his favourite project of drawing up a complete body of rural economy. He now purchased a domain at Beziers, in the finest part of France, and engaged actively in country labours, and at the same time employed himself in the abridgment of the great works from which his compilation was to be formed. This was at length finished, under the title of "Cours d'Agriculture," in 10 vols. 4to., of which the last did not appear till after the author's death. In 1788 he went to Lyons, and was admitted a member of the academy, while the government gave him the direction of the nursery ground of the Generality. On the unfortunate revolution, Rozier was one of its earliest partizans, but without ever entering into its excesses. He was, however, one of its victims; in September 1793, during the siege of Lyons, a bomb falling upon his bed, buried his body in the ruins of his house. He was author, likewise, of several treatises on the method of making wines, and distilling brandy, on the culture of turnip and cole-seed, on oil-mills, and other machinery.

Rozier, *Cape*, in *Geography*, a cape on the coast of Canada, in the gulf of St. Lawrence; 9 miles W. of cape Gaspe.

ROZIERES. See Rosieres.

ROZOY, a town of France, in the department of the Seine and Marne, and chief place of a canton, in the district of Coulommiers. The place contains 1507, and the canton 13,199 inhabitants, on a territory of $312\frac{1}{2}$ kiliometres, in 28 communes.

Rozoy *en Thierache*, a town of France, in the department of the Aisne; 21 miles N.E. of Laon.

ROZVALINA, Totagai, a town of Russian Tartary, near lake Kargaldzin. N. lat. 52° 44'. E. long. 68° 54'.

RSESCHOW, a town of Austrian Poland, in Galicia; 70 miles W. of Lemberg.

RUA, La, a town of Spain, in Galicia; 25 miles N.E. of Orense.

RUAD, Rouad, or *Rou-Wadde*, an island of the Mediterranean, anciently celebrated under the name of Aradus or Arad. N. lat. 34° 42'. E. long. 35° 57'. See Arad.

RUADOK, or Rhiwaedog, a village of North Wales, in the county of Merioneth, where a battle was fought between the Welsh, under Llywarch Hen and the Saxons; 2 miles E. of Bala.

RUALGO, a town of Italy, in the Cadorin; 4 miles S. of Cadora.

RUANEL, a town of Ceylon; 38 miles S.S.W. of Candy.

RUARUS, Martin, in *Biography*, was born at Krempen, in Holstein, about the year 1587, and being designed for a Lutheran minister, he was educated in the principles professed by the disciples of Luther. But at Altdorf he became a convert to the Socinian doctrine, as taught in a private manner by professor Sonerus. When he was reproached and threatened by his family for deserting the principles of his forefathers, he justified his conduct, and defended the cause of free inquiry in matters of religion. Of his sincerity no doubt could be entertained, as he submitted to the loss of his patrimony rather than make a sacrifice of what he considered to be truth. He travelled over the greater part of Europe, and acquired respect and esteem wherever he went, by his great learning and excellent moral character. He was offered situations of trust and honour in England and Silesia, but declined them all. At length he became principal of the college of Racow in Poland; after which, about the year 1635, he became pastor to the Socinian church at Dantzic. In the year 1646, Calixtus used all his endeavours to bring him back to his original principles, but without effect. He died at Dantzic in 1657, at the age of 70. He wrote notes on the catechism of the Socinian churches in Poland, which were added to the addition of that work printed in 1665. Two volumes of his letters, each containing one hundred, were published after his death at Amsterdam. They are said to be curious and interesting, not only as they throw light on the history of Socinianism, but as they furnish the reader with valuable literary anecdotes. Among the author's correfpondents were father Merfenne, Hugo Grotius, and De Bergius.

RUATUN, or RATTAN, in *Geography*, an ifland in the bay of Honduras, about 30 miles in length and 12 in breadth, furrounded with rocks and fhoals; with a harbour capable of containing a large fleet of fhips. The Englifh, in the year 1742, formed a fettlement here for the purpofe of carrying on the logwood trade, but it was foon abandoned. N. lat. 16° 24′. W. long. 87° 10′.

RUBASS, a town of Hindooftan, in the fubah of Agra; 14 miles W. of Fattipour.

RUBBER, a large coarfe file.

RUBBER *of Pencil Strokes*. See CAOUTCHOUC.

RUBBER, in *Electricity*. See ELECTRICAL *Machine*.

RUBBERS, among *Shepherds*, a difeafe in fheep. See SCAB.

RUBBING-POST, a poft fet up for the purpofe of cattle, hogs, or other animals, rubbing themfelves upon. Mr. Marfhall, in his "Rural Economy of Norfolk," fays, it is an excellent cuftom of the Norfolk farmer to erect rubbing-pofts in the different parts of the inclofure he is feeding or teathing; they keep the ftock from the fences, and furnifh them, no doubt, with an agreeable, and perhaps a falutary, amufement. Some he faw draw the crown of a tree, with the lower part of the boughs left on, into the middle of the clofe: this is lefs trouble than putting down a poft, is eafily rolled out of the way of the plough, and feems to be ftill more agreeable to the cattle. They are alfo ufeful in hog-fties.

Thefe forts of pofts may probably be found of great fervice in the feeding pafture, for the purpofe of the fattening ftock rubbing themfelves upon, as they tend to keep them eafy and quiet, as well as to afford them that kind of agreeable feeling which may be of utility in promoting their progrefs towards a ftate of fatnefs.

RUBBIO, in *Commerce*, a meafure for corn in Italy, containing 8 lappa, which are equal to $7\frac{3}{4}$ Englifh bufhels.

RUBBLE STONE, *Grauwacke* of Werner, *Gres gris* of the French, is a particular kind of fand-ftone, containing not only grains of quartz, filiceous fchiftus, or horn-ftone, but alfo fcraps of blueifh argillite in a clayey cement, of which there is often no more than is barely fufficient to hold the grains together, fometimes with and fometimes without mica; commonly compact, fometimes flaty in the grofs. Its colour is yellowifh, or blueifh-grey, or dark reddifh-brown mixed with grey. Fracture, in the fmall, fine fplintery, or earthy; hardnefs from 7 to 9, rarely 10. Sp. grav. from 2.64 to 2.685, but when withered only 2.60. See *Tranfition* ROCKS.

RUBECULA, in *Ornithology*, a fpecies of *Motacilla*; which fee.

RUBEFACIENT, in *Medicine*, from *rubor*, *rednefs*, and *facio*, *I make*, or *produce*, a term which is ufed to denote thofe fubftances which, when applied externally, by friction or otherwife, excite the action of the fuperficial veffels, and, by filling them with red blood, occafion a fuffufion of rednefs in the part.

The operation of a rubefacient is, therefore, analogous to that of a blifter, but confiderably lefs efficient as a remedy; fince it produces, in fact, but a fmall degree of the incipient effect of a blifter, *viz.* a very flight and fuperficial diftenfion of the blood-veffels, fcarcely amounting to inflammation. Rubefacients are employed under the fame indications as blifters, and are intended, like them, to relieve fome internal pain or inflammation, by exciting a counter-irritation, or, as fome explain it, by revulfion; *i. e.* by drawing the fluids from the difeafed to the external parts. The friction, by means of which the rubefacient is ufually applied, contributes alfo to the fame effect.

The fubftances, by which this effect is produced, are of an acrid or ftimulating nature, fuch as ammonia, turpentine, camphor, vinegar, the effential oils, fpirits, &c.: and the difeafes, which they are ordinarily ufed to relieve, are the flighter degrees of local internal inflammation. Thus, for the relief of a flight fore-throat, or inflammation of the tonfils, it is cuftomary to rub the front of the neck with hot vinegar, or ammonia and oil; and the more external rednefs it produces, the more effectual is the internal relief. Slight pains in the cheft are often materially alleviated by the ufe of a warm liniment or plafter, or by the ufe of the ointment of tartarized antimony, which excites not only rednefs, but puftules. And rheumatic affections of the joints are often more effectually removed by friction with a rubefacient, than by any other means. See REVULSION.

RUBELLIO, in *Ichthyology*, a name given by fome authors to a fmall fea-fifh of a red colour, caught in the Mediterranean, and more ufually called by writers on thefe fubjects the *erythrinus*.

RUBELLITE, in *Mineralogy*, is confidered as a fubfpecies of tourmaline, of a reddifh-violet colour. It differs from tourmaline, being infufible under the blowpipe, but it lofes its colour and tranfparency. Its fpecific gravity is 3.1. It contains, according to Klaproth,

Silex	43.5
Alumine	42.25
Soda	9
Oxyd of iron and manganefe	1.5

A fpecimen analyfed by Vauquelin gave 7 parts in the 100 of oxyd of iron and manganefe. This ftone is fometimes ufed in jewellery. In the Greville collection of minerals in the Britifh Mufeum, there is a magnificent fpecimen of the red rubellite, originally prefented to Col. Symes by the king of Ava. It has been valued at 1000*l.*

RUBELLUS, in *Ichthyology*, a name given by fome authors to the common roach, and by others to the rudd or finfcale.

RUBENACH, in *Geography*, a town of France, in the department of the Rhine and Mofelle, and chief place of a canton, in the diftrict of Coblentz. The place contains 567, and the canton 6935 inhabitants, in 19 communes.

RUBENS, *Sir* PETER PAUL, in *Biography*. This moft fingularly accomplifhed man, and extraordinary painter, was the fon of John Rubens and Mary Pipelings, both defcendants of diftinguifhed families of the city of Antwerp. His father was one of the principal magiftrates of that place, when civil war defolated Flanders; and its calamities approaching the precincts of his abode, he left it for Cologne, in which city our artift was born in 1577. The day of his nativity was the feaft of St. Peter and St. Paul, and from thence he received, at the baptifmal font, the names of thefe apoftles. From his infancy he difcovered prompt and lively talents, which were cultivated by his parents with great care, in every branch of polite and claffical literature; and he amply repaid their care by the high degree of fuccefs he attained.

The views of his parents were otherwife directed than to the arts, and Rubens was placed, when his education was completed, as a page to the countefs of Lalain; a fituation too humble, and attended with occupation too trivial, to engage or detain long, in its obfequious frivolities, fuch a mind as he poffeffed: and on the death of his father, which happened foon after, he obtained permiffion of his mother to purfue the bent of his inclination, and became a painter.

To

To forward this view, he placed himſelf as a diſciple of Tobias Verhaecht, a landſcape painter of ſome note, but ſoon left him, to ſtudy hiſtory painting under Adam Van Oort. As the vulgar and brutal deportment of that artiſt were little congenial to the elevated and gentle mind and diſpoſition of Rubens, he ſoon quitted him alſo, and then entered the ſchool of Otho Venius, who poſſeſſed qualities, both as a man and an artiſt, far more ſuited to his taſte; and he became attached to this his laſt preceptor, in the warmeſt and moſt reſpectful degree.

When Rubens had attained his twenty-third year, Otho had the candour to tell him that he could no farther promote his progreſs; and adviſed him to travel to Italy, and gather the rich fruit of higher cultivation in art, at that rich ſtorehouſe and fertile nurſery of taſte and talent. This wiſe and parental advice of his maſter correſponded ſo entirely with his own inclination, that he immediately prepared for the journey; and having received ſtrong recommendatory letters from the archduke Albert, governor of the Netherlands, to Vincenzio Gonzaga, duke of Mantua, he ſet forth for Italy.

Devoting a ſhort time to the examination of the fine works at Venice, he proceeded to Mantua, where he received moſt marked attention from the duke, who was no leſs pleaſed with his polite accompliſhments, than with his ſkill as an artiſt, and ſoon after appointed him one of the gentlemen of his chamber. His reſidence with this prince afforded him every deſirable means of ſeeing and ſtudying the great works of Giulio Romano, in the palace del T, with which he is ſaid to have been peculiarly delighted; and he had continued with him two years, when he requeſted permiſſion to go to Venice, the empire of colouring, for the purpoſe of ſtudying ſtill farther the works of Titian and others, which had ſo much engaged his attention as he paſſed through that city. On his return to Mantua he evinced how much he had benefited by ſtudying the rich and brilliant productions of the Venetian ſchool, in the three magnificent pictures he painted for the church of the Jeſuits; which, in bravura of execution, and freedom of force in effect, rank nearly among his beſt productions. His patron afterwards gave him a commiſſion, which afforded him the means of purſuing his ſtudies at Rome, where he had not yet been, which was to make copies for him of ſome of the moſt celebrated pictures there, and he received it with gratitude and delight. During his reſidence there he executed ſeveral of theſe tranſcripts with uncommon ſucceſs, and they were eſteemed by the duke almoſt equal in value with the originals.

In 1605, Rubens was honoured by his friend with another commiſſion, which ſtill further aſſiſted to advance his knowledge of the art, whilſt it ſerved the views of the prince. He was ſent on an embaſſy from Mantua to the court of Spain, and went to Madrid, carrying with him magnificent preſents for the duke of Lerma, the favourite of Philip III. He executed his miſſion with the ſucceſs which attends ability and integrity; and while intent upon the political part of his employment, did not neglect to employ his pictorial talents with full power, gaining the eſteem and admiration of the king of Spain, whoſe portrait he painted, and from whom he received the moſt flattering marks of approbation.

Soon after his return to Mantua, he reviſited Rome, where he was engaged to adorn the tribune of Sta. Maria, in Valticella; there he painted three admirable pictures, in which he appears to have imitated the ſtyle of P. Veroneſe. From Rome he went to Genoa, where the reputation he had acquired greatly excited public curioſity, and he was engaged to paint many pictures. Among them he executed two for the church of the Jeſuits, the ſubjects of which were, the Crucifixion, and St. Ignatius performing a miracle, which gave univerſal ſatisfaction and delight.

Having been abſent from his native country eight years, he was ſummoned home by the reported illneſs of his mother; but though he haſtened with all ſpeed, he did not reach Antwerp in time to afford his beloved parent the conſolations of his preſence and affections. The loſs of her affected him deeply, and he intended, when he had arranged his private affairs, to go and reſide in Italy; but the archduke Albert, and the Infanta Iſabella, exerted their intereſt to retain him in Flanders, and in their ſervice. He conſequently eſtabliſhed himſelf at Antwerp, where he married his firſt wife, Elizabeth Brants, and built a magnificent houſe, with a ſaloon in form of a rotunda, which he enriched with antique ſtatues, buſts, vaſes, and pictures by the moſt celebrated painters: and here, ſurrounded by works of art, he carried into execution thoſe numberleſs productions of his prolific and rich invention, which once adorned his native country, but now are become the ſpoil of war, and the tokens of conqueſt and ambition, ſhining with equal luſtre among other ſuper-eminent productions of painting in the gallery of the Louvre.

The amazing ſucceſs of Rubens in his art, and the honours and wealth which were accumulated upon him, excited the envy and malignity of many among his rivals, who aſcribed the moſt meritorious parts of his works to the ability of his pupils, among whom were Jordaens, Van Uden, Snyders, Wilden, &c. and forgetting that ſuch men would not conſent to work for another whom they did not regard as pre-eminent to themſelves. Cornelius Schut abuſed him for lack of invention. Abraham Janſens had the audacity to defy him to a trial of ſtrength. Rubens anſwered, that he would contend with him when he had ſhewn himſelf to be a worthy competitor. A more friendly offer was rejected by him with equal wit. A chemiſt offered him a ſhare of his laboratory, and of his hopes of obtaining the philoſopher's ſtone. He carried the viſionary into his painting room, and told him his offer came twenty years too late, for ſo long, ſaid he, is it ſince I found the art of making gold with my palette and pencils. The abuſe of Schut and of Rombouts, who joined in it, he anſwered by relieving their neceſſities, and procuring them employment; and by engaging in thoſe varieties of art, landſcapes, lion and crocodile-hunting, and other miſcellaneous ſubjects, he decidedly eſtabliſhed his claim to the title of an univerſal painter, and covered his calumniators with ſhame and confuſion.

In 1620, when his talents had procured him univerſal renown, he received a commiſſion from Mary de Medici to adorn the gallery of the palace of the Luxembourg. There, in conſequence, he executed the works ſo well known; in which he repreſented, with the moſt rich and varied imagination, by very ingenious allegorical and emblematical deſigns, the principal events in the life of that princeſs. The whole were executed at Antwerp, except two pictures, which he painted at Paris in 1623, when he went there to arrange the whole in the gallery: and thus, in the ſhort ſpace of three years, amidſt innumerable other engagements, was this large ſeries of compoſitions, extenſive in their deſign, and rich in number of figures and in variety of colouring, completed: exhibiting an aſtoniſhing proof of the vivacity of his imagination, and the ſkill and dexterity with which he controlled the materials of his art. It was at this period that he became known to the duke of Buckingham, as that nobleman paſſed with his maſter, prince Charles, through France on his way to Madrid. He afterwards became the purchaſer of Rubens's rich museum of works of art, for which he is said to have given 10,000*l.* sterling.

On the return of Rubens to Antwerp, he was honoured with several conferences with the Infanta Isabella, and was by her dispatched on a political mission to the court of Madrid, where he arrived in 1628, and was most graciously received by Philip IV. He acquitted himself in his novel capacity to the satisfaction of that monarch, and his minister, the duke de Olivares, by both of whom he was highly esteemed; and while his talents as a diplomatist met with the success they merited, those of the painter were not neglected.

The duke de Olivares had just completed the foundation of a convent of Carmelites at the small town of Loeches, near Madrid, and the king, as a mark of his favour to the minister, commissioned Rubens to paint four pictures for their church, which he executed in his grandest style, and the richest glow of his colouring. The first is an allegorical design of the triumph of the new Law, which he has personified by a figure of Religion, seated on a superb triumphal car, drawn by four angels, with others bearing the cross, with characteristic symbols; four figures, expressive of Infidelity or Ignorance, over which Religion is supposed to triumph, follow the car like slaves or captives bound in chains. The group is crowned with beautiful cherubims, that hover in the air with chaplets in their hands, disposed with singular art and the most charming effect. The companion picture represents the interview of Abraham and Melchisedech, who offers him bread and the tenth of his spoils. The other two pictures, of equal excellence with the above, represent the four doctors of the church, and the four evangelists, with their distinctive emblems: they are all of very large dimensions, and in composition and expression are not excelled by any of his works. He also painted eight grand pictures for the great saloon of the palace at Madrid, which are regarded among the most brilliant of his productions. Their subjects were the Rape of the Sabines; the battle between the Romans and Sabines; the Bath of Diana, Perseus, and Andromeda; the Rape of Helen; the Judgment of Paris, Juno, Minerva, and Venus; and the Triumph of Bacchus. He also painted a large portrait of the king on horseback, with other figures; and a picture of the martyrdom of the apostle St. Andrew, which was in the church dedicated to that saint. For these extraordinary productions he was richly rewarded, received the honour of knighthood, and was presented with the golden key as gentleman of the chamber to the king. In 1629 he returned to Flanders, and thus, in the short space of little more than nine months, he designed and executed so extensive a series of pictures; a labour which, to any other artist not possessed of his extraordinary powers, must have required the exertion of many years. When he had rendered the account of his mission to the Infanta, she dispatched him to England, to sound the disposition of the government on the subject of a peace. There for a time he concealed the powers granted to him to negociate upon the subject. Charles, in the interim, honoured this great painter with his notice, and commissioned him to paint the ceiling of the banqueting-house at Whitehall, where he has represented the apotheosis of king James I.

During one of the frequent visits with which Charles honoured Rubens, whilst he was engaged in this great work, the latter, with infinite address, took a favourable opportunity of touching on the subject of peace with Spain; and finding that the monarch was no ways averse to it, at length produced the credentials with which he was furnished. The king appointed some members of the council to negociate with him; and the business was speedily brought to a conclusion. Charles, delighted both with the man and the artist, munificently rewarded Rubens, and on the 21st of February 1630, conferred upon him the honour of knighthood. Soon afterwards, the important object of his mission being happily effected, he returned to the Netherlands, where he was received with all the honours and distinctions due to exalted merit.

Rubens continued to enjoy his well-earned fame and honours, with uninterrupted success, till he arrived at his 58th year, when he was attacked with strong fits of gout, which debilitated his frame, and unfitted him for great exertions: he abandoned, therefore, all larger works, and confined himself to easel painting. Yet he continued to exercise his art until the year 1640, when he died, at the age of 63. He was buried, with extraordinary pomp, in the church of St. James at Antwerp, under the altar of his private chapel, which he had previously decorated with a very fine picture. A monument was erected to him by his wife and children, with an epitaph in Latin, eulogizing his talents and virtues, and displaying their success.

The victorious yet barbarous irruption of the French republicans into the Netherlands, robbed Flanders generally, and no place more than Antwerp, of the fine historical works of Rubens, of which at this period the gallery of the Louvre exhibits a most astonishing display; no less than fifty-two of his pictures, and among them several of the highest quality, being now exposed to view there. It is difficult to say which branch of the art most successfully employed his talents, in history, portraiture, animals, landscape, or still life: in all, his brilliancy of imagination, and wonderful skill in execution, are equally apparent. From his birth he had evinced a lively and uncommon portion of genius, which met the advantages furnished to him in his progress through life, with an ardour and success of which history scarcely affords a parallel. Both the number and merit of the works of Rubens are calculated to excite extraordinary attention. His fame is extended over a large part of the continent, and it may be truly said, that he has enriched his country, not only by the magnificent examples of art which he left, but also by what some may deem a more solid advantage, the wealth which continued till lately to be drawn into it, by the concourse of strangers from all parts of the world to view them.

Rubens is not one of those regular and timid composers, who escape censure and deserve no praise. He produced no faultless monsters; his works abound with defects as well as beauties, and are liable, by their daring excentricities, to provoke much criticism. But they have, nevertheless, that peculiar property, always the companion of true genius, that which seizes on the spectator, commands attention, and enforces admiration, in spite of all their faults. His productions seem to have flowed from his pencil with more than freedom—with prodigality: his mind appears to have been inexhaustible; his hand never wearied: the exuberant fertility of his imagination was, therefore, always accompanied by a correspondent spirit in the execution of his work.

"Led by some rule, which guides but not constrains,
He finished more through happiness than pains."

No man ever more completely laid the reins on the neck of his inclinations, no man ever more fearlessly abandoned himself to his own sensations, and depending on them, dared to attempt extraordinary things, than Rubens. To this, in a great measure, must be attributed that perfect originality of manner, by which the limits of the art may be said to have been extended. Endowed with a full comprehension

prehension of his own character, he waited not a moment for the acquisition of what he perhaps deemed incompatible excellence: his theory once formed, he seldom looked abroad for assistance; there is consequently in his works very little that appears to be taken from other masters, and if he has occasionally stolen any thing, he has so well digested and adapted it to the rest of his composition, that the theft is not discoverable. But though it must be allowed that he possessed, in many respects, the true art of imitation, though he looked at nature with a painter's eye, and saw at once the characteristic feature by which every object is distinguished, and rendered it on canvas with a vivacity of touch truly astonishing; though his powers of grouping and combining his objects into a whole, and forming his masses of light and shadow and colour have never been equalled; and though the general animation and energy of his attitudes, and the flowing liberty of his outline, all contribute to arrest the attention, and inspire a portion of that enthusiasm by which the painter was absorbed and carried away; yet the spectator will at last awake from his trance, his eyes will cease to be dazzled, and then he will not fail to lament, that such extraordinary powers were so often misapplied, if not entirely cast away: he will enquire, why Rubens was content to waste so many requisites to the perfection of the art? why he paid no greater attention to elegance and correctness of form, to grace, to beauty, dignity, and propriety of character? Why every subject, of whatever class, is equally adorned with the gay colours of spring, and every figure in his compositions indiscriminately *fed on roses*. Nor will he be satisfied with the ingenious, but surely unfounded apology, that these faults harmonize with his style, and were necessary to its complete uniformity, that his taste in design appears to correspond better with his colouring and composition, than if he had adopted a more correct and refined style of drawing; and that perhaps, in painting, as in personal attractions, there is a certain agreement and correspondence of parts in the whole together, which is often more captivating than more regular beauty.

The redemption of what he wanted, is found in the universality of his power as an executive painter. In the smallest sketch, the lightness and transparency of his touch and colour, are no less remarkable than the sweeping rapidity and force of his brush in his largest works: and in all kinds of subjects, he equally keeps up his wonted superiority. His animals, particularly his lions and horses, are so admirable, that it may be said they were never properly, at least poetically, painted, but by him; his portraits rank with the best works of those painters who have made that branch of art their sole study; and his landscapes remind us of the lustre of Claude Lorraine and the grandeur of Titian. In the latter class of his works, the picturesque forms of his rocks and trees, the deep tones in his shady glades and glooms, the watery sunshine, the dewy verdure, the airiness and facility of his touch, exhibit a charm, and shew a variety of invention, which fascinate the observer, and leave him no inclination to dwell on the defects, though they are often neither few nor small.

As a colourist, Rubens, in comparison with Titian, the great master of the Venetian school, will rise or fall, according to the taste of the amateur. If he is less chaste than the Venetian, he is more brilliant; and if not by the truth of his colours, yet he claims our applause by the lustre and splendour of his tints. The latter, in his execution, mingled his hues as they are found in nature, in such a manner as to make it impossible to say where they begin or terminate; Rubens, on the other hand, laid his colours in their places, one by the side of the other, and then very slightly mixed them by a touch of a soft pencil; not unfrequently leaving his prepared ground visible through parts of the colours, to produce an harmonizing tone. Of these different styles, the only correct mode of judging is by reference to the specific object of art, *the imitation of nature*, and then Titian's will be regarded as the most correct, though Rubens may be more alluring.

RUBENS, ALBERT, son of Peter Paul, was born at Antwerp in 1614, and succeeded his father in his post as secretary to the council, devoting his leisure to literary pursuits. He died in 1657, leaving behind him many works, as monuments of his great learning and sound judgment, of which the following may be mentioned. "Regum et Imperatorum Romanorum Numismata," which is a commentary on the medals of the duke of Arschot: "De Re Vestiaria Veterum:" "Dissertatio de Gemma Tiberiana et Augustea—de Urbibus Neocoris—de natali Die Cæsaris Augusti," which were published by Grævius in the Thesaurus Antiq. Roman.

RUBENTIA, in *Botany*, so called by Commerson, from the vernacular name of the tree in the Mauritius, *Bois Rouge;* see ELÆODENDRUM. See also RHAMNUS *pentaphyllus*, where we ought to have observed that the plant of Desfontaines and Boccone is very different from *Elæodendrum Argan*, to which the synonyms of Linnæus and Jacquin most probably belong, as cited in our vol. 12th.

RUBEOLA, the diminutive of *Rubia;* Tourn. Inst. 130. t. 50. See ASPERULA and CRUCIANELLA.

RUBETA, or TOAD, in *Zoology*, a species of *Rana;* which see.

RUBETRA, in *Ornithology*, a species of *Motacilla;* which see. It is also a name by which Gesner and some others have called that species of the œnanthe, commonly known by the names of the *stone-chatter*, *stone-smick*, or *moor-titling*. (See MOTACILLA *Rubicola*.) Other species of *Motacilla* are also called by the same name. See also MUSCICAPA and PIPRA.

RUBIA, in *Botany*, derived from *ruber*, red, on account of the fine scarlet colour afforded by its root; which is well known to dyers and tanners under the name of Madder.—Linn. Gen. 52. Schreb. 69. Willd. Sp. Pl. v. 1. 603. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 181. Prodr. Fl. Græc. Sibth. v. 1. 97. Ait. Hort. Kew. v. 1. 242. Juss. Gen. 197. Tournef. t. 38. Michaux Boreal-Amer. v. 1. 81. Pursh v. 1. 102. Lamarck Illustr. t. 60.—Class and order, *Tetrandria Monogynia*. Nat. Ord. *Stellatæ*, Linn. *Rubiaceæ*, Juss.

Gen. Ch. *Cal.* Perianth superior, of one leaf, four-toothed, very small, or none. *Cor.* of one petal, bell-shaped, four-toothed, or more frequently five-cleft, without a tube. *Stam.* Filaments four, awl-shaped, shorter than the corolla; anthers simple. *Pist.* Germen inferior, twin; style thread-shaped, cloven at the top; stigmas two, capitate. *Peric.* Two smooth berries united into one. *Seeds* solitary, roundish, umbilicated.

Ess. Ch. Corolla of one petal, bell-shaped, superior. Berries two, combined, each with a single seed.

1. R. *tinctorum*. Dyer's Madder. Linn. Sp. Pl. 158. Sm. Fl. Græc. Sibth. t. 141. Woodv. Med. Bot. t. 68. —Leaves elliptic-lanceolate, annual, about six in a whorl, rough at the keel. Stem prickly.—Native of the south of Europe, flowering in June. *Root* perennial, widely spreading, much divided and branched at the top, succulent, its bark principally affording a scarlet dye. *Stems* herbaceous, annual, decumbent, widely spreading, branched, leafy, obtusely quadrangular, prickly, with little hooks at the angles.

gles. *Leaves* ſpreading, acute, an inch and half long, roughiſh above, narrowed at the baſe into a ſhort, broad footſtalk; at the margin and back of the rib rough with ſpines, which for the moſt part point backwards, but in a contrary way towards the tip. *Flowers* yellowiſh-green, in axillary, terminal, trichotomous, leafy or bracteated, rough *panicles*, longer than the leaves. *Berries* dark-purple.

The cultivation of this uſeful plant in Great Britain by no means keeps pace with the demand for it. That grown in Holland is the moſt eſteemed by our dyers and calico-printers. Dr. Sibthorp tells us it is much cultivated in the neighbourhood of Athens.—Madder has the property of tinging, with its bright colour, not only the milk, but even the bones of ſuch animals as feed upon it.

2. R. *chilenſis*. Chili Madder. Willd. n. 2. "Molina Nat. Hiſt. Chili. 118." (Rubiaſtrum, Cruciatæ folio et facie, vulgo Relbun; Feuillée Peruv. 60. t. 45.)—Leaves annual, four in a whorl. Stalks axillary, ſolitary, ſingle-flowered. Stem ſmooth.—Native of Chili, on mountains. *Root* perennial, much divided and ſpreading, affording a dye like the laſt. *Stems* round, ſlender, ſomewhat creeping. *Leaves* ovate, four together, forming a croſs, rough and ſticking to the clothes. *Flowers* axillary, ſolitary, ſtalked, white. *Berries* roundiſh, red.

3. R. *peregrina*. Wild Engliſh Madder. Linn. Sp. Pl. 158. Fl. Brit. n. 1. Engl. Bot. t. 851.—Leaves about four in a whorl, elliptical; ſhining and ſmooth on their upper ſide. Flowers five-cleft. Not uncommon in the ſouth-weſt of England, among buſhes, on a rich loamy ſoil, flowering in July, and ripening its berries about October.—*Root* perennial, red, or orange-coloured. *Stems* branched, diffuſe, ſquare, rough at the angles, perennial. *Leaves* four, rarely ſix together, evergreen, pointed, rough, with teeth at the margin, and nerves on the under ſide. *Flowers* in forked panicles, terminal, yellowiſh, always five-cleft and pentandrous, without a calyx. *Berries* black, one of them generally abortive.

It is remarked in the Flora Britannica, that *Rubia*, n. 708 of Haller, which has been confounded with this ſpecies, is unqueſtionably *R. tinctorum* of Linnæus, having ovato-lanceolate *leaves*, rough on the upper ſide, and *flowers* which are moſtly four-cleft, deſtitute of a calyx.

4. R. *lucida*. Shining-leaved Madder. Linn. Syſt. Nat. ed. 12. v. 2. 732. Willd. n. 4. Sm. Fl. Græc. Sibth. t. 142.—Leaves elliptical, evergreen, ſix in a whorl, ſmooth at the keel. Stem without prickles. Native of Majorca, and the iſlands of Zante and Cyprus. It flowers in July. *Root* perennial, branched, much divided at the crown. *Stems* rather ſhrubby, a little ſpreading, much branched, unarmed, clothed with roughiſh down; jointed, roundiſh, leafleſs and grey in the lower part; leafy and ſquare in the upper. *Leaves* ſpreading, recurved, half an inch long, ſeſſile, pointed, ſmooth on both ſides, thickened at the margin, rough with ſpines pointing forwards. *Flowering* in axillary, numerous, trichotomous panicles, of a yellowiſh-green.

5. R. *fruticoſa*. Prickly-leaved Madder. Willd. n. 5. Jacq. Ic. Rar. t. 25.—Leaves evergreen, elliptical, carinated; prickly at the margin. Stem ſhrubby, rough.—Native of the Canary iſlands, and flowering at Kew in September.—*Stem* woody, round, much branched, of a greyiſh-brown colour; the younger *branches* angular, very rough, green. *Leaves* from three to ſeven together, ſmooth, except at the edges and back of the rib. *Flowers* on axillary, ſhort ſtalks, ſolitary or three together, pale yellow. *Berries* roundiſh, black, with purple pulp.

6. R. *anguſtifolia*. Narrow-leaved Madder. Linn. Mant. 39. Willd. n. 6.—Leaves evergreen, linear, ſmooth on the upper ſide.—Native of Minorca, and introduced at Kew, in 1772, by M. Richard, where it flowers in July and Auguſt.—*Stems* diffuſe, very rough, ſquare. *Leaves* four or ſix in a whorl, linear, acute, their keel and margin fringed with ſmall prickles, and rugged along the rib of the upper ſurface. *Flowers* yellow, flat, five-cleft.

7. R. *cordifolia*. Heart-leaved Madder. Linn. Mant. 197. "Pallas. It. v. 3. 715. t. L. f. 1." (R. cordata; Thunb. Japon. 60.)—Leaves perennial, four in a whorl, heart-ſhaped.—Native of the Cape of Good Hope, Siberia, China, and Japan; flowering at Kew in July.—Whole *herb* diffuſe, or ſlightly climbing. *Stem* ſquare, branched, with recurved prickles at the angles. *Leaves* four, rarely ſix, together, ovate, acute, revolute at the edge, rugged all over and dotted, on quadrangular ſtalks. *Flowers* white, in ſpreading, axillary, terminal panicles. Thunberg informs us that this ſpecies is uſed in Japan for dyeing.

8. R. *Brownei*. Brownean Madder. Michaux Boreal-Amer. v. 1. 81. Purſh 102. (R. peregrina; Walt. Fl. Carol. 86.—R. ſubhirſuta ſcandens vel reclinata, foliis cruciatis floribus ſingularibus ad alas; Brown Jam. 141.—Valantia hypocarpa; Linn. Sp. Pl. 1491.)—Leaves four in a whorl, oval. Flowers on ſtalks, ſolitary.—Found in ſhady woods from Carolina to Florida, and on the cool mountains of Jamaica. *Stem* herbaceous, from one to three feet high, looſe, branched, grooved, rugged. *Leaves* ſeſſile, ſmall, entire, convex, hiſpid with hairs, on ſhort downy ſtalks. *Flowers* axillary, ſmall, yellow, like thoſe of a *Galium*. *Berries* minute, tawny, or purpliſh, ſingle-ſeeded.

Rubia, in *Gardening*, contains plants of the hardy, herbaceous, perennial kind, of which the ſpecies moſtly cultivated is the dyer's madder (R. tinctorum).

It may be noticed, that madder is ſo eſſential to dyers and calico-printers, that theſe buſineſſes cannot be carried on without it.

Method of Culture.—The young plants of this kind are increaſed by off-ſets or ſuckers, from the roots of the old plants in the ſpring, as April or the following month; which ſhould be ſlipped off ſoon after they appear above ground, by opening the earth round the roots, and taking off the ſide ſuckers with as much root-part and fibres to each as poſſible, preſerving the tops entire; which ſhould be planted directly, in the manner directed below. The ground being well prepared by frequent deep ploughing, or trenching over, and the proper quantity of ſets or ſuckers provided, they ſhould, with a dibble, be planted in rows two feet aſunder, and one diſtant in the row, putting each plant low enough in proportion to the length of its root, leaving moſt of the green top out of the ground, and cloſing the earth well about each ſet, as the work proceeds. Some ſet theſe plants in beds, three rows length-ways, at two feet diſtance, with wide alleys between bed and bed, in order for landing up the crowns of the roots two or three inches deep in winter. They ſhoot up into ſtalks the ſame year in either mode, but the roots require two or three years' growth before they are large enough for uſe; during which period they ſhould be kept clean from weeds all the ſummer by broad-hoeing, in dry weather; and in autumn, when the ſtalks decay, cutting them down, and then ſlightly digging the ground between the rows, raiſing it ſomewhat ridge-ways along the rows of the plants, an inch or two thick over their crowns; or, if they are in beds, they may be landed up from the alleys to the ſame depth; the ſame culture being repeated till the autumn of the third year, when the roots will be fit for taking up for uſe. This is performed by trenching the ground the way of the rows, beginning at one end of it, and

and opening a two-feet-wide trench close along by the first row of plants, digging down to the depth of the roots to get them clean out to the bottom; then opening another trench close to the next row, turning the earth into the first; and so on, trench and trench, till the whole is taken up and removed.

It is found that, in the garden culture, these plants succeed best in a light rich deep soil; the roots are sometimes used fresh for dyeing, being prepared by washing and pounding; but commonly when designed for keeping, or to be sent to a distance, are dried in some covered airy shed; then all the mould being rubbed off, and the roots made sufficiently dry, are sold to those who manufacture them for use, if not performed by the cultivator; this consists in drying them in a kiln or some stove-house, &c. then thrashing them to beat off the outer skin, in order to separate it from the inner part of the root, as being of an inferior quality. The roots being then dried in a kiln about twenty-four hours, are removed to a mill or pounding-house, where they are pounded in a long hollow oaken block, with stampers kept in motion by the mill; and when thus reduced to powder, sifted, and put in casks, as may be more fully seen under the head MADDER, in *Agriculture*.

But these plants are sometimes employed for variety in the borders or other open parts of gardens or pleasure-grounds, when of large extent.

RUBIA, in the *Materia Medica*, &c. See MADDER.

RUBIA, in *Geography*, a town of Austria, in the county of Goritz, on the Vipao; four miles S.E. of Goritz.

RUBIACEÆ, in *Botany*, one of Jussieu's largest and most important natural orders of plants, which has grown out of the Linnæan *Stellatæ*, and is named from *Rubia*, a genus belonging to the latter. Linnæus, in subordinate sections of his *Stellatæ*, has indicated some genera, as akin to what more strictly appeared to him to constitute that order. But his ideas wandered between this tribe and the *Contortæ*, to which last he referred some genuine *Rubiaceæ*; as *Cinchona* and *Gardenia*. Jussieu, taking a more accurate and comprehensive view of the subject, has greatly extended the order, while he has, at the same time, better defined it than any preceding botanist. This order is the 57th of his series, the 2d of his 11th class. We refer the reader to DIPSACEÆ for the characters of that class. *Cotyledons* two. *Flowers* monopetalous, superior. *Anthers* distinct; &c. The order of *Rubiaceæ* is thus defined.

Calyx of one leaf, superior, simple; its limb divided, or occasionally undivided. *Corolla* regular, mostly tubular, with a divided limb. *Stamens* definite, four or five, seldom more, inserted into the tube of the corolla, alternate with its segments, and equal to them in number. *Germen* inferior; style one, very rarely double; stigma generally double. *Fruit* in some cases of two lobes, or grains, each lobe single-seeded, not bursting, but having the appearance of a naked seed; in others a simple capsular or pulpy fruit, often of two cells, in each of which the seeds are either solitary or numerous; in a few instances there is but one cell, in some others many; the fruit, of whatever description, is either crowned with the permanent limb of the calyx, or marked with a rim, or scar, where the latter had been. The *corculum* is oblong, slender, inclosed in a large, horny, lateral *albumen*. *Stem* herbaceous, shrubby, or arboreous. *Leaves* in a few instances whorled, in most opposite, their *footstalks* generally connected at the base, through the medium of a simple pair of *stipulas*, or sometimes a fringed kind of sheath, embracing the stem or branch. Plants of this order are readily known, even without flowers, by their *leaves* or *stipulas*. The shrubby and arborescent kinds are principally natives of tropical climates, where they greatly abound.

Section 1. *Fruit two-lobed, with two seeds. Stamens generally four.* Leaves mostly whorled; stem almost uniformly herbaceous.

Sherardia, *Asperula*, *Galium*, *Crucianella*, *Valantia*, *Rubia*, and *Anthospermum*.

Sect. 2. *Fruit two-lobed, with two seeds. Stamens four, rarely five or six.* Leaves mostly opposite, connected by a fringed sheath; stem in general herbaceous.

Houstonia, *Knoxia*, *Spermacoce*, *Diodia*, *Galopina*, *Richardia*, and *Phyllis*.

Sect. 3. *Fruit simple, with two cells, and many seeds. Stamens four.* Leaves opposite. Stem either herbaceous or shrubby. *Hedyotis; Oldenlandia* of Plumier and Linnæus, which is not distinct from *Hedyotis*, as we have shewn in its proper place; *Carphalea* of Jussieu, Lamarck Illustr. t. 59; *Coccocypselum* of Browne and Schreber; *Gomozia; Manettia* of Linnæus, for which Jussieu prefers Aublet's name *Nacibea; Tontanea* of Aublet, supposed to be Schreber's *Bellardia; Petesia* of Browne and Linnæus; *Fernelia* of Commerson, Lamarck Illustr. t. 67; and *Catesbæa*.

Sect. 4. *Fruit simple, with two cells, and many seeds. Stamens five.* Leaves opposite; stem often shrubby.

Randia, which is a *Gardenia; Bellonia; Virecta; Macrocnemum; Bertiera* of Aublet and Schreber; *Dentella* of Forster; *Mussænda; Cinchona; Tocoyena* of Aublet, Lamarck Illustr. t. 163; *Posoqueria* of the same authors, which is *Cyrtanthus* of Schreber; *Rondeletia; Genipa* of Plumier and Linnæus, which is a *Gardenia; Gardenia;* and *Portlandia*.

Sect. 5. *Fruit simple, with two cells, and many seeds. Stamens six, or more.* Leaves opposite; stem shrubby or arboreous.

Coutarea of Aublet, which is *Portlandia hexandra* of Linnæus; *Hillia;* and *Duroia*.

Sect. 6. *Fruit simple, with two cells and two seeds. Stamens four.* Leaves opposite; stem for the most part shrubby.

Chomelia of Jacquin; *Pavetta; Ixora; Coussarea* of Aublet; *Malanea* of the same, which is Schreber's *Cunninghamia;* and *Antirrhæa* of Commerson.

Sect. 7. *Fruit simple, with two cells and two seeds. Stamens five.* Leaves opposite; stem shrubby or arboreous.

Chimarrhis of Jacquin; *Chiococca; Psychotria; Coffea; Canthium* of Lamarck, which is a *Gardenia; Ronabea* of Aublet, Lamarck Illustr. t. 166; *Pæderia; Coprosma;* and Aublet's *Simira*.

Sect. 8. *Fruit simple, with many cells, each containing a solitary seed. Stamens four, five, or more.* Leaves opposite; stem often shrubby.

Nonatelia of Aublet, which is scarcely different from *Psychotria; Laugeria; Erithalis; Psathura* of Commerson, Lamarck Illustr. t. 260; *Myonima* of Commerson, ibid. t. 68; *Pyrostria*, ibid. t. 68; *Vangueria*, ibid. t. 159; *Matthiola* of Plum. and Linn.; and *Guettarda*.

Sect. 9. *Fruit simple, with many cells, each containing many seeds. Stamens five, or more.* Leaves generally opposite; stem either shrubby or herbaceous.

Hamellia; Patima of Aublet, Lamarck Illustr. t. 159; and *Sabicea* of Aublet, which is Schreber's *Schwenkfeldia*.

Sect. 10. *Flowers aggregate upon a common receptacle; the fruit sometimes, but rarely, confluent.* Leaves opposite; stem arboreous or shrubby, rarely herbaceous.

Mitchella; Canephora of Jussieu, Lamarck Illustr. t. 151; *Patabea* of Aublet; *Evea* of the same, also *Tapogomea*, both compre-

comprehended by Schreber under *Callicocca; Morinda; Nauclea;* and *Cephalanthus.*

Sect. 10. *Rubiaceous genera, with the nature of whose fruits Jussieu was not, as yet, sufficiently acquainted.*

Serissa of Commerson, Lamarck Illustr. t. 151, which L'Heritier named *Buchozia;* and found to have a berry with two seeds; *Pagamea* of Aublet, Lamarck Illustr. t. 88; *Faramea* of the same, ibid. t. 63; and *Hydrophylax* of Linn. Suppl.

RUBICAN, in the *Manege.* A horse is said to be of a rubican colour, that is a bay, sorrel, or black, with a light grey or white upon the flanks, but so that this grey or white is not predominant there.

RUBICILLA Americana, in *Ornithology,* a name given by Mr. Ray to the guiratirica, a Brasilian bird, of the bull-finch kind, very beautifully variegated with red, black, and grey.

RUBICOLA, a species of *Motacilla;* which see.

RUBICON, in *Geography,* a river of Italy, famous in Roman history, now a diminutive stream, and called by some Fiumesino, and by others *Pisatello* (which see), which enters the Adriatic about eight miles N. of Rimini.—Also, a department of Italy, composed of part of the Romagna. It contains about 105,000 inhabitants, who elect 12 deputies. The capital is Rimini.

RUBICULUS, in *Ichthyology,* a name given by Figulus and some others to that species of fish which we call the *roach.* It is of the cyprinus kind, and is distinguished by Artedi under the name of the red-eyed cyprinus, with the tail and belly-fins red. See Cyprinus.

RUBIELOS, in *Geography,* a town of Spain, in Aragon; 22 miles S.E. of Teruel.

RUBIERA, a town of Italy, in the department of the Panaro; five miles W. of Modena.

RUBIFYING, formed of *rubens, ruddy,* and *fio, I become,* in *Chemistry,* &c. the act of turning a thing red by force of fire, &c.

Red arsenic is common white arsenic rubified by a mixture of sulphur and copper.

RUBIGALIA, or Robigalia, in *Antiquity,* a feast celebrated by the Romans, in honour of the god Rubigus, or the goddess Rubigo; to engage those deities to preserve the corn from blasting and mildews.

The Rubigalia were instituted by Numa in the eleventh year of his reign; and were held on the seventh of the calends of May, which is our twenty-fifth of April; being about the time when the blight or mildew, called by the Latins *rubigo,* uses to attack the corn.

Varro fixes it to the time when the sun enters the 16th degree of Taurus. Indeed the true time seems rather to have been on the 18th day before the equinox, and the true reason, because then Canicula, or the Little Dog, sets; which is esteemed a malific constellation.

Hence they sacrificed a dog to Rubigo: Ovid says, the entrails of a dog, and those of a sheep; Columella, only a sucking puppy. Festus insinuates, that the victim must also be red.

RUBIGO, or Robigo, a disease incident to corn, popularly called *mildew.*

The rubigo is a species of blight. See Blight, and Rust *of corn.*

RUBIN *of Antimony,* in *Chemistry,* a kind of liver of antimony, made with equal parts of nitre and crude antimony detonated together, to which is afterwards added an equal quantity of common salt. It is also called *magnesia opalina.*

Rubin, or *Roboan,* in *Geography,* a small island near the coast of Arabia, at the entrance of the straits of Babelmandeb, near a projecting cape of the continent, and accessible by fording at low-water. Pilots are obtained here to navigate vessels through the straits, and to different ports in the Red sea.

RUBINELLI, Giovanni, in *Biography,* an Italian opera singer of the first class for voice, figure, action, and knowledge, arrived in England, from Florence, in April, 1786. His journey hither from Rome, where he sung during the carnival of this year, was not very propitious, as the weather was uncommonly inclement; and he was not only overturned in his chaise at Macon, in France, but after quitting the ship, in which he sailed from Calais to Dover, the boat that was to have landed him was overset near the shore, and he remained a considerable time up to his chin in water, to the great risk of his health, his voice, and even his life. The first time we meet with his name in the dramatis personæ of an opera is in "Caliroe," set by Sacchini, for Stutgard, in 1770, where he performed the part of second man. He seems to have continued at the court of Wirtemberg, in no higher station, several years, as Grassi and Muzio are named before him in the "Indice de' Spettacoli Theatrale." His name does not appear as first serious man in Italy till 1774, when he sung at Modena, in Paesiello's "Alessandro nell' Indie," and Anfossi's "Demofoonte." After this, he appeared as principal singer in all the great theatres of Italy, till his arrival in London. The first opera in which Rubinelli appeared in England was a pasticcio, called "Virginia," May the 4th. His own part, however, was chiefly composed by Angiolo Tarchi, a young Neapolitan, then advancing into eminence with great rapidity. Rubinelli is in figure tall and majestic, in countenance mild and benign. There is dignity in his appearance on the stage; and the instant the tone of hie voice is heard, there remains no doubt with the audience of his being the first singer. It is a true and full contralto from C, in the middle of the scale, to the octave above. He sometimes, however, goes down to G, and up to F; but neither the extra low notes nor the high are very full. All above C is falset, and so much more feeble and of a different register from the rest, that we were uneasy when he transcended the compass of his natural and real voice. His shake is not sufficiently open; but in other respects he is an admirable singer. His style is grand, and truly dramatic. His execution is neat and distinct. His taste and embellishments are new, select, and masterly. His articulation is so pure and well accented, in his recitatives, that no one who understands the Italian language can ever want to look at the book of the words, while he is singing. His chest is so strong, and his intonation so perfect, that we have very seldom heard him sing out of tune. His voice is more clear and certain in a theatre, where it has room to expand, than in a room. He had a greater variety of embellishments than any singer we had heard, except Pacchierotti, who not only surpasses him in richness of invention and fancy, but in the native pathos, and touching expression of his voice. Yet Rubinelli, from the fulness of his voice, and greater simplicity of style, pleases a more considerable number of his hearers than Pacchierotti, though none perhaps, so exquisitely, as that singer used to please his real admirers. Rubinelli finding himself censured on his first arrival in England for changing and embellishing his airs, sung "Return, O God of Hosts," at Westminster Abbey, in so plain and unadorned a manner, that those who venerate Handel the most, thought him bald and insipid. Indeed, we we paffed feveral appoggiaturas, which we remember Mrs. Cibber to have introduced, who learned to fing the air from the compofer himfelf; and who, though her voice was a thread, and her knowledge of mufic very inconfiderable, yet from her intelligence of the words and native feeling, fhe fung this admirable fupplication in a more touching manner, than the fineft opera finger we ever heard attempt it; and Monticelli, Guadagni, Guarducci, and Pacchierotti, were of the number.

He remained here only one feafon; for in 1787 we find him finging at Brefcia and Venice; and in 1788 he likewife performed in that city; in 1789, at Rome and at Milan; in 1790, at Genoa. He was fucceeded in England by Marchefi.

RUBINUS Verus, from *ruber*, a true carbuncle.

RUBIO, Cape, in *Geography*, a cape on the N.W. coaft of the ifland of Iviça. N. lat. 39° 5′. E. long. 1° 21′.

RUBIS, in *Ornithology*, guainumbi or humming-bird. See Trochilus *Colubris*.

RUBLACEDA, in *Geography*, a town of Spain, in Old Caftile; 18 miles S. of Frias.

RUBLE, in *Commerce*, a money of account in Ruffia, containing 100 copecks, or kopeeks. The ruble is alfo divided into 10 grievens, 33⅓ altins, or 50 grofchen; and the copeck is likewife divided into 2 denufhkas, or 4 polufhkas.

The gold coins are the imperial and half imperial, of 10 and 5 rubles; double and fingle ducats, formerly worth 4½ rubles and 2¾ rubles, but raifed in value, in 1764, the double ducat to 5 rubles 60 copecks, and the fingle to 2 rubles 80 copecks. The filver coins are rubles of 100 copecks; alfo poltins of 50 copecks; polpoltins of 25 copecks; double and fingle grieven of 20 and 10 copecks; and pieces of 5 altins or 15 copecks; and peyte-copecks, of 5 copecks each, now out of circulation.

Affay and Value of Rubles.

	Affay.			Weight.		Contents in pure Silver.	Value in Sterling.	
		oz.	dwt.	dwt.	gr.	grains.	s.	d.
Ruble of the reign of Peter the Great - - -	W.	2	7	18	1	315.7	3	8
Ruble of Catherine I. (1725) - - - - -	W.	2	4½	17	11	309.9	3	7¼
Ruble of Peter II. (1727) - - - - -	W.	2	12	18	5¾	310.2	3	7¼
Ruble of the emprefs Ann (1734) - - - -	W.	1	11	16	14½	317.2	3	8¼
Ruble of the emprefs Elizabeth (1750) - - -	W.	1	7	16	12	321.8	3	9
Ruble of Peter III. (1762) - - - - - -	W.	2	2	15	10	277.8	3	2¾
Ruble of Catherine II. (1780) - - - - -	W.	2	4	15	12	275.9	3	2½
Ruble of the emperor Paul (1799) - - - -	W.	0	14	13	12	280.8	3	3¼
Ruble of Alexander (1802) - - - - -	W.	0	13	13	1½	273	3	2
Ruble of Alexander (1805) - - - - -	W.	0	16	13	12	278.6	3	3
Poltin, or half ruble, of the emprefs Ann - - -	W.	1	10	7	21	151.2	1	9
Poltin of the emprefs Elizabeth - - - - -	W.	1	8	8	2	156.9	1	10
Poltin of Catherine II. - - - - - -	W.	2	4	7	1[illegible]	137.9	1	7¼
Poltin of Paul - - - - - - -	W.	0	15	[illegible]	18	139.8	1	7½
Poltin of Alexander (1804) - - - - -	W.	0	14	[illegible]	13½	136.5	1	7
Polpoltin, or quarter ruble, old - - - -	W.	2	6	4	1	71.2	0	10
Polpoltin of Paul - - - - - - - -	W.	0	1[illegible]	3	7	67.3	0	9½
Polpoltin of Alexander (1802) - - - - -	W.	0	13½	3	9½	70.8	0	10
20-copeck piece (1767) - - - - - -	W.	2	2	3	10¾	62.6	0	8¾
20-copeck piece (1784) - - - - - -	[illegible]	2	2	3	3	56.2	0	8
15-copeck piece (1778) - - - - - -	[illegible]	2	2	2	6	40.5	0	5½
10-copeck piece - - - - - - - -	W.	2	6	2	1	35.8	0	4¾
10-copeck piece (1798) - - - - - -	W.	0	14½	1	9	28.5	0	4
10-copeck piece (1802) - - - - - -	W.	0	13	1	8½	28.3	0	4
5-copeck piece (1801) - - - - - -	W.	0	13½	0	16½	14.3	0	2

Gold Coins.—The ruble, and alfo the double and half ruble, bear the fame impreffions as the ducat, *viz.* the head of the reigning emperor or emprefs, with the name and titles in Ruffian characters, thus tranflated: "Peter by the grace of God emperor, or Elizabeth by the grace of God emprefs, and fovereign of all the Ruffias;" but on the reverfe of the ruble the value is written, "New coin, 2 rubles or 1 ruble;" and the half piece bears on its reverfe the cypher of the emprefs Elizabeth, with the word "Poltina," which means half a ruble. Thefe coins, as well as the ducats, are now nearly out of circulation.

The imperial has the head of the reigning fovereign, with name and title as above; reverfe, a crofs formed by five efcutcheons, with the four figures of the year of coinage in the four angles; legend, "Imperial Ruffian coin, value 10 rubles;" and on the half imperial, "Value 5 rubles." But the half imperials of Paul I. have on one fide a fquare, with ornaments, containing the infcription, "Not unto us, not unto us, but unto thy name;" reverfe, a crofs and four crowns, with a capital I in the centre, and the figure 5 in the four angles of the crofs.

Silver Coins.—The ruble has the head of the reigning fovereign, with the name and title as on the gold coins; reverfe, a two-headed eagle crowned, with an efcutcheon on its breaft; legend, "New coin, value 1 ruble," or fimply "Coin 1 ruble," and the date. Some rubles of Peter I. and Catherine I. bear on the reverfe a crofs and four crowns, with four I's, or four double II's in the four angles, and the date within the crofs.

The ruble of Paul I. (1799, &c.) bears the fame impreffions as the half imperial of the fame period, except that the legend on the reverfe is "Coin, value 1 ruble." The

The ruble of Alexander (1802) bears on one ſide the eagle and legend, as above; on the reverſe, "Coin of the Ruſſian empire, ruble," encircled with a branch of laurel, and one of oak, having a ſmall crown at the top.

The poltina, or half ruble, bears the ſame impreſſions as the ruble, according to the period at which it was coined, except that the inſcription contains the word POLTINA, inſtead of RUBLE; and the quarter ruble is marked POLUPOLTINICK.

The 20-copeck piece has the head, name, and title of the reigning ſovereign, as above; reverſe, a two-headed eagle, with the number 20 on its breaſt, and no legend. The 15-copeck piece bears the ſame impreſſions, but it is marked 15.

The 10-copeck piece has the two-headed eagle; reverſe, the value of the piece, 10 COPECKS.

The 5-copeck piece has a Ruſſian P, with a crown over it, and under which is an I; reverſe, 5 COPECKS, and two laurel branches. Kelly's Univerſal Cambiſt.

RUBRIC, RUBRICA, in the *Canon Law*, denotes a title, or article, in certain ancient law-books; thus called, becauſe written, as the titles of the chapters in our ancient Bibles are, in red letters.

RUBRICS alſo denote the rules and directions given in the Liturgy; for the order and manner in which the ſeveral parts of the office are to be performed.

They are called *rubrics* from the Latin *ruber, red;* becauſe formerly printed in red ink, to diſtinguiſh them from the reſt of the office, which was in black; as they ſtill are in the Roman miſſals, &c.

The great rubric for the celebration of Eaſter, preſcribed by the Nicene council, is to this purpoſe: Eaſter-day to be the Sunday which falls upon, or next after, the firſt full moon which immediately ſucceeds the vernal equinox. Dr. Wallis has a particular diſcourſe on the ancient rubrics for the feaſt of Eaſter, in the Philoſophical Tranſactions.

RUBRICA. See REDDLE.

RUBUS, in *Botany*, an ancient Latin word, certainly of the ſame origin as *ruber*, which appears to be the Celtic *rub*, red. (See RHUS, ROSA, and RUBIA.) The red hue, more or leſs prevalent, in various parts of the different kinds of Bramble, of which the preſent genus conſiſts, readily accounts for the application of the above name.—Linn. Gen. 254. Schreb. 342. Willd. Sp. Pl. v. 2. 1080. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 541. Prodr. Fl. Græc. Sibth. v. 1. 349. Ait. Hort. Kew. v. 3. 267. Purſh 346. Juſſ. 338. Tourn. t. 385. Lamarck Illuſtr. t. 441. Gærtn. t. 73.—Claſs and order, *Icoſandria Polygynia*. Nat. Ord. *Senticoſæ*, Linn. *Roſaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, flattiſh, in five oblong, ſpreading, ſimple, permanent ſegments. *Cor.* Petals five, roundiſh or oblong, ſomewhat ſpreading, inſerted into the calyx, and uſually about the length of its ſegments. *Stam.* Filaments numerous, ſhorter than the corolla, inſerted into the calyx; anthers roundiſh, compreſſed. *Piſt.* Germens numerous, altogether ſuperior; ſtyles ſmall, capillary, one ſpringing from the ſide of each germen; ſtigmas ſimple, permanent. *Peric.* Berry compound, conſiſting of ſeveral roundiſh pulpy grains, each of one cell, collected into a convex head, hollow underneath, inſerted upon a conical ſpongy permanent receptacle, and at length deciduous. *Seeds* ſolitary, oblong, compreſſed.

Obſ. The ſeparate juicy grains, which compoſe the general berry, are uſually ſo attached to each other, that they cannot be diſunited without tearing. In *R. ſaxatilis* they are diſtinct. *R. Chamæmorus* is not, as Linnæus firſt thought, dioecious, but monoecious; Dr. Solander having obſerved that the male and female flowers grow from one root, though on ſeparate ſtems. Each flower of this ſpecies has indeed both ſtamens and piſtils, though, in one or other flower, one part is imperfect.

Eſſ. Ch. Calyx in five ſimple ſegments. Petals five. Berry ſuperior, compoſed of ſingle-ſeeded grains, deciduous. Receptacle permanent.

This numerous genus partakes conſiderably of the beauty and elegance prevalent throughout the whole order of *Roſaceæ*, and is beſides valuable, in many inſtances, for its wholeſome and highly grateful fruit. The *ſtem* is moſt generally ſhrubby; ſometimes herbaceous; more frequently trailing than erect; in ſome of the ſhrubby kinds biennial only, not perennial. Both *ſtem, ſtalks*, and even the ribs of the *leaflets*, in many of the ſhrubby ſpecies, are prickly. *Leaves* either lobed, digitate, pedate, or pinnate. *Flowers* either ſolitary, racemoſe, or panicled, red or white. *Fruit* black, blueiſh, red, or yellowiſh, often highly fragrant. Moſt of the ſpecies grow in cool climates, or mountainous ſituations. We have ſeveral to add to Willdenow's, which amount to 31 in number.

Section 1. *Stem woody.*

1. R. *roſæfolius*. Roſe-leaved Bramble.—Leaves pinnate, of five, or three, doubly ſerrated leaflets; green, and ſlightly downy, on both ſides. Stem and footſtalks prickly. Flowers ſolitary.—Sm. Plant. Ic. faſc. 3. t. 60. Willd. n. 1. Gathered by Commerſon in the iſle of Mauritius, and communicated by Thouin to the younger Linnæus. We have alſo a fine ſpecimen from ſir Joſeph Banks, without any account of its native country. The *ſtem* is ſhrubby, round, finely downy like the whole of the herbage, but no part is hoary or white. *Prickles* ſomewhat hooked, yellowiſh, rather ſmall, copiouſly ſcattered over the ſtem and leaf-ſtalks. *Leaflets* uſually five, ovato-lanceolate, taper-pointed, deeply, ſharply, and doubly ſerrated; beſprinkled with minute reſinous particles, and of the ſame colour, on both ſides. *Stipulas* in pairs on the baſe of each footſtalk, linear-lanceolate, narrow and acute. *Flowers* ſolitary, ſtalked, either axillary, or oppoſite to the leaves, one of them terminal. Segments of the *calyx* ovate, taper-pointed, longer than the *petals*, denſely downy, eſpecially on the inner ſide. We know nothing of the *fruit*. The minute globular reſinous particles, ſcattered, more or leſs copiouſly, over both ſides of the *leaves*, ſeem peculiar to this ſpecies.

2. R. *fraxinifolius*. Aſh-leaved Indian Bramble. Poiret in Lamarck Dict. v. 6. 242. (R. moluccus parvifolius; Rumph. Amboin. v. 5. 88. t. 47. f. 1.)—Leaves pinnate, of ſeven, or five, doubly ſerrated, parallel-veined leaflets; quite ſmooth on both ſides. Footſtalks prickly. Panicles terminal, ſmooth, widely ſpreading.—Gathered by Commerſon in Java. If we are right in the ſynonym of Rumphius, about which there ſeems little doubt, and which is certainly miſapplied by Linnæus to his *R. parvifolius*, this ſpecies is common in Amboyna, growing in low ſituations near rivers. He ſays the *fruit* is red, but watery and inſipid. The whole plant in our ſpecimen is, except the downy inſide of the *calyx*, quite ſmooth, and of ſo ſtriking an appearance with its large aſh-like *leaves*, marked with numerous, ſtraight, parallel veins, that we cannot but wonder at its having ſo generally eſcaped the notice of Indian botaniſts. The *ſtem* is round, ſlightly, or not at all, prickly; though the *footſtalks*, and now and then the rib of a leaflet, bear ſmall hooked prickles. *Stipulas* almoſt ſetaceous. *Panicles* terminal, many-flowered, repeatedly compound, widely ſpreading; their ſtalks ſlender, unarmed, with ſeveral, ſcattered, oblong, ſmooth *bracteas*, toothed at the end. Segments of the *calyx* broadly ovate, with a long ſlender

ſlender point; partly downy on the outſide, and denſely ſo within. *Petals* not obſerved. *Fruit* of very numerous ſmall grains. *Seeds* curiouſly reticulated or corrugated. Rumphius's figure is about half the ſize of nature.

3. R. *pinnatus*. Wing-leaved Cape Bramble. Willd. n. 2. Ait. n. 10.—"Leaves pinnate, of five or three rugoſe leaflets; ſmooth on both ſides. Stem, footſtalks, and flower-ſtalks prickly. Cluſter terminal."—Native country unknown. *Willd.* Cape of Good Hope, and iſland of St. Helena; from whence it was introduced by ſir Joſeph Banks in 1789. *Aiton.* A ſhrubby green-houſe plant, flowering in June and July. *Branches* villous, green, with hooked prickles. *Leaflets* ovato-lanceolate, green, ſharply and doubly ſerrated; their mid-ribs, like the *footſtalk*, prickly beneath. *Cluſter* ſimple. *Flower-ſtalks* villous, very prickly. *Calyx* villous, longer than the *petals*. *Willd.* We preſume the above authors both mean the ſame plant, though Willdenow is not cited by Aiton, and we have no ſpecimens from either. We ſhould ſuſpect that the above-mentioned ſpecimen of *roſæfolius*, communicated by ſir Joſeph Banks, might be Mr. Aiton's *pinnatus*, were not the latter, as well as Willdenow's, ſaid to have ſmooth leaves.

4. R. *auſtralis*. New Zealand Bramble. Forſt. Prodr. 40. Willd. n. 3.—"Shrubby. Flowers dioecious. Leaves pinnate, of five, or three, leaflets. Stem and footſtalks prickly. Cluſters ſimple, axillary."—Native of New Zealand. *Forſter.*

5. R. *rigidus*. Rigid Cape Bramble.—Leaves pinnate, of five, or three, partial-ſtalked leaflets; ſmooth above; very downy beneath. Stem downy, minutely prickly. Cluſter terminal, twice compound.—Native of the Cape of Good Hope. We know it only by an unnamed ſpecimen, from thence, in the Linnæan herbarium. The *ſtem*, *footſtalks*, *flower-ſtalks*, *calyx*, and under ſide of the *leaves*, are all very denſely clothed with fine, ſhort, velvet-like down. *Leaflets* uſually five, ovate, doubly and unequally ſerrated near an inch and a half long, each on a ſhort, thick, partial ſtalk; the upper ſide green, ſmooth, ſtriated with ſunk ribs and veins, which project on the downy under ſide. *Stipulas* lanceolate, downy. *Flowers* numerous, rather ſmall. *Calyx* with ſhort thick points. The *petals* ſeem to be awl-ſhaped, and very ſmall. We are unacquainted with the *fruit*.

6. R. *laſiocarpus*. Woolly-berried Bramble.—Leaves pinnate, of ſeven, or five, leaflets; ſmooth above; white and very downy beneath. Stem nearly ſmooth, with curved prickles. Cluſter terminal, ſimple. Fruit downy.—Native of Myſore and the neighbouring hills. Sent by the Rev. Dr. Rottler, under the name of *Rubus indicus*. It appears to be no where deſcribed. At firſt ſight the plant reſembles our Raſpberry, but the *leaflets* are generally ſeven, the odd one large, often three-lobed; their upper ſurface ſtrongly ſtriated with veins, which are occaſionally hairy; the under very white and woolly, with yellowiſh, hairy ribs and veins. *Stipulas* awl-ſhaped, hairy. *Prickles* of the ſtem numerous, ſtrong, a little curved. *Cluſter* of few *flowers*, downy and prickly. *Fruit* clothed with denſe, white, woolly down. *Seeds* reticulated. Poſſibly *R. apetalus* of Poiret, Lamarck Dict. v. 6. 242, may be allied to this.

7. R. *idæus*. Raſpberry. Linn. Sp. Pl. 706. Willd. n. 4. Ait. n. 1. Purſh n. 1. Fl. Brit. n. 1. Engl. Bot. t. 2442. Woodv. Med. Bot. t. 158. Fl. Dan. t. 788. Ger. Em. 1272. Math. Valgr. v. 2. 357.—Leaves pinnate, of five, or three, ovate, rather angular leaflets, very downy beneath. Footſtalks channelled. Stem with briſtly prickles. Cluſters terminal, lax, ſomewhat compound. Native of mountainous or ſtony woods and thickets throughout Europe. Mr. Purſh ſays it occurs alſo in hedge-rows, from Canada to Pennſylvania; and Dr. Buchanan gathered what we cannot conſider as a diſtinct ſpecies, in the woods of Nepaul. It flowers every where in April, May, or June, ripening fruit about ſix weeks after. The *ſtems* are erect, ſhrubby, though only biennial, with creeping perennial *roots*. They are pale brown, uſually rough with ſmall briſtles rather than thorns; ſometimes they are quite ſmooth. Lower *leaves* pinnate, with two pair of leaflets and an odd one; upper ternate only; leaflets broad-ovate, partly rhomboid, unequally and ſharply ſerrated and cut, more or leſs pointed; greyiſh-green, and nearly ſmooth, above; white with denſe cottony down beneath, like the *calyx* and *flower-ſtalks*. *Footſtalks* rather downy, with a ſtrong furrow along their upper ſide, prickly, like the *flower-ſtalks*. *Stipulas* ſetaceous. *Cluſters* terminal, for the moſt part ſimple, lax, rather drooping. *Flowers* pendulous. *Calyx* with taper points, variable in length. *Petals* erect, obovate, white, ſmall. *Fruit* crimſon, of numerous pulpy grains, beſet with the permanent ſtyles. Its rich ſweetneſs, and highly perfumed flavour, render this fruit generally agreeable, both recent and preſerved. Raſpberry jam is an acceptable preſent, even in India. There are ſeveral cultivated varieties, differing in ſize and luxuriance, as well as the colour of the berries, which are ſometimes of an amber hue. Mr. Purſh ſays there are a number of wild varieties in America; a circumſtance which we have not much remarked in Europe. There is uſually a ſecond crop of the fruit in gardens. The flavour of the wild kind is thought ſuperior to the cultivated; at leaſt in Wales.

8. R. *ſuberectus*. Red-fruited Bramble. Engl. Bot. t. 2572. Ait. Epit. Hort. Kew. 373. (R. neſſenſis; Hall in Tr. of R. Soc. Edinb. v. 3. 20.)—Leaves pinnate, of ſeven, five, or three ovate leaflets; hairy beneath. Footſtalks channelled. Stems aſcending. Prickles minute, nearly ſtraight. Flowers axillary and terminal, ſomewhat panicled.—This ſpecies, firſt obſerved in Scotland near Loch Neſs, has ſince been found in other parts of that kingdom by Mr. George Anderſon, F.L.S. as well as in Wales and Yorkſhire. It is often intermixed with *corylifolius*, hereafter deſcribed, which it reſembles in habit, eſpecially in the pubeſcence, ſize, and hue of the foliage, though more naturally allied to *R. idæus*. The *ſtems* are biennial, not quite upright, brittle, reddiſh, nearly round, with ſpreading branches. *Prickles* ſcattered, ſmall. *Leaves* light green on both ſides; ſmooth above. *Panicles* racemoſe, rather lax, terminal and axillary. *Petals* larger and more ſpreading than in the laſt. *Calyx* finally reflexed. *Fruit* deep red, agreeable in flavour, later than the Raſpberry, and perhaps for that reaſon, as Mr. Anderſon ſuggeſts, not unworthy of cultivation.

9. R. *biflorus*. Two-flowered Bramble. Buch. MSS.—Leaves pinnate, of five or three acute jagged leaflets; hairy above; white and downy beneath: the odd one three-lobed. Stem and footſtalks prickly. Flower-ſtalks downy, terminal, in pairs, ſingle-flowered.—Native of wet ſituations, about banks of rivers in Upper Nepaul. Gathered by Dr. Buchanan at Chitlong, April 13, 1802. The *ſtems* are partly procumbent, branched, angular, a little zigzag, armed with ſcattered, ſtraight prickles. *Leaves* on long, hairy, prickly ſtalks; their leaflets deeply ſerrated and jagged, uſually five, the terminal one nearly ſeſſile, more or leſs diſtinctly three-lobed, or even pinnatifid, though ſometimes confluent with the two next, ſo as to make with them one deeply three-cleft leaflet; they are all very hairy, though green above; ſnow-white, with greeniſh hairy veins,

 beneath.

beneath. *Stipulas* linear. *Flowers* in pairs at the end of each branch, drooping. Segments of the *calyx* broad-ovate, very downy, with ſhort naked tips. *Petals* broad and roundiſh, as long as the calyx. Of the *fruit* we are ignorant.

10. R. *ſtrigoſus*. Rough-ſtalked American Bramble. Michaux Boreali-Amer. v. 1. 297. Purſh n. 3. (R. penſylvanicus; Lamarck Dict. v. 6. 246.)—"Leaves pinnate, of five, or three, oval, pointed leaflets; downy and white beneath. Stem erect, very briſtly, without thorns. Flowers axillary, ſolitary; their ſtalks and calyx hiſpid."—Native of the mountains from Canada to Virginia, flowering in June and July; berries very agreeably flavoured. *Purſh.* The *branches*, *ſtalks*, and ribs of the *leaves*, *flower-ſtalks* and *calyx*, are all very hiſpid, but not prickly. *Michaux.*

11. R. *Commerſonii*. Commerſonian Bramble. Poiret in Lamarck Dict. v. 6. 240.—"Leaves pinnate, of ſeven, or five, leaflets, ſmooth on both ſides. Stem prickly. Flowers terminal or axillary, nearly ſolitary. Calyx with long points."—Found by Commerſon in ſhady mountainous parts of the iſland of Java. Poiret ſays it has ſome relationſhip to *R. idæus*, but the *leaflets* are ſmaller, ſmooth on both ſides, and the *flowers* larger. *Prickles* nearly ſtraight, ſcattered. *Leaflets* narrow, cut and ſerrated; the odd one ſometimes lobed. *Footſtalks* cylindrical, prickly. *Petals* white, roundiſh, ſcarcely longer than the calyx. *Fruit* reddiſh, the ſize of raſpberries, but with a much leſs agreeable taſte and ſmell. We have ſeen no ſpecimen.

12. R. *occidentalis*. Virginian Raſpberry. Linn. Sp. Pl. 706. Willd. n. 5. Ait. n. 2. Purſh n. 6. (R. idæus, fructu nigro, virginianus; Dill. Elth. 327. t. 247.)—Leaves ternate, taper-pointed, doubly ſerrated; downy and white beneath. Footſtalks nearly cylindrical; prickly and glaucous, like the ſtem. Prickles hooked. Cluſters terminal, very prickly.—Native of rocky mountainous ſituations, from Canada to Carolina, flowering in May and June. Cultivated in Chelſea garden, before the year 1696, according to Plukenet. The *ſtem* is round, conſpicuous for its peculiarly fine glaucous bloom, even in a dried ſtate. *Leaves* all ternate, the ſide leaflets often furniſhed with a lateral notch, or lobe. *Prickles* on the *flower-ſtalks* remarkably numerous, and hooked. *Petals* ſmall, white, commonly emarginate. *Fruit* black, ſometimes red, ſweetiſh, but not highly flavoured. *Seeds* wrinkled.

13. R. *triphyllus*. Three-leaved Japaneſe Bramble. Thunb. Jap. 215. Willd. n. 6.—Leaves ternate, rounded, cut and coarſely ſerrated; entire at the baſe; downy and white beneath. Branches, footſtalks, and flower-ſtalks hairy and prickly. Flowers ſomewhat racemoſe.—Gathered by Thunberg in Japan. *Stem* round, ſmooth, purpliſh, with ſlender, ſpreading, wavy *branches*, which are hairy and minutely prickly. *Leaflets* rounded, broad and abrupt, nearly ſmooth above, of a thin and pliant ſubſtance. *Flower-ſtalks* very ſhaggy juſt under the *calyx*, which is downy and white, with long taper points. *Petals* erect, obovate, crenate, with long claws. This ſpecies is in reality more akin to our Raſpberry than any other, though perhaps ſufficiently diſtinct. We have no knowledge of the fruit.

14. R. *tomentoſus*. Velvet-leaved Bramble. Willd. n. 7. Sm. Prodr. Fl. Græc. Sibth. v. 1. 349. (R. etneus, trifolius rectus candicans ac piloſus; Cupan. Panphyt. v. 1. t. 149.)—Leaves ternate, or quinate, obovate, unequally ſerrated, all over hoary, very ſoft and downy; paler beneath. Stem and footſtalks with hooked prickles. Panicle downy, many-flowered. Bracteas linear-lanceolate, ſometimes thr e-cleft.—Native of Germany, Switzerland, the neighbourhood of Conſtantinople, and the country about mount Etna. We know no figure of this ſpecies, except in the very rare old work of Cupani, where it is extremely well repreſented, nor does any ſyſtematic author but Willdenow deſcribe it. Botaniſts have moſt unaccountably confounded it with the common *R. fruticoſus*, from which, and every other known ſpecies, it is diſtinguiſhed by the peculiar and uniform ſoft pubeſcence of its *leaves*, equalling that of the Marſh Mallow. The *leaflets* vary in ſhape, but are always contracted towards their baſe. They are uſually three, the lateral ones ſometimes lobed at the lower edge. We have a ſpecimen with five diſtinct leaflets, the lowermoſt pair ſmalleſt, growing out of the partial footſtalks of the next. The *ſtem* is angular, downy, with many uniform, rather ſmall, ſtrongly hooked prickles, ſuch as occur alſo on the footſtalks. *Flowers* large and abundant, with obovate, white, ſpreading *petals*, twice as long as the *calyx*; whoſe ſegments are ovate, finely downy, with ſmall points. The *bracteas* are more pale and membranous than in *fruticoſus*. *Stipulas* linear, very narrow, hairy. This ſpecies is unknown in England, either wild or cultivated.

15. R. *cuneifolius*. Wedge-leaved American Bramble. Purſh n. 5. (R. parvifolius; Walt. Carol. 149.)—"Leaves digitate, of three or five obovate-wedge-ſhaped leaflets; unequally toothed upwards, plaited, entire at the margin, revolute; downy beneath. Stem, footſtalks, and flower-ſtalks downy, with ſcattered recurved prickles. Cluſters terminal, panicled; the partial flower-ſtalks divaricated, and almoſt naked."—In ſandy fields and woods, from New Jerſey to Carolina, flowering in June and July. A ſtraggling briar, of a grey aſpect; the *berries* hard and dry. *Purſh.* Not having ſeen this plant, we have given, as nearly as poſſible, a tranſlation of Mr. Purſh's ſpecific character, though we do not quite underſtand what regards the *leaves*.

16. R. *ellipticus*. Oval-leaved Indian Bramble.—Leaves ternate, elliptical, finely ſerrated; downy and hoary beneath: the lower ones ſimple, ſomewhat three-lobed. Stem and footſtalks hiſpid, downy, and prickly. Panicle denſe, hairy.—Gathered by Dr. Buchanan, in January and April 1802, about the ſtony banks of rivulets in Nepaul. This *ſhrub* is ten or twelve feet high, with long, climbing, angular, zigzag, leafy *branches*, not only clothed with ſoft down, and copious rigid prominent briſtles, but alſo bearing ſcattered, hooked, ſtrong, though not large, prickles. The *footſtalks* are ſimilarly furniſhed. *Leaflets* much reſembling thoſe of a common Provins Roſe in ſhape and ſerratures, but rather larger, and only three to each leaf; ſmooth above; their under ſurface grey or whitiſh with fine down; the veins parallel, ſtraight, ſtrongly marked. *Stipulas* ſetaceous. The lower *leaves*, and ſmall axillary ones, are ſimple, occaſionally three-lobed. *Panicle* terminal, denſe, ſhorter than the *leaves*, compound. *Flowers* not very numerous. *Calyx* downy. *Petals* white, longer than the calyx. *Berries* yellow, pleaſantly flavoured. *Seeds* wrinkled, numerous.

17. R. *hiſpidus*. Briſtly American Bramble. Linn. Sp. Pl. 706. Willd. n. 8. Ait. n. 3. Purſh n. 7.—Leaves ternate, ſtrongly ſerrated, ſmooth on both ſides. Stems trailing, round, hiſpid as well as the footſtalks. Cluſters terminal, ſlender, ſomewhat hiſpid, of few flowers.—Gathered in Canada by Kalm, whoſe ſpecimen is before us. The *ſtems* are very long and trailing, clothed with copious, brown, reflexed briſtles, without prickles, as are alſo the *footſtalks*. *Leaflets* of a ſhining green; the middle one obovate; the others dilated, and often lobed at the outer edge; all acute, unequally ſerrated. *Flowers* few, with linear,

linear, sometimes three-cleft, *bracteas*. *Berries* of few grains, with large wrinkled *seeds*. Perhaps this ought to be arranged among the herbaceous species, near *saxatilis* hereafter described.

18. R. *trivialis*. Common American Dewberry. Michaux Boreali-Amer. v. 1. 296. Pursh n. 8.—"Leaves ternate, or quinate, oblong-oval, acute, unequally serrated, rather downy. Stems trailing. Flower-stalks solitary, elongated, rough, like the footstalks, with recurved prickly bristles. Stipulas awl-shaped. Petals obovate, thrice the length of the calyx."—Common in old fields, from New England to Carolina, blossoming in May and June. *Flowers* large. *Berries* black, large, very agreeably flavoured, known by the name of Dewberries. *Pursh.*

19. R. *flagellaris*. Long Trailing American Bramble. "Willd. Enum. 549." Pursh n. 9. (R. trivialis; Ait. n. 7. *Pursh.*)—Leaves ternate, unequally serrated, smooth on both sides. Stems trailing, round, beset, like the footstalks, with recurved prickles. Clusters terminal, lax, slender, downy, of few flowers.—Native of fields and sandy woods, from Virginia to Carolina, flowering in June and July. *Pursh.* Very nearly akin to *R. hispidus*, n. 17, but the *leaves* are smaller, and the *stem* is rather prickly than bristly. The hooked prickles on the *footstalks* are few, and widely scattered. *Petals* more orbicular than in the last; whether they accord with those of *hispidus*, we have not materials to determine; but we are greatly inclined to think the present is but a variety of that species.

20. R. *inermis*. Smooth American Bramble. "Willd. Enum. 548." Pursh n. 10. ("R. hispidus; Walt. Carol. 149?")—"Leaves ternate, ovate, acute, unequally serrated; downy beneath; the lateral leaflets somewhat cut. Stem, footstalks, and flower-stalks unarmed. Stipulas narrow-awl-shaped."—Native of Pennsylvania. We have seen no specimen of this species, nor did Mr. Pursh himself meet with it in America.

21. R. *parvifolius*. Small-leaved Indian Bramble. Linn. Sp. Pl. 707. Willd. n. 9; excluding the synonym of Rumphius, which has no affinity to this species, but rather belongs to our *fraxinifolius*, n. 2.—Leaves ternate, wrinkled, rounded, cut, and crenate; somewhat hairy above; downy and snow-white beneath. Branches and footstalks downy, with short hooked prickles. Stem round. Panicles downy and hairy, of few flowers.—Gathered by Osbeck in China. A miserable specimen from him, without flowers, exists in the Linnæan herbarium; but we have very complete ones collected by Dr. Buchanan, at Chitlong in Nepaul, April 10, 1802. Their first appearance accords very much indeed with our Common Raspberry, but the *leaflets* are all ternate, rounded, not pointed, crenate rather than serrated, as well as more wrinkled; and their upper surface, though green, is clothed with extremely soft hairs, feeling like velvet. The *flowers*, though few together, are panicled rather than simply racemose; their very woolly *calyx* is destitute of long points; and their *stalks* are hairy as well as woolly. We have no account of the *fruit*. The short, but strong and hooked, *prickles* moreover afford an essential distinction between this species and *R. idæus*.

22. R. *sanctus*. Bramble of the Holy Land. Schreb. Dec. 15. t. 8. Willd. n. 10. (R. creticus triphyllus, flore parvo; Tourn. Cor. 43. Pococke's Trav. v. 2. pt. 2. 190.)—Leaves ternate, or simple, downy and white beneath. Branches and footstalks downy, with hooked prickles. Stem angular. Panicles downy, many-flowered. Native of Crete and Palestine. This has a general resemblance to our British *R. fruticosus*, but has smaller, more rounded, and fewer *leaflets*. The *flowers*, and whole plant, are also of smaller dimensions. We do not however profess to be well acquainted with the limits of these two species, nor has the present one been properly investigated.

23. R. *jamaicensis*. Jamaica Bramble. Linn. Mant. 75. Willd. n. 11. Swartz Obs. 205. (R. n. 1; Browne Jam. 242. R. foliis longioribus, subtùs molli lanugine obductis et incanis, flore et fructu minoribus; Sloane Jam. v. 2. 109. t. 213. f. 1.)—Leaves ternate, or pedato-quinate, pointed, sharply serrated; white and finely downy beneath. Branches, footstalks, and flower-stalks downy, with hooked prickles. Panicles lax.—Native of Jamaica; frequent in the mountains of St. Mary's, and those beyond mount *Diable*, towards St. Ann's, but seldom seen in any other part of the island. *Browne.* Sloane justly remarks, that any arguments in favour of the coldness of the air in parts of Jamaica, or Hispaniola, where this bramble occurs, prove nothing, because it is a different species from our European one. Possibly however they may be more nearly related than he was aware. The pubescence of the back of the *leaves*, though very fine, soft, and white, is often approached in those particulars by that of our *fruticosus*, even on the same stem, with leaves that are almost green underneath. The insertion of the stalks of the fourth and fifth *leaflets*, when present, upon those of the next pair, making a pedate leaf, is characteristic of the Jamaica Bramble, but even this is occasionally to be detected in our's. The *flower* and *fruit* are said to be smaller than in *fruticosus*. In the Linnæan specimen the *flowers* are double, quite as large as those of the latter. The ribs of the *leaflets* are prickly in both; nor are the serratures at all more deep in one than the other.

24. R. *roseus*. Red-flowered Peruvian Bramble. Poiret in Lamarck Dict. v. 6. 245.—Leaves ternate, or simple, smooth. Stipulas oval, obtuse. Flowers axillary, nearly solitary. Calyx smooth, slightly fringed. Stem, flower-stalks, footstalks, and ribs of the leaves very prickly.—Gathered by Dombey in Peru. The *branches*, according to Poiret, are woody, striated, smooth, zigzag, prickly. *Leaves* very large, mostly ternate, oval or lanceolate, unequal, smooth on both sides; a little paler beneath. The terminal *leaflet* is four or five inches long, and three broad. *Stipulas* large, almost half embracing the stem. *Flower-stalks* long, plentifully furnished with strong, reddish, recurved prickles. *Calyx* large, with bluntly-pointed segments, a little fringed at the margin. *Petals* rose-coloured, roundish, shorter than the calyx, furnished with claws. We have seen no specimen, but the above description leaves no doubt of this being a most distinct species.

25. R. *urticæfolius*. Nettle-leaved Peruvian Bramble. Poiret in Lamarck Dict. v. 6. 246.—Leaves ternate, or simple, ovate, sharply serrated; silky beneath. Stem, flower-stalks, footstalks, and ribs of the leaves densely hispid and somewhat prickly. Panicles compound, many-flowered. Calyx silky.—Gathered at Lima by Dombey, from whom we have a specimen. This is said to be of very lofty growth. The *branches* are angular, remarkable, like all the *stalks*, for a dense rusty coating, resembling coarse plush, among which some few short hooked prickles are interspersed. The *leaflets* are large, densely, sharply, and rather unequally serrated; in form ovate, or somewhat elliptical; their upper side green, minutely downy; the under very densely covered with shining silky pubescence, which is said by Dombey to be of a silvery whiteness when fresh, though rather tawny in our specimen. *Stipulas* almost setaceous. *Panicle* large, dense, many-flowered. *Bracteas* ovate, silky externally, as well as the *calyx*. *Petals* minute, white.

white. *Fruit* black, of numerous grains, with reticulated *ſeeds*.

Mutis ſent Linnæus a ſpecimen from Santa Fé, which agrees in every eſſential particular with that of Dombey, except the *leaflets* being ſmaller, and in ſome inſtances five in number.—The ſpecific name does not appear to us very appropriate; *holoſericeus* would have been better, for we have met with nothing of ſo ſilky an aſpect in the genus beſides.

26. R. *cæſius*. Common Dew-berry. Linn. Sp. Pl. 706. Willd. n. 12. Ait. n. 4. Fl. Brit. n. 2. Engl. Bot. t. 826. Bulliard t. 381. (R. minor, fructu cæruleo; Bauh. Hiſt. v. 2. 59.)—Leaves ternate, hairy beneath; the lateral leaflets lobed externally. Stem prickly, proſtrate, glaucous. Calyx embracing the fruit.—Native of Europe, in groves and buſhy places; not rare in England; about ſhady hedges and the borders of fields, flowering in June and July, bearing fruit throughout Auguſt and September. The ſtems are round, weak and trailing, beſet with ſlender ſlightly curved prickles, and conſpicuous for a vivid glaucous bloom, eaſily rubbed off. Though woody, they are only annual, or at moſt biennial. *Leaflets* three, of a broad, rounded, ovate figure, acute, ſharply and doubly ſerrated, light green; downy and a little paler, but not hoary, beneath; the lateral ones ſeſſile, generally lobed on the outſide. *Footſtalks* prickly and downy. *Stipulas* lanceolate. *Flowers* few together, in ſlender, terminal or axillary, prickly panicles. Segments of the *calyx* ovate, or obovate, long-pointed, downy, ſpreading the *flower*, cloſed about the *fruit*, which laſt character is neglected in Bulliard's, otherwiſe characteriſtic, plate. *Petals* obovate, longer than the calyx, ſpreading, waved and crumpled, white, rarely reddiſh. *Fruit* of few and rather large grains, black with a bright blue tinge, like a plum; its flavour very agreeably acid, though not perfumed, and deſtitute of the mawkiſh flavour of the common Black-berry.

27. R. *corylifolius*. Hazel-leaved Bramble. Fl. Brit. n. 3. Engl. Bot. t. 827. Ait. n. 5. (R. major, fructu nigro; Schmidel Ic. t. 2. R. montanus repens, ſarmentis longiſſimis et rotundis, ſpinis tenuiſſimis exaſperatis, amplo coryli folio, flore albo, fructu nigro craſſiore; Mich. Hort. Florent. 82. Till. Pis. 149?)—Leaves quinate, or ternate, rounded, hairy beneath; the lateral leaflets ſeſſile. Prickles ſtraightiſh. Calyx of the fruit reflexed.—Native of England, Germany, and probably of Italy. We cannot diſcover that Dr. Sibthorp met with this ſpecies in Greece. Dillenius ſeems to hint at it in his edition of Ray's *Synopſis*, 467, as differing from the common bramble, in having "earlier, larger, and white bloſſoms," which is correctly true. Mr. Crowe, ever attentive to the uſeful parts of botany, was led to diſtinguiſh our *corylifolius*, by obſerving that thatchers rejected the *ſtems*, on account of brittleneſs, and ſelected the true *fruticoſus* to bind down their thatch, that ſpecies being truly ſhrubby and perennial; while the *ſtems* of the preſent are, like thoſe of the Raſpberry, biennial, and far more brittle than *fruticoſus*. They are moreover roundiſh, all the prickles nearly ſtraight, not hooked. The *leaflets* are large, pliant, doubly ſerrated, always of a bright green on both ſides; hairy, but never white or cottony, beneath. Some of them ſo exactly reſemble the leaves of a hazel, that we have puzzled good botaniſts to diſtinguiſh one from the other. The *flowers* appear early in July, and are white, forming an oblong cylindrical *panicle*. *Fruit* earlier, of a browner black, of rather fewer grains, and more gratefully acid than in *fruticoſus*, being intermediate, as it were, between the Dew-berry and Common Black-berry. Its reflexed *calyx* diſtinguiſhes it readily from the former. Our *corylifolius* is ſuppoſed to be the *fruticoſus* of Hoffmann's German Flora, and perhaps of many other botaniſts. Willdenow has it not.

28. R. *fruticoſus*. Common Bramble, or Black-berry. Linn. Sp. Pl. 707. Willd. n. 13. Ait. n. 6. Fl. Brit. n. 4. Engl. Bot. t. 715. Mill. Illuſtr. t. 45. (R. major, fructu nigro; Bauh. Hiſt. v. 2. 57. Rubus; Ger. Em. 1272. Camer. Epit. 751.)—Leaves moſtly quinate, downy beneath; leaflets ſtalked. Stem angular, beſet, like the footſtalks and flower-ſtalks, with hooked prickles. Calyx of the fruit reflexed.—Common in hedges and thickets throughout Europe; flowering with us in July and Auguſt, and ripening fruit in September and October. Dr. Sibthorp found this ſpecies extremely abundant in Greece, and conceived it to be, as generally ſuppoſed, the true Βατος, or Bramble, of Dioſcorides, the ſame name being given to it by the modern Greeks. The *ſtem* is truly ſhrubby and perennial, long and arching, purpliſh, ſtrongly angular, armed with very powerful hooked prickles, ſuch as occur, of a ſmaller ſize, on the ſtalks and ribs of the *leaves*, as well as on the *flower-ſtalks*. The *leaflets*, uſually five, are of a narrower, more oblong, and pointed form than the laſt; dark green above; very white and cottony beneath; though ſpecimens may occaſionally be found which have, on one and the ſame branch, ſuch white-backed leaves, with others that are pale green, or barely hoary. All the *leaflets* have commonly very conſiderable partial footſtalks, the outermoſt more or leſs combined with the next. The *flowers* in long, cylindrical, compound, denſe, and rigid panicles, are of an elegant bluſh or roſe-colour, ſeldom white. *Calyx* downy, moderately pointed, always reflexed both in flower and fruit. *Berry* of very numerous crowded grains, of a violet black when ripe, with a ſweet but mawkiſh taſte, acceptable only to children, whoſe

> "Pretty lips with black-berries,
> Are oft beſmeared and dyed."

There is a ſuppoſed variety of *R. fruticoſus* with jagged *leaves*, green beneath, and double white *flowers*.

29. R. *villoſus*. Hairy American Black-berry. Ait. n. 8. Willd. n. 14. Purſh n. 2.—Leaves quinate, or ternate, ovate-oblong, taper-pointed, ſharply ſerrated, finely hairy on both ſides. Stem and footſtalks hiſpid, and ſomewhat prickly. Cluſters ſimple, lax, hairy, and glandular; ſometimes leafy.—In old fields and commons, from New England to Carolina, frequent, flowering in June and July, and known by the name of Black-berries. *Purſh*. It appears to have been introduced into the gardens of England and France about the ſame time, near 40 years ago. In the latter it was called *R. vulpinus*. The *leaves* are rather large, properly conſiſting of five leaflets, green on both ſides, of which the terminal one has a very long partial ſtalk, and the two hindmoſt very ſhort ones, all the partial ſtalks radiating from one point. In ſome of the upper leaves the lateral leaflets are combined for almoſt their whole length; the next leaf to theſe is ternate; and the uppermoſt of all ſimple, diminiſhing into a leafy *bractea* under each *flower-ſtalk*, but ſtill accompanied by *ſtipulas*. The *flowers* are rather ſmall, and ſeem to be white.

30. R. *canadenſis*. Purple-ſtalked Canada Bramble. Linn. Sp. Pl. 707. Willd. n. 15. Purſh n. 4.—Leaves digitate, of from ten to five, or three, lanceolate, taper-pointed, ſharply ſerrated, partial-ſtalked leaflets, ſmooth on both ſides. Stem without prickles.—In rocky barren woods of Canada and New England, flowering in June and July.

 The

The *stem* and old branches are purple. *Pursh.* This is very unlike all the rest, having so many *leaflets*, all smooth on both sides; paler beneath, where they are marked by strong, prominent, parallel veins. *Footstalks* channelled, purplish, nearly or quite smooth. *Stipulas* setaceous. *Flowers* in simple, dense, terminal, downy *clusters*, with ovate, pointed, smooth *bracteas*. *Calyx* of the fruit reflexed, slightly downy. *Berries* of a few large grains, with wrinkled *seeds*. Linnæus by mistake cites the very same figure of Miller, which a few lines below, he properly refers to *R. odoratus*. This error Willdenow implicitly copies, without doubt or remark.

31. R. *spectabilis*. Elegant American Bramble. Pursh n. 11. t. 16.—Leaves ternate, ovate, acute, doubly serrated; downy beneath. Stem smooth and unarmed. Stalks single-flowered, solitary. Petals ovate.—Gathered by Mr. Menzies on the north-west coast of America, and by governor Lewis on the banks of the Columbia; flowering in April and May. *Pursh.* An elegant *shrub*, four or five feet high. *Stem* smooth, destitute of prickles; the *branches* slender, round, very smooth. *Leaves* large, on downy, channelled, occasionally somewhat prickly *stalks*, ternate; the lateral leaflets sessile, oblique at the base, and lobed at the outer side. *Stipulas* awl-shaped. *Flowers* as large as in the following species, of a full and rich crimson. Segments of the *calyx* downy, oblong, with short points. *Petals* full twice as long as the calyx.

32. R. *odoratus*. Flowering Raspberry. Linn. Sp. Pl. 707. Willd. n. 16. Ait. n. 9. Pursh n. 12. Curt. Mag. t. 323. Mill. Ic. t. 223. Cornut. Canad. 149. t. 150.—Leaves simple, with three or five acute lobes. Stem erect, hispid, unarmed. Corymbs terminal, spreading, hispid and glutinous. Petals nearly orbicular. Calyx with linear leafy points.—This, according to Mr. Pursh, is found in the woods of Canada, and on the Allegany mountains, from New York to Carolina, blossoming in June and July. In the gardens of Europe it has been cultivated for above a century, being, though a greenhouse plant in Sweden, perfectly hardy with us, and generally admired in shrubberies for the beauty of its copious, large, crimson *flowers*, with singularly white *stamens*; as well as for the cedar-like fragrance of its glutinous, rough, brown *flower-stalks* and *calyx*. The *stems* are a yard high, or more, biennial like *R. idæus*. *Leaves* ample, serrated, roughish, of a fine green. The *fruit* is scarcely ever formed in England. Miller describes it as reddish, insipid, of numerous small grains. Mr. Pursh says "the *berries* are yellow, of a very fine flavour and large size, but scarcely ever produced in the gardens."

33. R. *alcææfolius*. Hollyhock-leaved Bramble. Poiret in Lamarck Dict. v. 6. 247.—Leaves simple, somewhat palmate, sharply serrated, rugose; downy beneath. Clusters axillary and terminal, prickly. Bracteas in many capillary segments. Calyx very hairy, inflated. Branches angular. Gathered by Commerson in Java. The *stems* are about as tall as *R. idæus*, divided into very hairy, almost quadrangular, *branches*, furnished with reddish prickles. *Leaves* lobed, almost palmate, sharply toothed, very broad; rough and wrinkled, but not hairy, on their upper surface; downy beneath, with yellowish reticulated veins. *Footstalks*, as well as the principal ribs of each leaf, prickly. *Clusters* short, prickly, very hairy. *Bracteas* hairy, divided into numerous capillary segments. *Calyx* inflated, almost globular, divided half way down into five oval segments; white within; clothed externally with dense, tawny, woolly hairs. *Petals* roundish, white, soon falling. We know nothing of this species but from Poiret's description, which is very clear and well marked. We have altered his specific character by that description, for the purpose of contrasting its essential particulars with the following.

34. R. *rugosus*. Rugged-leaved Bramble.—Leaves simple, heart-shaped, roundly lobed, crenate, rugose; downy beneath. Clusters axillary and terminal. Bracteas ovate, cut. Calyx very hairy, branches round, prickly.—Gathered by Dr. Buchanan, July 18, 1802, at Sembu, in Upper Nepaul, where it is called, in the Parbuttic language, *Jogi Ayshalu*, and by the Nawars *Cumbatashi*. The *stem* is climbing, with round, downy *branches*, armed with small, scattered, hooked prickles. *Leaves* as broad as the palm of the hand, heart-shaped, acute, with about five or seven rounded, sharply crenate, rather shallow lobes; the upper side green, tessellated with numerous wrinkles, rather hairy; the under white and downy, reticulated with innumerable veins. *Footstalks* round, downy and prickly, as well as the principal ribs. *Stipulas* oblong, ovate, toothed, downy. *Clusters* short and dense, chiefly axillary, not so long as the footstalks, of few flowers; the terminal one larger. *Bracteas* broader than the stipulas, hairy, slightly cut or toothed. *Flowers* large. *Calyx* densely covered with long silky hairs; its segments ovate, acute, recurved, downy within. *Petals* white, erect, almost as long as the calyx, ovate, obtuse, finely toothed, furnished with claws. *Fruit* red. The round *branches*, less divided *leaves*, and more entire *bracteas*, seem to render this essentially distinct from Poiret's *alcææfolius*, to which it is evidently next akin.

35. R. *tiliaceus*. Lime-leaved Bramble.—Leaves heart-shaped, rounded, acute, sharply crenate, very obscurely lobed; white and downy beneath. Clusters axillary. Segments of the calyx lanceolate, downy. Stem and footstalks round, downy, slightly prickly. Gathered by Dr. Buchanan at the same place as the last, June 2, 1802. The *leaves* somewhat resemble those of the American *Tilia alba*. They are sometimes nearly orbicular, but generally have indications of a slight lobe at each side; the upper surface is green, naked, and tolerably even; the under clothed with very soft fine white down. All the stalks, like the *calyx*, are more cottony than silky. The latter is deeply divided, spreading, or in some degree recurved. *Petals* small, spatulate. *Seeds* wrinkled. The *clusters* are more lax, and the *flowers* very much smaller than in *R. rugosus*. Small dispersed prickles may be felt, rather than seen, here and there on the downy *branches* and *footstalks*. The *bracteas* are small, woolly, deeply jagged.

36. R. *moluccanus*. Molucca Bramble. Linn. Sp. Pl. 707. Willd. 17. (R. moluccus latifolius; Rumph. Amboin. v. 5. 88. t. 47. f. 2.)—Leaves simple, heart-shaped, somewhat lobed, crenate; white and downy beneath. Clusters axillary and terminal, aggregate. Bracteas deeply palmate. Calyx silky. Stem and footstalks round, downy, prickly.—Native of Amboyna and the Molucca islands. Very nearly allied to the three preceding species, but the *leaves* are more elongated and acute than in any of them, with a pair of rounded, more or less distinct, lateral lobes towards the base. The deeply palmate, or digitate silky *bracteas* seem nearly to agree with those of the *alcææfolius*. The *flowers* are plentiful. *Calyx* silky, with deep, lanceolate, taper-pointed segments. *Petals* obovate, crenate. *Fruit* red, eatable, but rather insipid.

37. R. *microphyllus*. Small-leaved Japan Bramble. Linn. Suppl. 263. (R. palmatus; Thunb. Jap. 217. Ki Itzigo; Kæmpf. Amœn. Exot. 787.)—Leaves simple, heart-shaped, obtuse, three-lobed, smooth. Stem and footstalks prickly. Flowers solitary. Outside of the calyx naked. Gathered by Thunberg, in hilly places, between Miaco and Quana in Japan,

Japan, flowering in April. The *ftem* is fhrubby, erect, two or three feet high. *Branches* round, wavy, fmooth, purplifh, befet with prominent, rather afcending, fcattered prickles. *Leaves* feveral together from each lateral bud, on fhortifh, channelled, rather prickly *ftalks*, heart-fhaped, rounded, fharply crenate, more or lefs three-lobed, ftrongly veined and fomewhat plaited, fmooth on both fides; paler beneath; their length about an inch. *Flowers* folitary from each bud, ftalked. *Calyx* fmooth and angular at the outfide; downy within; its fegments lanceolate, acute. *Petals* twice as long as the calyx, obovate, white, wrinkled, with long claws. *Fruit* yellow, very well flavoured.

38. R. *incifus*. Cut-leaved Japan Bramble. Thunb. Jap. 217. Willd. n. 19.—Leaves fimple, heart-fhaped, obtufe, cut, fmooth. Footftalks with hooked prickles. Stem prickly. Flowers folitary. Outfide of the calyx naked.—Native of Japan. We have feen no fpecimen. This fpecies feems, from Thunberg's defcription, very near the laft, differing chiefly in the divifions of the *leaves*.

We here find in Willdenow the *R. japonicus*, Linn. Mant. 245. Suppl. 263. This the Linnæan herbarium fhews to be no other than *Corchorus japonicus* of Thunberg, a beautiful fhrub, now becoming common in our gardens, where it is quite hardy. The double yellow *flowers* are much admired. Linnæus, by his fpecimen, fuppofed the *petals* to be white. He knew nothing of the *fruit*, and judging by the habit, was not inexcufable in referring the plant to *Rubus*. See Corchorus, n. 12.

39. R. *corchorifolius*. Corchorus-leaved Bramble. Linn. Suppl. 263. Willd. n. 21. (R. villofus; Thunb, Jap. 218.)—Leaves fimple, oblong-heart-fhaped, pointed, ferrated, fomewhat hairy. Stem round, downy, prickly. Flowers folitary. Outfide of the calyx hairy. Native of Japan, between Miaco and Jedo, flowering in April. The *ftem* is fhrubby and upright, finely downy, with a few diftant, flightly recurved, prickles. *Footftalks* hairy and prickly. *Leaves* longer, and much more pointed, than in *microphyllus* or *incifus*, with finer more copious ferratures; their ribs and veins efpecially hairy. *Flowers* on the young branches, ftalked, folitary, much like the two laft fpecies, but the calyx is both downy and hairy on the outfide. Nothing is faid of the *fruit*. The *leaves* are defcribed by Thunberg as elegantly plaited before they fully expand.

40. R. *elongatus*. Long-cluftered Bramble. Sm. Plant. Ic. t. 62. Willd. n. 22.—Leaves fimple, heart-fhaped, pointed, doubly crenate; white and downy beneath. Panicle elongated, racemofe. Segments of the calyx rounded, obtufe. Gathered by Commerfon in Java. The *branches* are round, downy, with minute difperfed prickles. *Leaves* very fmooth and even on the upper fide; their margin furnifhed with a row of broad fhallow notches, or ferratures, with fmall, rather acute, intermediate ones. *Panicle* terminal, long, lax, zigzag, finely downy or filky, in every part, as well as the *calyx*. *Bracteas* oblong, jagged at the end, deciduous. *Flower-ftalks* fhort and thick, aggregate, cluftered, or fomewhat umbellate. Segments of the *calyx* remarkably rounded. *Petals* orbicular, white. *Fruit* red.

41. R. *paniculatus*. Spreading Panicled Bramble.—Leaves fimple, heart-fhaped, pointed, flightly lobed, fharply and finely crenate: white and downy beneath. Panicle twice compound, fpreading. Segments of the calyx ovate, taper-pointed. Gathered by Dr. Buchanan, at Narain hetty, in Nepaul, Nov. 18, 1802. The round, downy *branches*, with fmall fcattered prickles, agree with the laft, as well as with *moluccanus*, *rugofus*, &c. The woolly *footftalks* alfo bear very fmall hooked prickles. The *leaves* are as broad as the hand, more finely and fharply crenate than thofe of *R. elongatus*, with fome irregular, fhallow, obfolete, acute lobes. *Panicle* very large, lax and fpreading, twice, or even thrice compound, downy, its ultimate ftalks partly umbellate, but all much more long and flender than in the foregoing. The *calyx* alfo differs effentially in its tapering fegments, downy, not filky on both fides. *Petals* fmall, obovate. *Fruit* black.

42. R. *pyrifolius*. Pear-leaved Bramble. Sm. Plant. Ic. t. 61. Willd. n. 23.—Leaves fimple, elliptical, pointed, ferrated, fmooth. Panicle corymbofe, downy. Calyx partly jagged. Petals minute.—Found in Java, by Commerfon. The *branches* are flender, round, flightly zigzag, minutely hairy, armed with fmall recurved prickles. *Leaves* on fhortifh hairy *ftalks*, coriaceous, three inches long, and one broad, coarfely ferrated; the ribs and veins only hairy on both fides. *Panicle* terminal, large, twice compound; its branches corymbofe and downy. *Bracteas* linear, deeply jagged, deciduous. Segments of the *calyx* ovate, taper-pointed, downy on both fides; the points of two or three of them deeply divided into three or four parts, while the reft are entire. *Petals* very fmall, abrupt and jagged, fcarcely a quarter the length of the calyx. *Fruit* of a few large grains, with wrinkled *feeds*.

43. R. *acuminatus*. Pointed-leaved Bramble.—Leaves fimple, ovate, taper-pointed, ferrated, fmooth. Panicle racemofe, not downy. Petals as long as the calyx.—Found by Dr. Buchanan, in the woods at Sembu in Upper Nepaul, flowering early in July, 1802. This fpecies is related to the laft, but very diftinct. The *ftem* is climbing, unarmed. The *branches* are minutely prickly, but not hairy. *Leaves* four or five inches in length, fcarcely coriaceous, fmooth and fhining on both fides, paler beneath, fimply or doubly ferrated, remarkable for their long taper points. *Footftalks* channelled, prickly, as well as the midrib, hardly pubefcent. *Stipulas* awl-fhaped, toothed, fmooth, deciduous. Panicle terminal, elongated, zigzag, compound, accompanied by fome leaves; its ultimate branches often three-flowered. *Flower-ftalks* warty, but not downy. *Bracteas* awl-fhaped, fimple or divided, fmooth. *Calyx* warty and downy, with a fhort fimple point to each fegment. *Petals* ovate, acute, the length of the calyx, white. *Fruit* of a very bright red, larger than the calyx.

Sect. 2. *Stem herbaceous.*

44. R. *pedatus*. Pedate Bramble. Sm. Plant. Ic. t. 63. Willd. n. 24. Purfh n. 17.—Leaves pedate, of five bluntifh, nearly fmooth, cut and ferrated leaflets. Flower-ftalks capillary, fimple, bracteated in the middle. Calyx fmoothifh, partly cut, reflexed.—Gathered on the north-weft coaft of America, by Mr. Menzies, to whom we are obliged for fpecimens. This is an elegant, delicate, herbaceous plant, with creeping *roots*, throwing up, at intervals, fhort fimple *ftems*, with one or two *leaves*, on long, flender, channelled *footftalks*, and one, rarely two, *flower-ftalks*, nearly the fame length, but more flender, bearing a pair of little roundifh *bracteas*, about half way up. *Stipulas* in pairs, roundifh, fringed, larger than the *bracteas*. *Flowers* folitary, fmall. *Calyx* deeply divided; its fegments oblong, fome of them three-cleft. *Petals* the fame length, elliptical, rather abrupt or jagged; whether white or yellow we are doubtful. If the latter, it would greatly confirm Mr. Purfh's fufpicion of this plant being a fpecies of *Dalibarda*, provided that genus fhould be eftablifhed, a point on which we fhall touch at the conclufion of this article. We know nothing of the *fruit* of our *R. pedatus*.

45. R. *faxatilis*. Stone Bramble. Linn. Sp. Pl. 708. Willd. n. 25. Ait. n. 11. Purfh n. 13? Fl. Brit. n. 5.

n. 5. Engl. Bot. t. 2233. Fl. Dan. t. 134. Ger. Em. 1273.—Leaves ternate, acute, ſlightly downy, doubly and unequally notched. Runners creeping, herbaceous. Panicle of few flowers. Stipulas ovate.—Native of ſtony, rather mountainous, dry woods and thickets, in the north of Europe, chiefly confined with us to Scotland, Wales, and the moſt northern and hilly part of England, flowering in June. The whole herb is of a ſlender delicate habit, light green, ſlightly downy, not at all white or hoary. It ſpreads extenſively by means of long trailing ſhoots, either naked or leafy, which do not bloſſom till their extremities have taken root. The flowering *ſtems* are ſolitary, erect, ſimple, a ſpan high, ſlightly angular, leafy, hairy, beſides a few occaſional, very tender, horizontal prickles, often preſent alſo on the *footſtalks*. The *leaflets* are in ſome meaſure rhomboid, ſharply and coarſely crenate; the ſide ones now and then lobed at the lower margin, and very rarely two at each ſide. *Cluſter* terminal, downy, of from three to five ſmall inconſpicuous *flowers*. Segments of the *calyx* lanceolate, downy, acute. *Petals* erect, lanceolate, bluntiſh, cream-coloured or greeniſh. *Berries* of a very few large, crimſon, globular grains, pleaſantly acid. *Seeds* compreſſed, wrinkled.

Mr. Purſh, following Michaux, conſiders as a variety of this a plant found in Canada, and on the mountains from New York to Virginia, which has ſmall black *berries*. The *flowers* are about three, on long partial ſtalks. Its runners accord with our *ſaxatilis*, but we ſhould preſume that an accurate compariſon of theſe two plants might prove them to be diſtinct ſpecies.

46. R. *obovalis*. Moſs American Black-berry. Michaux Boreali-Amer. v. 1. 298. Purſh n. 14.—Leaves ternate, oval, rounded, ſerrated, naked. Stem hiſpid. Cluſters ſomewhat corymboſe, of few flowers. Stipulas ſetaceous.—Found in ſwamps, among bog-moſs, on the mountains from New York to Carolina, flowering from May to July. The *ſtem* is deſcribed as rather ſhrubby, hiſpid with rigid hairs. *Flower-ſtalks* elongated. *Bracteas* ovate. *Berries* with only a few large grains, black and ſweet. The name, and definition of the *leaves*, *foliolis obovalibus*, are incorrect. An oval is of the ſame breadth at each end. We preſume Michaux meant *obovate*.

47. R. *arcticus*. Dwarf Crimſon Bramble. Linn. Sp. Pl. 708. Fl. Lapp. ed. 2. 170. t. 5. f. 2. Willd. n. 26. Ait. n. 13. Purſh n. 15. Fl. Brit. n. 6. Engl. Bot. t. 1585. Curt. Mag. t. 132. Fl. Dan. t. 488.—Leaves ternate, ſmooth, bluntly ſerrated. Stem moſtly ſingle-flowered, without prickles. Petals roundiſh, notched.—Native of Lapland, alſo of Labradore, and about Hudſon's Bay; as well as of the iſle of Mull, and the mountains of Ben-y-glo, in Scotland, flowering in May and June. The *root* is perennial and creeping, but without ſcyons. *Stems* unarmed, erect, leafy, from four to eight inches high, almoſt invariably ſimple and ſingle-flowered, though ſometimes from luxuriance an axillary bloſſom occurs at the ſecond leaf, as drawn in Engl. Bot. *Leaflets* always three, ovate or rhomboid, bluntiſh, with broad roundiſh ſerratures. *Stipulas* ovate, entire. *Flower* terminal, ſtalked, of a beautiful crimſon. *Calyx* downy, often with ſix or ſeven ſegments, with which the *petals* agree in number. The latter are moſtly emarginate, ſometimes much jagged. *Berry* of a few large grains, amber-coloured, with a purpliſh tinge, about as big as a raſpberry, but far ſuperior in flavour, partaking of that fruit and the ſtrawberry, with a luſcious ſweetneſs. Linnæus juſtly extols this fruit, and acknowledges his obligation to it, when fatigued with the labours of his Lapland tour. Syrup, jelly, and wine are made of it in Sweden, which are eſteemed highly. Theſe berries are often ripened in our gardens, provided the plant be allowed to grow with luxuriance. The *ſeeds* are ſcarcely perceptibly wrinkled.

48. R. *piſtillatus*. Cloſe-ſtyled Bramble. Sm. Exot. Bot. v. 2. 53. t. 86. Ait. n. 12. Purſh n. 16. (R. acaulis; Michaux Boreali-Amer. v. 1. 298.)—Leaves ternate, ſmooth, ſharply ſerrated. Stem ſingle-flowered, without prickles. Petals oblong, entire. Styles cluſtered together.—Native of Labradore; and, according to Mr. Purſh, of the bogs of Canada, as well as the north-weſt coaſt of America, flowering in June and July. It was firſt cultivated in England by Mr Dickſon, in the garden of the late Rt. Hon. Charles Greville at Paddington, about the year 1802. This moſt reſembles the *arcticus* in habit, but is of more humble ſtature, though by no means deſtitute of a ſtem. The *leaves* are more acutely ſerrated, and riſe above the *flower*, which is crimſon, large, and handſome, on a terminal, downy, ſimple *ſtalk*. *Calyx* with ſix, or more, lanceolate, narrow ſegments, rather downy. *Petals* as numerous, and twice as long, elliptic-oblong, with taper claws. *Stamens* club-ſhaped and obtuſe, which is likewiſe the caſe in the *arcticus*, but in the preſent there is more of a capillary ſtalk to the *anther*. *Germen* depreſſed. *Styles* few, crowded together, looking like a ſimple one. We know nothing of the *fruit*.

49. R. *geoides*. Avens-leaved Bramble. Sm. Plant. Ic. t. 19. Willd. n. 29.—Leaves ſimple or ternate, obtuſe, ſerrated, ſmooth; the odd leaflet very large. Stems depreſſed, ſingle-flowered. Petals roundiſh.—Gathered by Commerſon at the ſtraits of Magellan. This is a humble depreſſed herb, with very ſhort *ſtems*. *Footſtalks* long, channelled, ſlightly hairy, each bearing two awl-ſhaped *ſtipulas*, a good way above the baſe. *Leaves* moſtly compoſed of one large, heart-ſhaped, rounded, abrupt, unequally ſerrated, ſmooth, terminal leaflet, and a pair of, much ſmaller, ſtalked ones, which laſt are ſometimes wanting. *Flower* terminal, ſolitary, on a thick downy ſtalk. Segments of the *calyx* oblong. *Petals* nearly orbicular. *Fruit* unknown. Commerſon obſerved the *ſtamens* and *piſtils* to be always preſent together in each flower, in which this plant differs from *R. Dalibarda* and *Chamæmorus*, hereafter deſcribed.

50. R. *trifidus*. Three-cleft Japan Bramble. Thunb. Jap. 217. Willd. n. 27.—Leaves ſimple, three-cleft, cut and ſerrated, ſmooth. Stem without prickles, nearly ſimple, erect. Flowers ſtalked, ſolitary. Calyx white and downy.—Found by Thunberg, near Quana in Japan, flowering in April. The *ſtem* is ſaid to be rather zigzag, round, moſtly ſimple, purple, and ſmooth. *Leaves* ſtalked, heart-ſhaped, roundiſh, nearly as broad as the palm of the hand; their lobes cut, and unequally ſerrated. *Flowers* from the ſame bud with the leaves, ſolitary, on a ſimple, rarely divided, *ſtalk*, which is like the *footſtalks*, about a finger's length, and villous. *Fruit* red, eatable, agreeably flavoured. By the above deſcription, taken from Thunberg, it ſhould ſeem that there are more *flowers* than one on each ſtem; but we have ſeen no ſpecimen.

51. R. *ſtellatus*. Starry-flowered Bramble. Sm. Plant. Ic. t. 64. Willd. n. 28. Purſh n. 18.—Leaves ſimple, three-lobed, rugoſe. Stem ſingle-flowered. Segments of the calyx awl-ſhaped. Petals lanceolate.—Gathered by Mr. Menzies, near Foggy Harbour, on the north-weſt coaſt of America. The *roots* are perennial and creeping. *Stems* annual, ſolitary, erect, ſimple, leafy, downy, without prickles, about two inches high. *Leaves* two or three, alternate, on long downy ſtalks, heart-ſhaped, broader than they are long, more

more or lefs deeply three-lobed, rather acute, fharply ferrated, rugofe, veiny, flightly hairy; paler beneath. *Stipulas* roundifh, or ovate, fomewhat notched. *Flower* large, terminal, folitary, much overtopped by the foliage, crimfon, on a fhort downy ftalk. *Calyx* hairy, with from five to ten long, taper fegments; its bafe angular and ribbed. *Petals* as many, lanceolate or obovate, with taper claws. *Berry* compofed of feveral grains. The *calyx* fometimes remains through the winter, elevated on the elongated dried *ftem*, as in the plate above cited.

52. R. *Chamæmorus.* Mountain Bramble, or Cloudberry. Linn. Sp. Pl. 708. Fl. Lapp. ed. 2. 173. t. 5. f. 1. Willd. n. 30. Ait. n. 14. Purfh n. 19. Fl. Brit. n. 7. Engl. Bot. t. 716. Lightf. Scot. 266. t. 13. f. 2. Fl. Dan. t. 1. (Chamæmorus; Ger. Em. 1273. Vaccinia nubis; ibid. 1420, very bad.)—Leaves fimple, lobed, rugofe. Stem fingle-flowered. Segments of the calyx ovate. Petals roundifh.—Native of alpine turfy bogs in the north of Europe, frequent in Lapland, Denmark, Siberia, &c., as well as on the higheft mountains of Scotland, Wales, and the north of England, flowering in June. It occurs alfo in Canada and New England. The *roots* are long and creeping, throwing up here and there folitary *ftems*, about a fpan high, fome bearing folitary male *flowers*, others female ones. *Leaves* fhaped like thofe of a mallow, or currant, heart-fhaped at the bafe, ftrongly veined, plaited, fmooth, unequally ferrated, one or two on each ftem. *Footftalks* flightly hairy. *Stipulas* ovate, obtufe. *Flower* on a long downy *ftalk*, rifing above the leaves, white, elegant. *Calyx* tawny, downy, with five broad ovate fegments. *Petals* about twice as long as the calyx. *Berry* of many large grains, amber-coloured, with a pleafant acid flavour refembling that of tamarinds, though rather mucilaginous. Lightfoot fays, thefe berries are brought to table in the highlands. Linnæus fpeaks of them as much efteemed by the Laplanders, who preferve them through the winter, buried under the fnow.

53. R. *coriaceus.* Coriaceous Peruvian Bramble. Poiret in Lamarck Dict. v. 6. 237.—Leaves fimple, ovate-oblong, undivided, fmooth, ferrated. Stem and footftalks fomewhat prickly. Flowers axillary, folitary. Segments of the calyx lanceolate. Petals roundifh.—Found by Dombey in Peru. Defcribed by Poiret, from Juffieu's herbarium. The *ftems* are erect, nearly fimple, herbaceous, reddifh, compreffed, very fmooth, except a few fmall fcattered prickles on their upper part. *Leaves* alternate, diftinct, thick, and coriaceous, rather obtufe; fhining on the upper fide; their *footftalks* furnifhed with fome fmall prickles. *Stipulas* oval, toothed. *Flowers* axillary, towards the top of the ftem, on fimple, thickifh *ftalks*, armed with very fine prickles. *Calyx* large, broad at the bafe, with five fmooth, lanceolate, pointed, greenifh fegments. *Petals* rounded, fhorter than the calyx, crenate at the extremity, appearing yellow when dry.

54. R. *Dalibarda.* Violet-leaved Dwarf Bramble. Linn. Sp. Pl. 708. Willd. n. 31. Sm. Plant. Ic. t. 20. Lamarck Illuftr. t. 441. f. 3. (Dalibarda repens; Linn. Sp. Pl. ed. 1. 491. Poiret in Lamarck Dict. v. 6. 250. Purfh v. 1. 350. D. violæoides; Michaux Boreali-Amer. v. 1. 299. t. 27. Ait. v. 3. 271.)—Leaves fimple, heart-fhaped, undivided, crenate, hairy. Stems creeping. Stalks fingle-flowered. Petals ovate. Gathered by Kalm in Canada. Mr. Purfh fays it is found in the fhady woods and bogs of that country, and on the high mountains of New England and Pennfylvania, flowering in May and June. The *herbage* much refembles that of fome fpecies of violet. The *root* is perennial and creeping, fending forth feveral depreffed, creeping, round, leafy, downy *ftems*. *Leaves* rounded, about an inch in diameter, finely hairy on both fides, on long, flender, hairy *footftalks*. *Stipulas* oblong, with feveral terminal awl-fhaped fegments. *Flower-ftalks* nearly radical, about as long as the footftalks, but more flender, fimple, hairy, each bearing a fmall white *flower*, not unlike a fingle *hepatica*, but about half the fize. Segments of the *calyx* lanceolate, acute, downy, fometimes partly notched, nearly equal to the *petals*. *Stamens* capillary. *Styles* five, above half as long as the ftamens. They are erroneoufly defcribed "very fhort" in the Plant. Ic. *Fruit* of five, or not fo many, pale, dry, ovate, obtufe grains, minutely downy, and flightly wrinkled.

The want of pulp in the *fruit* firft induced Linnæus to feparate this plant, as a genus, from *Rubus*; but he afterwards altered his opinion. His original determination has been followed by Michaux, Purfh, and Aiton. The queftion is difficult, but there are many different degrees of pulpinefs in the feveral fruits of acknowledged *Rubi*, and Mr. Purfh himfelf defcribes his *cuneifolius*, fee n. 15, with "hard and dry *berries*," though no perfon furely would think of placing that fpecies any where elfe. Till, therefore, we can judge for ourfelves, by tracing the growth of the *fruit* in queftion, and comparing it with others, we had rather follow Linnæus. Michaux fays *Dalibarda* differs from *Rubus*, nearly in the fame manner as *Potentilla* from *Fragaria*; but this is incorrect. Thefe latter are diftinguifhed by the deciduous flefhy receptacle of *Fragaria*; the others merely by more or lefs pulp in the berry; for *Dalibarda* has not naked feeds, or "*femina exfucca*," but poffibly *bacca exfucca*, a very different matter. We fhall recur to the fubject again under the following fpecies.

55. R? *fragarioides.* Strawberry-leaved Bramble. (Dalibarda fragarioides; Michaux Boreali-Amer. v. 1. 300. t. 28. Curt. Mag. t. 1567. Purfh v. 1. 350. Ait. v. 3. 271. Poiret in Lamarck Dict. v. 6. 250.)—Leaves ternate; leaflets all feffile, wedge-fhaped, notched and ferrated, fringed. Stalks radical, many-flowered. Calyx tubular at the bafe.—Native of fhady beech woods in Canada, and of the Allegany mountains, flowering in May and June. We have feen no fpecimen, but by the above plate, the *root* appears to be fimple, oblong, woody and perennial. *Leaves* all radical, on longifh flender ftalks; the middle *leaflet* feffile like the reft, and very little larger. *Flower-ftalks* longer than the leaves, fomewhat panicled, bearing about five *flowers*, the fize of the laft. *Calyx* remarkably elongated, and inverfely conical, at the bafe, with ovate, finally reflexed, fegments. *Petals* ovate, faid to be yellow. *Stamens* numerous; their filaments permanent, erect. Of the particular ftructure of the *fruit* we find no account. This fpecies, with its yellow *flowers*, and tubular *calyx*, to fay nothing of the *herbage*, is fo unlike the other *Dalibarda*, that it weakens, inftead of confirming, that fuppofed genus. We prefume not to fay, without actual examination, what it moft refembles. Pallas, it feems, made this plant a *Dryas*. We place it here merely for further enquiry. Dr. Sims in Curtis's Magazine remarks that the *calyx* fometimes betrays an inclination to have intermediate fegments, a very curious, though puzzling, circumftance.

56. R. *radicans.* Creeping Peruvian Bramble. Cavan. Ic. v. 5. 7. t. 413. Poiret in Lamarck Dict. v. 6. 249. —Leaves ternate; leaflets all ftalked, heart-fhaped, villous, ferrated. Stem creeping, prickly. Stalks radical, fingle-flowered. Calyx notched. Gathered by Lewis Née, in the woods of Chili, growing at the roots, or on the rotten trunks, of trees, bearing flowers and fruit in February. The *ftem* is quite proftrate, armed with fhort prickles, fpreading

ing to a great extent, and fixing itfelf here and there, as it runs, by fibrous *roots*. *Leaves* feveral from each part where the roots are produced, forming a tuft, accompanied by a folitary, long-ftalked, pale red *flower*, rifing above the leaves, and fucceeded by an ovate greenifh *berry*, compofed of numerous grains, all together the fize of a currant, and faid to be very agreeably flavoured. The *calyx* is reflexed when in fruit, its fegments oblong, acute, with many deep notches. *Petals* roundifh, obtufe.

Rubus, in *Gardening*, contains plants of the under-fhrubby and herbaceous perennial kind, of which the fpecies cultivated are, the rafpberry (R. idæus); the Virginian rafpberry (R. occidentalis); the flowering rafpberry (R. odoratus); the common bramble (R. fruticofus); the briftly bramble (R. hifpidus); the dewberry bramble (R. cæfius); the dwarf crimfon bramble (R. arcticus); and the mountain bramble, or cloud-berry (R. chamæmorus).

In the firft fpecies the varieties are, the red-fruited, the white-fruited, the twice-bearing, of which the firft crop ripens in July, and the fecond in October, thofe of the latter feafon having feldom much flavour; the fmooth rafpberry, and the large Antwerp. But the forts moftly cultivated, according to Mr. Forfyth, are, the early white, the double-bearing white, the large common white, the large red, the red Antwerp, the large white Antwerp, the fmooth cane double-bearing, and the Woodward's new rafpberry.

In the fourth fort there are feveral varieties; but that which is chiefly introduced as a garden fhrub, is the double-flowered bramble.

Method of Culture.—In the firft fort and varieties of thefe plants it may be effected by fuckers and layers. The plants fhould always have a portion of ground to themfelves, being planted at the diftance of about fix feet from row to row, and four in the rows, with the exception of the early white fort, which may be fet out clofer. And according to Mr. Forfyth, the ground fhould firft be well trenched over and dunged; then, making choice of the ftrongeft and fineft plants that come out from the fides of the ftools, where they have been ftanding for fome years, or encouraging the ftrongeft plants that come out betwixt the rows after digging, which fhould be done annually, they may be planted out as above. In digging the ground, it frequently happens that the roots are cut with the fpade, which occafions a great number of fmall plants to come up; of thefe the ftrongeft and fineft fhould be felected, hoeing up all the fuperfluous ones. But he prefers laying down fome of the ftrongeft outfide fhoots in the month of March; as, by the following autumn, they will make fine roots, and may be planted out in a quarter, or piece of ground, where they are intended to remain. Thefe will not be fo liable, he thinks, to throw out fuckers as thofe which are produced from fuckers. The frefh pieces of ground fhould always be planted in moift weather, as the roots are very delicate, and liable to hurt, when expofed to a dry air. If, however, they are planted in dry weather, he advifes that care be taken to moiften the roots with water, and cover them well with wet litter, or leaves, during the time in which they are planting out. In performing the work, a trench fhould be opened with a fpade, along the line where the fuckers or layers are to be planted, cutting off all the fmall fibry roots with a knife, leaving only the ftronger roots; putting them into the trench, and covering them with fome earth; then watering them well, and throwing the remainder of the earth over them, letting them remain till you have finifhed planting the piece; then, where you firft began to plant, beginning to tread the ground with the foot as hard as poffible along each of the trenches, and in the fame direction as planted; then with a fpade levelling all the ground fmooth, and running it over with a rake, taking off any ftones and rubbifh that may be left on the furface, fo as to render it perfectly even. The plants fhould be watered two or three times a week, when the feafon is dry, till they have taken root; and it will be neceffary to ftake the Antwerp, and other ftrong growing forts, with ftout ftakes, running a couple of fmall rails at top to tie the branches to, which will prevent their being broken by the wind, or beaten down by the rain. The early white, and fmaller forts, may be plaited together at top, tying them round with the fmall yellow willow, which will keep them together. Some of the early rafpberries may be planted between the trees on a weft afpect, to produce early fruit before thofe in the quarters come in. The Antwerps thrive exceedingly well againft north walls or palings, and produce late crops. Such as are planted againft walls or palings fhould be tacked to them, to keep them in their places.

And it is advifed that where any of the fmall red and white forts are found, they fhould be deftroyed, planting the large red, the fmooth cane double-bearing, the large red and white Antwerps, the large common white, the double-bearing white, and Woodward's new rafpberry in their ftead. In refpect to the cutting or pruning of thefe plants, fome, Mr. Forfyth remarks, prefer pruning them in autumn, a practice of which he by no means approves. As they bear the fruit on the wood of the preceding year, they are, he thinks, very liable to be killed by the froft in fevere winters; but, by deferring the pruning till the month of February, there will be a great choice of fine wood for bearing the following fummer, being careful to root out or cut down all the wood that bore fruit the preceding year, which generally dies, felecting only from five to feven of the moft vigorous and ftrong fhoots from the laft year's wood to bear fruit the enfuing feafon. Thefe fhoots may be pruned to the length of three or four feet, according to their ftrength, when they are of the fmooth cane double-bearing fort (which generally bears a fecond crop in autumn, and will, in fine feafons, continue bearing from June to November); but, if the large Antwerp, the fhoots fhould be left five or fix feet long in thefe prunings.

But in regard to the early white, which never grows fo ftrong as the above forts, it fhould be fhortened to two feet and a half, or three feet. Thefe fhould be planted in rows about three feet diftant from each other, and two feet from plant to plant in the rows; always remembering to keep them clear of fuckers, and to cut out the dead or laft year's wood, as above; making choice of the ftrongeft fhoots for bearing wood. Great care fhould, however, be taken not to cut off the little fpurs on the fides, which bear the fruit in this kind. Plants of this fort continue in bearing five or fix years; by which time a frefh plantation fhould be in readinefs to fucceed them. The young plants often bear fome fruit the firft year, and come into full bearing in the fecond after planting. If they be fuffered to remain more than five or fix years on the fame ground, they degenerate, and bear fmall fruit. And much care fhould be taken not to leave above eight or ten of the ftrongeft fhoots, rubbing off or pulling up all the fuperfluous ones; and keeping the ground well hoed and cleared of weeds between the rows, as well as in other places.

Alfo in the other forts the increafe may be effected by fuckers, layers, cuttings, and dividing the roots, and in the two laft, or herbaceous kinds, by feed. The fuckers fhould be taken up in autumn, winter, or fpring, with roots; and the ftrongeft be planted at once into the fhrubbery, and the others in nurfery-rows for a year or two, or till wanted for

 planting.

planting. The layers ſhould be made from the ſhoots, which may be done almoſt any time, as they readily emit roots at every joint, and become fit to plant out in the autumn following. And the cuttings ſhould be taken off from ſome of the younger ſhoots, and divided into lengths a foot long, and planted in a ſhady border, either in the ſpring or ſummer ſeaſon. The roots in any of the raſpberry and herbaceous ſorts, when increaſed into large bunches, may be divided or ſlipped into ſeveral diſtinct ſets, and planted out ſeparately.

The laſt two ſorts may likewiſe be raiſed from ſeeds, which ſhould be taken from the ripened fruit, and ſown in a moiſt ſituation where the plants are to remain, keeping the young plants clean afterwards.

Both the firſt ſpecies, and all the varieties, are highly uſeful for their fruit; for the table, preſerving, and other culinary purpoſes.

And moſt of the other ſorts afford variety in the borders, clumps, and other parts of pleaſure-grounds, among other hardy plants.

Rubus, in *Ichthyology*, a name given by Joannes Cuba, Albertus, and ſome other writers, to the ſpecies of *ray*, uſually called the *ſkate*, or *ſlaire*. See Raia (Batis and Rubus).

RUBY, *Spinelle*, Fr., in *Mineralogy*, a precious ſtone, much valued by jewellers; but under this name a variety of minerals have not unfrequently been ſold, which differ eſſentially in their characters. Mineralogiſts have alſo diſagreed much in the claſſification of ſubſtances to which they have given the name of ruby. The oriental ruby is, in fact, a red variety of the ſapphire, and is deſcribed under the article Gems. It poſſeſſes greater hardneſs than the common ruby, and differs from it in its cryſtallization. The primitive form of the cryſtals of the common ruby is the regular octahedron, from which the ſecondary forms vary but little. Two cryſtals are ſometimes united, and form a macle. The colour is red, varying from ſcarlet to violet and yellowiſh-red, and ſometimes a dark red. It is infuſible by the blowpipe, nor does it loſe its colour by the heat. The fracture is flatly conchoidal; it has a ſplendent vitreous luſtre. The ruby poſſeſſes a conſiderable degree of hardneſs, though its principal conſtituent ingredient is alumine. According to Vauquelin, it contains

Alumine - - -	84.47
Magneſia - - -	8.78
Chromic acid - - -	6.18

To the chromic acid the common ruby owes its colouring matter. A variety of ruby has received from Haüy the name of Pleonaſte; it differs from the above in containing iron in place of chromic acid, and the colours vary from a purple to blue and green. Another gem nearly reſembling the ruby, the ſpinelle zinſifere of Haüy, called alſo automalite, has been claſſed as a ſub-ſpecies of ruby, but it differs from it greatly in its conſtituent parts.

Automalite, like the common ruby, has the octahedral cryſtallization, with laminæ parallel to the faces of the cryſtal; its colour is a dark blueiſh-green, nearly opaque. The conſtituent parts, according to Vauquelin, are,

Alumine - - - -	42
Silex - - - -	4
Oxyd of zinc - - -	28
Oxyd of iron - - -	5
Sulphur - - -	17

The ruby, in its moſt perfect ſtate, is a gem of very great beauty and value. It is often found perfectly pure, and free from all ſpots or blemiſhes; but it is much more frequently debaſed by them, and greatly brought down in its value, eſpecially in the larger ſpecimens. It is of very great hardneſs, equal to that of the ſapphire, and ſecond only to the diamond. It is various in ſize, but is leſs ſubject to variations in its ſhape than moſt of the other gems. It is moſt frequently found very ſmall; its common ſize being that of the heads of the larger ſort of pins; and when of this ſize it is very cheap; but it is alſo found of four, ſix, or ten carats; and ſometimes, though but very rarely, up to twenty, thirty, or forty; nay, we have accounts of ſome of more than a hundred. It is never found of an angular or cryſtalliform ſhape, but always of a pebble-like figure, often roundiſh, ſometimes oblong, and much larger at one end than the other, and in ſome ſorts reſembling a pear, and is uſually more or leſs flattened on one ſide.

It is commonly ſo naturally bright and pure on the ſurface as to need no poliſhing: it is worn in rings, and in the crowns of princes, in its rough or native ſtate. Its colour is red in very different degrees, from the deepeſt garnet colour to that of the paleſt red diamond, but it ever has with the red more or leſs of a purpliſh tinge. This is very plainly diſtinguiſhed in the deeper coloured ſpecimens, but in the pale ones is gradually leſs and leſs to be diſtinguiſhed in proportion to their degree of colour. Theſe are the diſtinguiſhing characters of the ruby, and by theſe it is eaſily known from the garnet, carbuncle, and other red gems.

Our jewellers are very nice, though not perfectly determinate in their diſtinctions; knowing this gem, in its different degrees of colour, under three names; the firſt is ſimply the *ruby:* this is the name they give to it in its moſt perfect and ſtrongeſt coloured ſtate.

The ſecond is the *ſpinel* ruby. Under this name they know thoſe rubies which are of a ſomewhat leſs deep and much leſs vivid colour than what they call the true ruby, or ſimply the ruby.

The third is the *balaſs* ruby, a name derived from Balakeia, the name of a country where the paler rubies are principally found. Under this name they expreſs a pale, yet a very bright ruby, with a ſmaller admixture of the purple tinge than in the deeper coloured one, and ſomething reſembling the colour of the damaſk roſe. This is of a conſiderable value, but leſs than the deeper, or, as they call it, the true ruby.

Beſides theſe, they know alſo two other ſtones under the general name rubies, calling them the *rock ruby*, and the *rubacelle*. But theſe are not truly of the ruby kind; the firſt being a very beautiful ſpecies of garnet, and having a tinge of blue with its red; and the other a hyacinth, having a manifeſt caſt of yellow. See Gems.

There are but two places in the Eaſt where the ruby is found; the kingdom of Pegu, and the iſle of Ceylon. The mine in Pegu, where it is found in greateſt plenty, is in the mountain Capelan, twelve days' journey from Siren, the reſidence of the king of that country. The fineſt rubies brought hence do not exceed three or four carats; the king reſerving all the larger to himſelf.

In Ceylon the rubies are found in a river which deſcends from the mountains towards the middle of the iſland: ſome few are alſo found in the ground. The rubies of Ceylon are uſually brighter and more beautiful than thoſe of Pegu, but they are rare; the king of Ceylon prohibiting his people to gather them, or traffic with them. There are, as ſome ſay, rubies alſo found in Europe, particularly in Bohemia and Hungary, eſpecially the former, in which is a mine of flints of divers ſizes; which, upon breaking, are ſometimes found to contain rubies, pretended to be as fine and hard as any of the Eaſtern ones.

The

The Greeks call the ruby ἀπύρωτος, *q. d.* refifting the fire. The ancients, out of their credulity and fuperftition, attributed many virtues to the ruby; as that it expels poifons, cures the plague, abates luxury and incontinence, banifhes forrow, &c.

It is faid the inhabitants of Pegu have the art of heightening the rednefs and brilliancy of rubies, by laying them in the fire, and giving them a proper degree of heat; but this feems a very erroneous account.

The ruby is formed in a ftony fubftance, or bed, of a rofe-colour, called *mother of ruby;* it has not all its colour and luftre at once, but comes to it by degrees. At firft it is whitifh; and, as it approaches to maturity, becomes red. Hence we have white rubies, others half-white, half-red, and others blue and red, called *fapphire* rubies. When a ruby exceeds twenty carats, it may be called a *carbuncle;* the name of an imaginary ftone, of which the ancients and moderns have given us fo many defcriptions.

They have feveral modes of counterfeiting rubies; and fome have carried the imitation to that length, that the moft able lapidaries, till they come to try the hardnefs, are fometimes deceived.

Frutiere affures us very pofitively, that there have been rubies in France of two hundred and forty carats. Tavernier tells us he faw one in the Indies of fifty carats, which he had a mind to have bought. He adds, that the king of France has finer and larger rubies than any in the poffeffion of the great Mogul.

The largeft ruby that is known to be in the wörld was brought from China to prince Gargarin, governor of Siberia. It came afterwards into the hands of prince Mentchikof, and is at prefent one of the ornaments of the imperial crown of Ruffia.

Ruby, *Sapphire.* See Sapphire and Gems.

Ruby, *Counterfeit.* See Gems, *Ruby* Glass, and *Ruby* Paste.

Ruby, in *Chemiftry,* is a name given to feveral preparations of natural bodies, becaufe of their red colour: as,

Ruby *of Arfenic,* &c. See Realgar.

Ruby, in *Heraldry,* denotes the red colour with which the arms of noblemen are blazoned; being the fame which, in the arms of others, not noble, is called *gules.*

Ruby-*Throat,* Latham, in *Ornithology.* See Motacilla *Calliope.*

RUCCELLA, La, in *Geography,* a town of Sicily, in the valley of Demona; 7 miles S.W. of Cefalu.

RUCELLAI, Bernardo, in *Biography,* was born of a noble family at Florence in 1449. At the age of feventeen he married Nannina, daughter of Piero, and fifter of the illuftrious Lorenzo de Medici, which gave him great influence, and raifed him to the higheft pofts in the republic. In 1480 he was appointed to the office of gonfalonier of juftice; and four years afterwards he went as ambaffador to the ftate of Genoa. In 1494 he was deputed, in the fame quality, to Ferdinand, king of Naples, and afterwards to Charles VII. king of France. With his public employments he joined that cultivation of polite literature, which was frequent among the Florentines in the age of the Medici. He was intimately acquainted with Marfiglio Ficino, of whofe academy he was at firft one of the chief ornaments, and afterwards the firmeft fupport. After the death of Lorenzo he was the munificent patron and protector of the Platonic academy, for the ufe of which he erected a fumptuous edifice, with fine gardens and groves, furnifhed with monuments of antiquity, ferving as well for ornament as inftruction. In the revolutions which followed the fubverfion of the Medici intereft, Rucellai incurred the charges of ambition and inconftancy, by favouring fometimes one party and fometimes another: but, according to Mr. Rofcoe, his crime, in the eyes of the Florentine hiftorians of the fucceeding century, was "an ardent love of liberty, which he preferred to the claims of kindred, and the expectations of perfonal aggrandizement." On the acceffion of Leo X. he declined the office which his countrymen would have conferred upon him of going as public orator to congratulate the pontiff, forefeeing, probably, in his elevation, the ruin of the liberties of Florence. He died in 1514, and was buried in the church of St. Maria Novella, the front of which, begun by his father, was finifhed by him with great magnificence. The following are the works of this patron of literature: "De Urbe Roma," which is a commentary on the defcription of Rome by Publio Vittore, in which he collected from all the ancient writers whatever would ferve to convey a juft idea of the grandeur of that capital; "De Magiftratibus Romanis;" "De Bello Italico;" and "De Bello Pifano:" thefe have been compared with the hiftory of Salluft. Bernardo was a poet in his own tongue; and a piece of his, entitled "Trionfo della Calumnia," was printed among the "Canti Carnafcialefchi," at Florence in 1759. Rofcoe's Lorenzi de Medici.

Rucellai, Giovanni, fon of the preceding, a diftinguifhed Italian poet, was born in 1475. Improving the advantages which he naturally enjoyed under his father's roof, he became a diftinguifhed fcholar, and in 1505 the republic of Florence nominated him ambaffador to the Venetian ftate. He took a very active part in the tumult raifed by the younger citizens in the year 1512, to promote the return of the Medici to Florence. Upon the elevation of pope Leo X., who was his relation, Giovanni, in hopes of preferment, repaired to Rome, and entered into the ecclefiaftical order: and in 1515 he attended Leo on his vifit to Florence, on which occafion the pontiff was entertained in the Rucellai gardens with the reprefentation of the tragedy of "Rofmonda," written by Giovanni. Leo fhewed the greateft attachment to his relation, and fent him, at a very critical period, as nuncio to the court of Francis I., where he was at the death of Leo X. On that event he returned to Florence, and was fent to Rome to congratulate the new pope Adrian VI. on his acceffion. In this, as well as in the pontificate of Leo X., and alfo in the fucceeding one of Clement VII., to whom he was related, he had the moft fanguine hope of promotion to a cardinalate. He died in 1526, without attaining to the object of his ambition. As an author, Giovanni is known by "Le Api," The Bees, which is a didactic poem in unrhymed verfe, and bears a high rank among Italian compofitions in that clafs. His tragedy Rofmonda, already noticed, and his Oreftes, are imitations, the former of the Hecuba of Euripides, the latter of the Iphigenia in Tauris. Rofcoe's Leo X.

RUCHENWALDE, in *Geography,* a town of Brandenburg, on the Ucker Mark; 2 miles N.E. of Storkow.

RUCHT, a river of France, which runs into the Roer, near Hermbach.

RUCK, in *Rural Economy,* a provincial term, fignifying a rude heap or bundle of any thing.

RUCKENSTEIN, in *Geography,* a town of the duchy of Carniola; 6 miles W. of Gurkfeld.

RUCKERSDORF, a town of Bavaria, in the territory of Nuremberg; 8 miles W. of Lauf.

RUCKERSWALDE, a town of Silefia, in the principality of Neiffe; 5 miles E.S.E. of Neiffe.

RUCKINGEN, a town of Germany, in the county of Ifenburg, on the Kinzig; 5 miles N.E. of Hanau.

RUCTATION, Ructus, in *Medicine*, belching, an involuntary difcharge of flatus from the ftomach, fometimes accompanied with a portion of the folid or liquid contents of that organ.

This is ufually one of the fymptoms of indigeftion, whether arifing from a morbid condition of the ftomach, or from a temporary overloading of it with too much food, or with food of an acrid, heavy, or indigeftible quality, or fuch as is difpofed to pafs into fermentation. There is a natural tendency in the food, efpecially the vegetable portion of it, to the procefs of fermentation, and the confequent evolution of air; but by the influence of the gaftric juice, when it is fufficient to accomplifh the digeftive procefs, this tendency is counteracted, and no air is evolved. Whence the beft remedy for eructation is the improvement of the digeftive power, and the avoiding of fermentative food. See Indigestion.

RUD, in *Ichthyology*. See Cyprinus *Caraffius*, and Cyprinus *Erythrophthalmus*.

Rud, in *Rural Economy*, a term provincially fignifying a fort of red ochre.

RUDAW, in *Geography*, a town of Pruffia, in the province of Natangen; 12 miles S.W. of Lick.—Alfo, a town of Pruffia, in the province of Samland, formerly fortified with a caftle, now in ruins. Some monuments of Pagan idolatry ftill remain in the vicinity of Rudaw; and alfo a ftone pillar in a field near Tranzou, erected in commemoration of a victory obtained by the knights of the Teutonic order in 1370, over Kinftud, great duke of Lithuania; 12 miles N.N.W. of Königfberg.

RUDBECK, John, in *Biography*, a learned Swedifh bifhop, was born about the year 1581. After having obtained the elementary parts of education, he was entered at the univerfity of Upfal, where he made fuch progrefs in the higher branches of learning, that before he had completed his twenty-third year he was appointed profeffor of mathematics, which, in 1610, he exchanged for his profefforfhip of Hebrew. On the coronation of Guftavus Adolphus, he took his degree in theology, and in 1619 he was nominated to the bifhopric of Vefteras. In confequence of fome ftrong expreffions which he made ufe of in a public oration, a violent difpute took place between him and profeffor Meffenius, which was carried fo far, that the king was obliged to interfere, and to allay the angry paffions of the difputants, his majefty appointed Meffenius affeffor in one of the courts of juftice; and in 1613 he made Rudbeck one of his own chaplains. It was owing, in a great meafure, to the zeal and exertions of this prelate, that the Swedifh bible, known among the learned as the Bible of Guftavus Adolphus, was publifhed in 1618. He is alfo known and highly efteemed in his own country for the confiderable donations which he made to the gymnafium of Vefteras, and for his aid in the improvement of other ufeful inftitutions; he died in 1646. He was author of feveral theological works, of which the titles are given in the General Biography. Among thefe was one, entitled "Privilegia quædam Doctorum, Magiftrorum, Pracalaureorum, Studioforum, et Scholarum omnium, &c." This work, which excited great attention, had nearly proved the author's ruin, and was, very foon after the publication, prohibited by a decree of the fenate. Upon this occafion, one of the members of the fenate afferted, that a more dangerous book had fcarcely ever appeared, and that it was neceffary the publifher fhould make oath that he had not retained a fingle copy. It prevented the promotion of the prelate, who would otherwife probably have been raifed to the rank of archbifhop.

Rudbeck, Olof, or Olaus, a man of very extenfive learning and accomplifhments, who if not, ftrictly fpeaking, the father of natural fcience in Sweden, muft be reckoned among its earlieft and moft diftinguifhed patrons and cultivators, was the fon of John Rudbeck, bifhop of Vefteras; an honeft and uncourtly bifhop, who fpoke truth, and was never promoted. The fon had a great and vigorous mind, fomewhat over-luxuriant in fpeculation and hypothefis, but fagacious in difcovery, and indefatigable in application. He was born in 1630, and educated at Upfal. Anatomy was his earlieft ftudy, and he profecuted it with fuch fuccefs, that at the age of nineteen or twenty he made the important difcovery of the lymphatic veffels in the liver, and, foon afterwards, of thofe of other parts of the body. His inaugural differtation, in 1652, treated of the circulation of the blood. Bartholine contended with Rudbeck for the originality of the difcovery of the lymphatic fyftem, and they appear to have made it independent of each other; though Haller gives the priority, in point of time, to Rudbeck. See Bartholine, Thomas.

The univerfity of Upfal was, at this time, advancing rapidly towards that celebrity which it has now fo long maintained. Enriched with the patrimonial eftates of the great Guftavus Vafa, its funds have ever been ample, and the good fenfe of its directors has generally led them to a right application of thefe refources. Rudbeck, however, having made Botany a part of his purfuits, contributed, out of his own means, to the advancement of that fcience. He founded a garden, which he afterwards gave to the univerfity. He vifited Holland in 1653, but returning home next year, devoted himfelf to the ftudy, and, we prefume, to the practice of medicine, as well as to the inftruction of his pupils in anatomy. In 1658 he was appointed profeffor of medicine, and was fixed at Upfal for the remainder of his life. It appears that he married before the age of thirty, his fon, the fubject of our next article, having been born in 1660, but we have no particular account of Rudbeck's domeftic hiftory. Befides the attention which he gave to the above-mentioned purfuits, he very early addicted himfelf to the ftudy of languages, hiftory, antiquities, architecture, and mufic, as well as the practical art of drawing. He fo far took the lead in matters of tafte, that the public feftivals and decorations, at the coronation of the young king Charles XI., in 1660, were put entirely under his direction.

The firft botanical publication of Rudbeck feems to have been his Catalogue of the Upfal Garden, printed in 1658, the year after the eftablifhment of that collection. To this little volume a preface in Latin and Swedifh is prefixed, treating of practical horticulture, and recommending botany for its agreeablenefs and utility. The lift is, of courfe, not very ample, but contains feveral exotic fpecies and varieties; and when the author complains of a fharp froft on the 24th of July, we cannot but allow the protection of ftoves and greenhoufes to have been of the moft imperious neceffity, fo that he could fcarcely, in one year, have fufficiently provided them. An Appendix to this catalogue was printed in 1666, the garden having been, by that time, confiderably enriched. The fame year, 1666, not, as Linnæus has it, 1664, another fimilar work appeared, *Deliciæ Vallis Jacobææ;* a catalogue, alphabetical like the former, of a garden at Jacob's Dahl, near Stockholm, belonging to count Magnus Gabriel de la Gardie, chancellor of the kingdom of Sweden, as well as of the univerfity of Upfal. This, though anonymous, is attributed by Linnæus, to to Rudbeck. It is a little book of extreme rarity, insomuch that Haller speaks of it by report only. A Latin poem is prefixed to the work, describing the beauty of this villa, its orangery, aviary, plantations, and fountains.

We know not at what period of his life Rudbeck first conceived the vast project of his *Campi Elysii*, in which all the plants in the world, as far as they had been discovered, were to be represented by wooden cuts, in twelve folio volumes, disposed according to Bauhin's *Pinax*. For this stupendous work he is said to have prepared ten or eleven thousand figures. The first and second volumes were already printed, when a dreadful fire reduced almost the whole town of Upsal to ashes, in the year 1702. Three copies only of the first volume escaped the fire, two of which remain in Sweden, and the third is preserved in the Sherardian library at Oxford. A few leaves of this last copy, having been deficient, are supplied in manuscript. A number of the blocks of this very volume, which consists of grasses and their allies, came into England with the Linnæan collection; and having been compared with the Oxford copy, an impression of them was given to the public in 1789, under the title of *Reliquiæ Rudbeckianæ*, the appropriate letterpress of each figure, and the Linnæan names, being subjoined. An historical preface is prefixed to this edition, as well as a dedication to Dr. John Gustavus Acrel, Professor of Medicine at Upsal, who was entrusted with the sale of the Linnæan museum and library. (See Linnæus.) The object of the dedication is to bear testimony to the honourable conduct of this gentleman, who, because he would not act unjustly, was accused of having received a bribe of 100 pounds, so moderate is the standard of bribery in Sweden, to betray the interest of the proprietors. Perhaps this report arose from his rejecting, for them, the offer of the same sum, from another quarter, to forfeit their engagement to the person with whom they had treated, and to whom he indignantly communicated the proposal.

The second volume of the *Campi Elysii* came from the press a little before the former; so that several copies, having got abroad, escaped the destruction of the rest. Even this, however, is a very rare book, the price of which can hardly be estimated. A copy was bought by professor Jacquin in Germany, many years ago, for about 30 guineas. This volume is in the Linnæan, Banksian, and Sherardian libraries. Containing liliaceous plants, and the Orchis tribe, it is much more splendid than the first. The figures are copied from all quarters, though several are original, and amount to about 600 in all, many of them executed with great correctness and elegance, more especially after the fine engravings of the Hortus Malabaricus. There are, of course, several repetitions of the same species, and abundance of garden varieties of Tulips, &c. The *Orchideæ* are numerous, but inferior, as to the correctness of their flowers, to some other plants, a defect arising from their singularity or minuteness. The preface attributes the anticipated publication of this volume to the greater popularity and attraction of its contents; and speaks of many of the intended figures of the whole work, as to be executed from drawings made by the author himself, after original specimens, either preserved in Burser's fine Swiss herbarium, or obtained from other quarters. The author speaks of his son and nephew, each of the same name with himself, as his coadjutors, and the destined continuators of this laborious undertaking. The destruction of his materials is extremely to be regretted; for such a repository of the botanical knowledge of the time, would have been highly valuable to succeeding writers; particularly as illustrating the plants of Bauhin, so many of which are to be determined from Burser's herbarium only. The volume in question stands alone, like the single unrivalled column of the temple of peace at Rome, a perpetual cause of regret, and a monument of irrevocable destruction.

Another great work of our author, on which, most of all perhaps, his literary celebrity depends, is entitled *Atlantica*, and ought to consist of four volumes in folio; but of these the fourth, at least, if we mistake not, is to be met with in manuscript only. The others are extremely rare, probably from the accident of the fire above-mentioned. One alone, composed of wooden cuts, is in our possession. The aim of this singular, but profoundly learned, performance, was to prove that Sweden had been the terrestrial paradise of our first parents, the *Atlantis* of Plato, and the source of all learning, ancient mythology, arts, and sciences. By a passage in Linnæus's Lapland Tour, v. 1. 19, it should seem that Rudbeck had fixed the scene of the Trojan war at a village in Gestrickland, which bears the name of Troye. The reader will no longer wonder at this, when, in one of our author's illustrative maps, he finds Helicon stationed in Lapland; the Fortunate Islands at the Orkneys; and Acheron at the Maelstrom, off the coast of Norway. The church of old Upsal, certainly a hyperborean temple of the simplest form, and the most remote antiquity, is supposed to have been a fane of Apollo. It is square, with two round-arched door-ways at each side, but no windows. Rudbeck compares it with the temple of Janus at Rome, and shews how the present cathedral of Upsal originated from the plan of a similar edifice. In these points his remarks are well worthy of attention. Those who cannot help smiling at the wildness of some of his hypotheses, must respect his learning and ingenuity, and his work is said to have excited much attention when it first appeared. At present it ranks chiefly among the baubles of mere collectors, for the sake of its rarity.

This great man did not long survive the wreck of all his hopes and labours, in the fire at Upsal. He died in 1702, aged 72, having, nine years before, resigned the Professorships of Botany and Anatomy to his son. In the frontispiece of his *Atlantica* he is represented, with rather an agreeable and sensible countenance, of a plump and sleek habit of body, with long straight hair, and the habiliments of our professors and divines in the time of the Commonwealth. He is demonstrating his peculiar opinions to a circle of ancient philosophers and poets, and Plato is lending the delighted Hesiod a pair of spectacles. Rudbeck is said to have been a man of a mild and amiable character, much esteemed for his personal qualities, as well as for his boundless erudition. We can scarcely call him the founder of Botanical Science in Sweden, because he was preceded by Chesnecopherus, under whose presidency at Upsal, in 1621, a physical dissertation on plants was published and defended by Starbeck, a native of Smoland, which evinces the deep attention this branch of philosophy had even then excited, in that famous school. The curious reader may trace, in this dissertation, many ideas, supposed to have a more modern origin. Rudbeck's Works. Haller's Bibl. Bot. and Anat. Aikin's Gen. Biog. S.

Rudbeck, Olof, junior, son of the preceding, was born at Upsal in 1660. Having been directed by his father to his own favourite studies of medicine, botany, and antiquities, he proved worthy of such a parent, friend, and preceptor. He excelled likewise in the art of delineating natural objects, and found great advantage from this talent in his subsequent pursuits. Having travelled to Holland, he took his degree of doctor of physic, at Utrecht, in 1690, publishing on that occasion an able dissertation, *de Fundamentali*

RUCKINGEN, a town of Germany, in the county of Isenburg, on the Kinzig; 5 miles N.E. of Hanau.

RUCTATION, Ructus, in *Medicine*, belching, an involuntary discharge of flatus from the stomach, sometimes accompanied with a portion of the solid or liquid contents of that organ.

This is usually one of the symptoms of indigestion, whether arising from a morbid condition of the stomach, or from a temporary overloading of it with too much food, or with food of an acrid, heavy, or indigestible quality, or such as is disposed to pass into fermentation. There is a natural tendency in the food, especially the vegetable portion of it, to the process of fermentation, and the consequent evolution of air; but by the influence of the gastric juice, when it is sufficient to accomplish the digestive process, this tendency is counteracted, and no air is evolved. Whence the best remedy for eructation is the improvement of the digestive power, and the avoiding of fermentative food. See Indigestion.

RUD, in *Ichthyology*. See Cyprinus *Carassius*, and Cyprinus *Erythrophthalmus*.

Rud, in *Rural Economy*, a term provincially signifying a sort of red ochre.

RUDAW, in *Geography*, a town of Prussia, in the province of Natangen; 12 miles S.W. of Lick.—Also, a town of Prussia, in the province of Samland, formerly fortified with a castle, now in ruins. Some monuments of Pagan idolatry still remain in the vicinity of Rudaw; and also a stone pillar in a field near Tranzou, erected in commemoration of a victory obtained by the knights of the Teutonic order in 1370, over Kinstud, great duke of Lithuania; 12 miles N.N.W. of Königsberg.

RUDBECK, John, in *Biography*, a learned Swedish bishop, was born about the year 1581. After having obtained the elementary parts of education, he was entered at the university of Upsal, where he made such progress in the higher branches of learning, that before he had completed his twenty-third year he was appointed professor of mathematics, which, in 1610, he exchanged for his professorship of Hebrew. On the coronation of Gustavus Adolphus, he took his degree in theology, and in 1619 he was nominated to the bishopric of Vesteras. In consequence of some strong expressions which he made use of in a public oration, a violent dispute took place between him and professor Messenius, which was carried so far, that the king was obliged to interfere, and to allay the angry passions of the disputants, his majesty appointed Messenius assessor in one of the courts of justice; and in 1613 he made Rudbeck one of his own chaplains. It was owing, in a great measure, to the zeal and exertions of this prelate, that the Swedish bible, known among the learned as the Bible of Gustavus Adolphus, was published in 1618. He is also known and highly esteemed in his own country for the considerable donations which he made to the gymnasium of Vesteras, and for his aid in the improvement of other useful institutions; he died in 1646. He was author of several theological works, of which the titles are given in the General Biography. Among these was one, entitled "Privilegia quædam Doctorum, Magistrorum, Pracalaureorum, Studiosorum, et Scholarum omnium, &c." This work, which excited great attention, had nearly proved the author's ruin, and was, very soon after the publication, prohibited by a decree of the senate. Upon this occasion, one of the members of the senate asserted, that a more dangerous book had scarcely ever appeared, and that it was necessary the publisher should make oath that he had not retained a single copy. It prevented the promotion of the prelate, who would otherwise probably have been raised to the rank of archbishop.

Rudbeck, Olof, or Olaus, a man of very extensive learning and accomplishments, who if not, strictly speaking, the father of natural science in Sweden, must be reckoned among its earliest and most distinguished patrons and cultivators, was the son of John Rudbeck, bishop of Vesteras; an honest and uncourtly bishop, who spoke truth, and was never promoted. The son had a great and vigorous mind, somewhat over-luxuriant in speculation and hypothesis, but sagacious in discovery, and indefatigable in application. He was born in 1630, and educated at Upsal. Anatomy was his earliest study, and he prosecuted it with such success, that at the age of nineteen or twenty he made the important discovery of the lymphatic vessels in the liver, and, soon afterwards, of those of other parts of the body. His inaugural dissertation, in 1652, treated of the circulation of the blood. Bartholine contended with Rudbeck for the originality of the discovery of the lymphatic system, and they appear to have made it independent of each other; though Haller gives the priority, in point of time, to Rudbeck. See Bartholine, Thomas.

The university of Upsal was, at this time, advancing rapidly towards that celebrity which it has now so long maintained. Enriched with the patrimonial estates of the great Gustavus Vasa, its funds have ever been ample, and the good sense of its directors has generally led them to a right application of these resources. Rudbeck, however, having made Botany a part of his pursuits, contributed, out of his own means, to the advancement of that science. He founded a garden, which he afterwards gave to the university. He visited Holland in 1653, but returning home next year, devoted himself to the study, and, we presume, to the practice of medicine, as well as to the instruction of his pupils in anatomy. In 1658 he was appointed professor of medicine, and was fixed at Upsal for the remainder of his life. It appears that he married before the age of thirty, his son, the subject of our next article, having been born in 1660, but we have no particular account of Rudbeck's domestic history. Besides the attention which he gave to the above-mentioned pursuits, he very early addicted himself to the study of languages, history, antiquities, architecture, and music, as well as the practical art of drawing. He so far took the lead in matters of taste, that the public festivals and decorations, at the coronation of the young king Charles XI., in 1660, were put entirely under his direction.

The first botanical publication of Rudbeck seems to have been his Catalogue of the Upsal Garden, printed in 1658, the year after the establishment of that collection. To this little volume a preface in Latin and Swedish is prefixed, treating of practical horticulture, and recommending botany for its agreeableness and utility. The list is, of course, not very ample, but contains several exotic species and varieties; and when the author complains of a sharp frost on the 24th of July, we cannot but allow the protection of stoves and greenhouses to have been of the most imperious necessity, so that he could scarcely, in one year, have sufficiently provided them. An Appendix to this catalogue was printed in 1666, the garden having been, by that time, considerably enriched. The same year, 1666, not, as Linnæus has it, 1664, another similar work appeared, *Deliciæ Vallis Jacobææ;* a catalogue, alphabetical like the former, of a garden at Jacob's Dahl, near Stockholm, belonging to count Magnus Gabriel de la Gardie, chancellor of the kingdom of Sweden, as well as of the university of Upsal. This, though anonymous, is attributed by Linnæus, to to Rudbeck. It is a little book of extreme rarity, infomuch that Haller fpeaks of it by report only. A Latin poem is prefixed to the work, defcribing the beauty of this villa, its orangery, aviary, plantations, and fountains.

We know not at what period of his life Rudbeck firft conceived the vaft project of his *Campi Elyfii*, in which all the plants in the world, as far as they had been difcovered, were to be reprefented by wooden cuts, in twelve folio volumes, difpofed according to Bauhin's *Pinax*. For this ftupendous work he is faid to have prepared ten or eleven thoufand figures. The firft and fecond volumes were already printed, when a dreadful fire reduced almoft the whole town of Upfal to afhes, in the year 1702. Three copies only of the firft volume efcaped the fire, two of which remain in Sweden, and the third is preferved in the Sherardian library at Oxford. A few leaves of this laft copy, having been deficient, are fupplied in manufcript. A number of the blocks of this very volume, which confifts of graffes and their allies, came into England with the Linnæan collection; and having been compared with the Oxford copy, an impreffion of them was given to the public in 1789, under the title of *Reliquiæ Rudbeckianæ*, the appropriate letterprefs of each figure, and the Linnæan names, being fubjoined. An hiftorical preface is prefixed to this edition, as well as a dedication to Dr. John Guftavus Acrel, Profeffor of Medicine at Upfal, who was entrufted with the fale of the Linnæan mufeum and library. (See LINNÆUS.) The object of the dedication is to bear teftimony to the honourable conduct of this gentleman, who, becaufe he would not act unjuftly, was accufed of having received a bribe of 100 pounds, fo moderate is the ftandard of bribery in Sweden, to betray the intereft of the proprietors. Perhaps this report arofe from his rejecting, for them, the offer of the fame fum, from another quarter, to forfeit their engagement to the perfon with whom they had treated, and to whom he indignantly communicated the propofal.

The fecond volume of the *Campi Elyfii* came from the prefs a little before the former; fo that feveral copies, having got abroad, efcaped the deftruction of the reft. Even this, however, is a very rare book, the price of which can hardly be eftimated. A copy was bought by profeffor Jacquin in Germany, many years ago, for about 30 guineas. This volume is in the Linnæan, Bankfian, and Sherardian libraries. Containing liliaceous plants, and the Orchis tribe, it is much more fplendid than the firft. The figures are copied from all quarters, though feveral are original, and amount to about 600 in all, many of them executed with great correctnefs and elegance, more efpecially after the fine engravings of the Hortus Malabaricus. There are, of courfe, feveral repetitions of the fame fpecies, and abundance of garden varieties of Tulips, &c. The *Orchideæ* are numerous, but inferior, as to the correctnefs of their flowers, to fome other plants, a defect arifing from their fingularity or minutenefs. The preface attributes the anticipated publication of this volume to the greater popularity and attraction of its contents; and fpeaks of many of the intended figures of the whole work, as to be executed from drawings made by the author himfelf, after original fpecimens, either preferved in Burfer's fine Swifs herbarium, or obtained from other quarters. The author fpeaks of his fon and nephew, each of the fame name with himfelf, as his coadjutors, and the deftined continuators of this laborious undertaking. The deftruction of his materials is extremely to be regretted; for fuch a repofitory of the botanical knowledge of the time, would have been highly valuable to fucceeding writers; particularly as illuftrating the plants of Bauhin, fo many of which are to be determined from Burfer's herbarium only. The volume in queftion ftands alone, like the fingle unrivalled column of the temple of peace at Rome, a perpetual caufe of regret, and a monument of irrevocable deftruction.

Another great work of our author, on which, moft of all perhaps, his literary celebrity depends, is entitled *Atlantica*, and ought to confift of four volumes in folio; but of thefe the fourth, at leaft, if we miftake not, is to be met with in manufcript only. The others are extremely rare, probably from the accident of the fire above-mentioned. One alone, compofed of wooden cuts, is in our poffeffion. The aim of this fingular, but profoundly learned, performance, was to prove that Sweden had been the terreftrial paradife of our firft parents, the *Atlantis* of Plato, and the fource of all learning, ancient mythology, arts, and fciences. By a paffage in Linnæus's Lapland Tour, v. 1. 19, it fhould feem that Rudbeck had fixed the fcene of the Trojan war at a village in Geftrickland, which bears the name of Troye. The reader will no longer wonder at this, when, in one of our author's illuftrative maps, he finds Helicon ftationed in Lapland; the Fortunate Iflands at the Orkneys; and Acheron at the Maelftrom, off the coaft of Norway. The church of old Upfal, certainly a hyperborean temple of the fimpleft form, and the moft remote antiquity, is fuppofed to have been a fane of Apollo. It is fquare, with two round-arched door-ways at each fide, but no windows. Rudbeck compares it with the temple of Janus at Rome, and fhews how the prefent cathedral of Upfal originated from the plan of a fimilar edifice. In thefe points his remarks are well worthy of attention. Thofe who cannot help fmiling at the wildnefs of fome of his hypothefes, muft refpect his learning and ingenuity, and his work is faid to have excited much attention when it firft appeared. At prefent it ranks chiefly among the baubles of mere collectors, for the fake of its rarity.

This great man did not long furvive the wreck of all his hopes and labours, in the fire at Upfal. He died in 1702, aged 72, having, nine years before, refigned the Profefforfhips of Botany and Anatomy to his fon. In the frontifpiece of his *Atlantica* he is reprefented, with rather an agreeable and fenfible countenance, of a plump and fleek habit of body, with long ftraight hair, and the habiliments of our profeffors and divines in the time of the Commonwealth. He is demonftrating his peculiar opinions to a circle of ancient philofophers and poets, and Plato is lending the delighted Hefiod a pair of fpectacles. Rudbeck is faid to have been a man of a mild and amiable character, much efteemed for his perfonal qualities, as well as for his boundlefs erudition. We can fcarcely call him the founder of Botanical Science in Sweden, becaufe he was preceded by Chefnecopherus, under whofe prefidency at Upfal, in 1621, a phyfical differtation on plants was publifhed and defended by Starbeck, a native of Smoland, which evinces the deep attention this branch of philofophy had even then excited, in that famous fchool. The curious reader may trace, in this differtation, many ideas, fuppofed to have a more modern origin. Rudbeck's Works. Haller's Bibl. Bot. and Anat. Aikin's Gen. Biog. S.

RUDBECK, OLOF, junior, fon of the preceding, was born at Upfal in 1660. Having been directed by his father to his own favourite ftudies of medicine, botany, and antiquities, he proved worthy of fuch a parent, friend, and preceptor. He excelled likewife in the art of delineating natural objects, and found great advantage from this talent in his fubfequent purfuits. Having travelled to Holland, he took his degree of doctor of phyfic, at Utrecht, in 1690, publifhing on that occafion an able differtation, *de Fundamentali*

mentali Plantarum Notitiâ ritè acquirendâ. In this he aſſerts the neceſſity of arranging and diſtinguiſhing the genera of plants by their fructification alone, and prefers ſuch leading principles as are derived from the fruit, rather than from the corolla. He rejects habit, colour, ſenſible qualities, time of flowering, &c. on which ſo much ſtreſs has been laid by ſuperficial obſervers; while, on the other hand, he declines being implicitly led by the more abſtruſe principles of certain more philoſophical botaniſts. Some unfortunate errors of the preſs occur in pages 12, 13, &c. the terms *gymno-* and *angio-ſpermæ* being often tranſpoſed. Rudbeck extends his remarks to nomenclature, and very much to the purpoſe. He had previouſly, at Upſal, in 1686, defended a theſis, *de Propagatione Plantarum*, which is leſs original, though highly creditable as a ſchool exerciſe. The Upſal garden was founded immediately on his return, and enriched with ſeeds obtained from the collections in Holland.

On the 21ſt of May 1695, profeſſor Rudbeck, junior, ſet out from Upſal on a tour to Lapland, accompanied by two young men, the ſons of Count Gyllenborg. After his return he prepared a very ample account of his journey, having made a number of drawings for the purpoſe. The firſt part, publiſhed in 1701, in Latin and Swediſh, is dedicated to king Charles XII. in a Latin, as well as Swediſh, poem, and ornamented with a magnificent wood cut of the *Pedicularis Sceptrum-Carolinum.* But this volume, a thin quarto, goes no further than the province of Upland. The reſt of the materials, except a collection of drawings of plants, which ſtill exiſt, and perhaps rather belong to the *Campi Elyſii*, ſeem to have periſhed in the fire of Upſal. Such indeed was the fate of moſt of the copies of the work juſt mentioned, entitled *Laponia illuſtrata*, which is therefore an extremely ſcarce book.

In 1720 Rudbeck, in conjunction with Benzelius, afterwards archbiſhop of Upſal, founded the Swediſh Academy of Sciences, as it was then called, though ſubſequently, when other ſimilar eſtabliſhments aroſe at Stockholm, Lund, &c. the original one was entitled the Royal Academy of Upſal. This inſtitution ſtill flouriſhes, and has produced ſeveral volumes of Tranſactions in Latin. In the firſt, printed in 1720, is a catalogue of plants, obſerved by Rudbeck in Lapland, with cuts of *Lobelia Dortmanna*, and *Linnæa borealis.*

Several curious diſſertations came forth, from time to time, from this learned man, which evince his deep erudition, though he betrays, like his father, ſomewhat of a paradoxical turn. He was particularly ſkilled in oriental literature, and was hence led to undertake the explanation of ſome of the moſt obſcure ſubjects of natural hiſtory in the ſacred ſcriptures. He contends that *Borith*, mentioned by ſome of the prophets, is neither an herb, nor any kind of ſoap, but a purple dye. He alſo undertook to demonſtrate that the *Dudaim* were Raſpberries. (See DUDAIM.) The peruſal of theſe erudite ſpeculations, inſtead of affording inſtruction on the ſubject diſcuſſed, rather leads us to the conviction, that a man who has ſo many tools at command, can turn and mould any ſubject as he pleaſes. The two diſſertations in queſtion appeared in 1733, in quarto. The author had previouſly given to the world three others, the inaugural eſſays of ſome of his pupils. Theſe were on *Hedera*, in 1707, in 4to.; on *Mandragora*, in 1702; and on the *Rubus arcticus* of Linnæus, in 1716, both in 8vo., with good cuts. His moſt elaborate and eccentric performance of all, perhaps, is a diſſertation on the bird *Selav*, which our tranſlation of the bible renders a quail. Some have thought it a locuſt, but Rudbeck will have it a flying-fiſh; and as Johnſon maliciouſly ſays of Milton, he is never at a loſs for a reaſon. Abundance of profound remarks are interſperſed in this treatiſe. Amongſt other things, the affinity of the Hebrew, Chineſe, and Gothic languages is diſcuſſed. The younger Rudbeck died in 1740, highly reſpected. He left in manuſcript a ſort of univerſal lexicon, which has never been printed. Rudbeck, jun.'s Works. Haller Bibl. Bot. Aikin's Gen. Biog. Dryand. Bibl. Banks. S.

RUDBECKIA, in *Botany*, was dedicated by Linnæus to the memory of his great countrymen, Olof Rudbeck, father and ſon, his predeceſſors in the botanical chair at Upſal. (See RUDBECK.) A genus allied to *Helianthus* was well choſen for this purpoſe, a Sun-flower having been the emblem, or, ſome ſay, a part of the coat of arms, of the perſons commemorated.—Linn. Gen. 440. Schreb. 574. Willd. Sp. Pl. v. 3. 2246. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 130. Purſh v. 2. 573. Juſſ. 189. Lamarck Illuſtr. t. 705. Gærtn. t. 172.—Claſs and order, *Syngeneſia Polygamia-fruſtranea.* Nat. Ord. *Compoſitæ oppoſitifoliæ*, Linn. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common Calyx* a double row of flat, broadiſh, ſhort ſcales, ſix in each row. *Cor.* compound, radiated. Florets of the conical diſk numerous, perfect, tubular-funnel-ſhaped, five-cleft in the border; thoſe of the radius about twelve, female, ligulate, very long, lanceolate, flat, pendulous, with two or three terminal teeth. *Stam.* in the perfect florets five, capillary, very ſhort; anthers united into a cylindrical tube. *Piſt.* in the perfect florets, germen ſquare; ſtyle thread-ſhaped, the length of the partial corolla; ſtigma deeply divided, revolute: in the female florets, germen minute; ſtyle and ſtigma wanting. *Peric.* none, except the unchanged calyx. *Seeds* in the perfect florets only, ſolitary, oblong, each crowned with a membranous four-toothed border. *Recept.* chaffy, conical, longer than the common calyx. Scales the length of the ſeeds, erect, of a concave or channel-like form, deciduous.

Eſſ. Ch. Receptacle chaffy, conical. Seed crowned with a four-toothed border. Calyx of a double row of ſcales.

1. R. *laciniata.* Broad Jagged Rudbeckia. Linn. Sp. Pl. 1279. Willd. n. 1. Ait. n. 1. Purſh n. 12. (Aconitum helianthemum canadenſe; Cornut. Canad. 178. t. 179.)—Lower leaves pinnate; leaflets ovate, unequal at the baſe, toothed, ſomewhat three-lobed: upper ones undivided or three-cleft, ovate-oblong. Crown of the ſeeds four-toothed.—Native of North America. On the edges of ſwamps and ditches, from Canada to Virginia, flowering from Auguſt to October. *Purſh.* A hardy perennial in our gardens, where it has been known for nearly two centuries, flowering in autumn. The *ſtems* are from five to eight or ten feet high, erect, branched, furrowed, ſmooth. *Leaves* alternate, deep green, minutely rough, like a file, to the touch, pointed, variouſly divided. *Flowers* large, terminal, on long ſolitary *ſtalks*, erect; their radius of a full yellow; diſk ovate, brown.

2. R. *columnaris.* High-crowned Rudbeckia. Purſh n. 11. Curt. Mag. t. 1601.—Stem ſimple, ſtraight, with a few flowers, on long ſtalks, at the top. Leaves pinnatifid, cut, with linear ſegments. Calyx ſimple, five-leaved. Diſk cylindrical, elongated.—Found on the banks of the Miſſouri, by Mr. Fraſer, who has brought it to England. The ſingular appearance of the *receptacle*, which is quite cylindrical, flat at the top, diſtinguiſhes this from all other known ſpecies. The *rays* are from five to eight, lax, elliptical, jagged at the end. *Leaves* narrow, roughiſh.

3. R. *digitata.* Narrow Jagged Rudbeckia. Mill. Dict. n. 6. Ait. n. 2. Purſh n. 13. (Chryſanthemum americanum

canum majus, foliis magis diffectis; Morif. v. 3. 22. fect. 6. t. 6. f. 54.)—Lower leaves pinnate; leaflets pinnatifid: upper ones deeply three-cleft, lanceolate, partly cut. Crown of the feeds crenate. Stem fmooth.—Found on the mountains of Virginia and Carolina, flowering from Auguft to October. *Purfh.* This refembles the firft fpecies, but has fmaller *flowers*, and much narrower, rather fmoother, *leaves*. The crown of each *feed*, befides having four teeth, is finely jagged, or crenate.

4. R. *pinnata*. Fragrant Pinnated Rudbeckia. Venten. Hort. Cels. t. 71. Sm. Exot. Bot. v. 1. 73. t. 38. Ait. n. 3. Purfh n. 14. Michaux Boreali-Amer. v. 2. 144. (R. digitata; Willd. n. 2.)—Leaves pinnate, fomewhat fubdivided. Crown of the feed entire at the edge. Stem rough.—Native of the weftern parts of Carolina and Georgia, where it flowers from July to October. *Purfh.* With us it is a hardy perennial, having been introduced, from the garden at Madrid, by feeds fent to the late lady Amelia Hume. Every part of the *herbage* is minutely rough. *Flowers* large and handfome, with the fcent of anife; their rays deep yellow; numerous, broad, downy, pointing downwards; difk ovate, dark purple, almoft black. Ventenat miftook this for the *digitata* of Miller and Aiton.

5. R. *triloba*. Three-lobed Rudbeckia. Linn. Sp. Pl. 1280. Willd. n. 3. Ait. n. 4. Purfh n. 9. (Chryfanthemum cannabinum virginianum hirfutum, difco nigro, petalis aureis radiato; Pluk. Almag. 100. Phyt. t. 22. f. 2.)—Leaves fpatulate; the lower ones three-lobed; the upper undivided. Stem hairy, much branched. Calyx leafy. Scales of the receptacle with prominent points.—An inhabitant of the mountains of Virginia and Carolina, flowering in Auguft and September. *Purfh.* *Stem* four or five feet high, much branched and fpreading, leafy, ftriated, rough with pale, rigid, deflexed hairs, which are more erect on the branches. *Leaves* more or lefs fhaggy with fimilar hairs. *Flowers* not much above an inch in diameter, pale yellow according to Mr. Purfh, but partly orange, or tawny, in our dried fpecimens. Outer fcales of the *calyx* leafy, as long as the radiant florets. *Difk* convex, hardly conical, remarkable for the projecting needle-like points of the fcales, between the florets. This has long been cultivated in France as well as England, where it is biennial, though fometimes perennial in Carolina.

6. R. *fubtomentofa*. Downy Rudbeckia. Purfh n. 10. (R. triloba β; Michaux Boreali-Amer. v. 2. 144.)—"Downy, with fhort pubefcence. Branches erect, many-flowered. Leaves oblong-lanceolate, acute, fomewhat ferrated; the lower ones three-lobed. Scales of the calyx clofe-preffed, fhorter than the rays."—Native of mountain meadows, in Virginia and the country of the Illinois, flowering in Auguft and September. Perennial, not near fo tall as the preceding, from which it is very diftinct. *Purfh.*

7. R. *Radula*. File Rudbeckia. Purfh n. 8.—"Stem hifpid below; fmooth, and nearly naked, above. Stalks very long, fingle-flowered. Leaves ovate, tapering, tuberculated, hifpid. Calyx imbricated; with ovate, pointed, fringed fcales.—Gathered by Bartram in Georgia. Mr. Purfh defcribed it from the Bankfian herbarium. The *root* is marked as biennial. We have examined no fpecimen.

8. R. *hirta*. Great Hairy Rudbeckia. Linn. Sp. Pl. 1280. Willd. n. 4. Ait. n. 5. Purfh n. 7. (R. foliis lanceolato-ovatis, alternis, indivifis, petalis radii bifidis; Mill. Ic. t. 224. f. 1. Obelifcotheca integrifolia, radio aureo, umbone atro-rubente; Dill. Elth. 295. t. 218.)—Rough with briftly hairs. Stem flightly branched, fingle-flowered. Flower-ftalk elongated, naked. Leaves undivided, ovate, fomewhat fpatulate, triply ribbed, ferrated. Calyx leafy. Scales of the receptacle lanceolate, hairy.—Found on the mountains from Virginia to Florida, flowering from July to September. *Purfh.* *Root* biennial. *Herb* about two feet high, rough and hairy. *Flower* rather large, with a dark brown difk, and long yellow rays.

9. R. *fulgida*. Small Hairy Rudbeckia. Ait. n. 6. Willd. n. 5. Purfh n. 6.—Stem hifpid. Branches ftraight, fingle-flowered. Leaves oblong-lanceolate, triply ribbed, toothed, rough; contracted, and fomewhat heart-fhaped, at the bafe. Calyx leafy. Scales of the receptacle lanceolate, fringed.—In mountain meadows and woods, from Penfylvania to Carolina, flowering from July to October. *Purfh.* Said in Hort. Kew. to have been introduced into England, by the late Meffrs. Kennedy and Lee, in 1760. This differs from the laft in having a perennial *root;* branched *ftem;* and fmaller *flowers*, whofe rays are of a deep orange-colour, and the difk dark purple. The fcales of the *calyx* are fhorter, broader, and more ovate.

10. R. *denfifolia*. Crowded-leaved Rudbeckia.—Stem rough. Branches fingle-flowered. Leaves oppofite, ftalked, elliptic-lanceolate, rough, fomewhat toothed. Calyx clofe-preffed, not half the length of the rays.—Gathered by Commerfon, on rocks at Monte Video. The *ftem* feems rather fhrubby, branched, round, clothed with numerous leaves, and very rough with minute depreffed prickles, fuch as cover every part of the herbage. *Leaves* about an inch and half long, more or lefs acute, fometimes diftantly toothed; the upper ones partly fcattered. *Flowers* large, on long, rough, nearly leaflefs *ftalks*. Scales of the *calyx* ovate, rough and fringed. *Rays* numerous, broad, yellow, afcending, almoft thrice as long as the *calyx*. *Difk* brown, or purplifh.

11. R. *decumbens*. Decumbent Rudbeckia.—Stem decumbent, creeping. Leaves oppofite, ftalked, linear-fpatulate, nearly fmooth. Flower-ftalks erect, folitary, angular, very long and flender, flightly hairy.—Found by Commerfon on the rocks of Monte Video. The *ftems* are woody, creeping by means of numerous radicles, afcending at the extremity only, but producing, as they go, a denfe affemblage of fhort leafy fhoots or branches. *Leaves* very various in fize and breadth, obtufe, triply ribbed, rather flefhy, very flightly and occafionally hairy, nearly entire. *Flower-ftalks* terminal, folitary, fimple, fingle-flowered, erect and ftraight, naked, near a fpan long, being ten times the length of the leaves, of equal thicknefs throughout. *Flowers* about an inch in diameter, yellow in the *difk* as well as *radius*. Scales of the *calyx* ovate, acute, clofe-preffed, fringed with briftles, and about half the length of the rays. We have no means of inveftigating the *receptacle*, or *feed-crown*, but we prefume, from the habit of every part, the genus can fcarcely be doubtful.

12. R. *bellidioides*. Daify-like Rudbeckia.—Stem decumbent. Leaves oppofite, ftalked, ovate, rough-edged. Flower-ftalks erect, folitary, very long; fwelling and very downy at the top.—This likewife was gathered by Commerfon, at Monte Video. *Roots* creeping, with thick flefhy fibres. *Stems* trailing, with fhort leafy branches, forming a fort of tuft, much as in the foregoing, but the leafy part does not appear to take root. *Leaves* tolerably uniform, from one and half to two inches long, and half an inch wide, obtufe, triply ribbed, entire; very rough on the ribs and margin; tapering down at the bafe into a broad fringed *footftalk*. *Flower-ftalks* four or five inches long, fituated as in the laft fpecies, but ftouter, efpecially towards the flower, where they are denfely covered with fhort, rigid, clofe-preffed hairs. *Flowers* entirely yellow, the fize of the laft,

laſt. Scales of the *calyx* cloſe-preſſed, ovate, half the length of the *radius*, ſmooth, except a ſlight marginal fringe; ſtrongly ribbed, or furrowed, at the baſe. The younger Linnæus, as well as Commerſon, thought this a *Rudbeckia*, nor have we ſufficient doubts on the ſubject to ſpoil a flower by diſſection.

13. R. *ariſtata.* Awn-ſcaled Rudbeckia. Purſh n. 5.—"Stem hiſpid. Branches elongated, corymboſe, ſingle-flowered. Leaves lanceolate-oblong, ſerrated, hiſpid. Diſk of the flower nearly hemiſpherical. Scales of the ſeed-crown awl-ſhaped, awned."—Native of South Carolina; deſcribed by Mr. Purſh from the Bankſian herbarium. The *flowers* are ſmall, deep yellow. If there be no error in the above definition, and the *ſeed* be really crowned with ſeparate awl-ſhaped ſcales, this ſpecies does not well anſwer to the character, or idea, of a *Rudbeckia.* The analogy of other ſpecies would lead us to ſuppoſe the ſcales of the *receptacle* were meant, had not the words "*paleis pappi*" been ſo preciſe.

14. R. *ſpatulata.* Spatulate-leaved Rudbeckia. Michaux Boreali-Amer. v. 2. 144. Willd. n. 6. Purſh n. 4.*—"Slender, finely downy. Stems ſingle-flowered. Leaves obovato-ſpatulate, entire. Calyx ſpreading, imbricated. Radiant florets three-toothed."—Gathered by Michaux on the mountains of Carolina; by Bartram in Florida. It is biennial, flowering in July and Auguſt. *Purſh.*

15. R. *diſcolor.* Two-coloured Rudbeckia. Purſh n. 4.—"Branches corymboſe, ſingle-flowered. Flower-ſtalks naked, elongated. Leaves lanceolate, nearly entire, rough with rigid hairs. Calyx-ſcales ovate, acute. Petals lanceolate, entire, of two colours, as long as the calyx."—Gathered in Florida, by Bartram. Perennial. *Flowers* ſmall; their rays yellow above, deep orange or purple underneath. *Purſh.* We have not examined a ſpecimen of either of the two laſt, both which Mr. Purſh deſcribed from ſir Joſeph Banks's herbarium.

16. R. *lævigata.* Smooth Rudbeckia. Purſh n. 3.—"Quite ſmooth all over. Stem poliſhed, panicled. Branches corymboſe. Stalks elongated, ſingle-flowered. Leaves ovato-lanceolate, pointed at each end, triply ribbed, poliſhed, nearly entire. Scales of the calyx lanceolate, the length of the rays."—Found by Mr. Lyon, in Georgia. Perennial. The *leaves* have occaſionally one or two teeth. *Rays* pale yellow, ſhort. In Mr. Lambert's herbarium. *Purſh.*

16. R. *amplexifolia.* Stem-claſping Rudbeckia. Jacq. Coll. v. 5. 155. Ic. Rar. t. 592. Willd. n. 7. Ait. n. 7. Purſh n. 2. (R. perfoliata; Cavan. Ic. v. 3. 27. t. 252.)—Leaves elliptic-oblong, heart-ſhaped at the baſe, naked, rough-edged; the lower ones ſerrated. Stem ſmooth, ſtriated. Diſk nearly cylindrical.—Native of Lower Louiſiana, on the banks of the Miſſiſippi, flowering in July and Auguſt. We had a ſpecimen, in 1793, from the garden of Mr. Saliſbury, who received ſeeds the preceding year, ſaid to have been collected by Michaux, in New Orleans. The *root* is annual. *Stem* erect, branched, round, leafy, about two feet high. *Leaves* of a pale glaucous green, acute, alternate, reticulated with veins, very ſmooth, except at the edge, which is beſet with minute cloſe prickles. *Flowers* ſolitary, at the ſummit of each branch, erect, with broad, dependent, deep yellow *rays*, each terminating in two or three blunt teeth; and an elongated, obtuſe, dark green or blackiſh *diſk*.

17. R. *purpurea.* Purple Rudbeckia. Linn. Sp. Pl. 1280. Willd. n. 8. Ait. n. 8. Purſh n. 1. Curt. Mag. t. 2. Chryſanthemum americanum, doronici folio, &c.; Pluk. Phyt. t. 21. f. 1. Cateſb. Carol. v. 2. t. 59.)—Leaves rough, ovate, tapering at the baſe, undivided, toothed; the upper ones lanceolate, entire. Rays very long, pendulous, cloven.—On the mountains from Virginia to Florida, flowering from Auguſt to October. *Purſh.* This elegant and hardy perennial plant has been more than a century in our gardens. It thrives beſt in a rich moiſt ſoil, and is propagated by parting the roots. The *ſtems* are three or four feet high, erect, round, ſtriated, ſmooth, moſtly purpliſh. *Leaves* triply ribbed, near a ſpan long, rough and harſh to the touch; the lower ones on long ſtalks. *Flowers* terminal, ſolitary, very large, and of a beautiful, as well as ſingular, aſpect; the *diſk* obtuſely conical, brown, beſet with the long, prominent, rigid, ſpinous ſcales of the *receptacle*; *radius* of numerous, linear-lanceolate, pink or light crimſon *florets*, each three inches long, pendulous, acute and cloven at the extremity. Mr. Curtis obſerves that the *ſeeds* are rarely perfected here, nor do the *roots* increaſe very faſt. Linnæus has ſtrangely erred, in referring to this ſpecies, Miller's yellow-flowered figure, which belongs to *R. hirta*; ſee n. 8.

R. *anguſtifolia*, Linn. Sp. Pl. 1281. Willd. n. 9, proves the very ſame plant with *Helianthus anguſtifolius* of the ſame authors.

R. *oppoſitifolia*, Linn. Sp. Pl. 1280, is, according to Mr. Purſh, the ſame as *Helianthus lævis*, Linn. Sp. Pl. 1278, and *Silphium ſolidaginoides*, ibid. 1302. Perſoon has eſtabliſhed it as a new genus, by the name of *Heliopſis lævis*, and he is followed by Purſh, p. 563. The *leaves* do not anſwer to the ſpecific name, being rough with briſtly warts.

R. *alata*, Jacq. Ic. Rar. t. 593, is *Helenium quadridentatum*, Willd. Sp. Pl. v. 3. 2121. Purſh 560. See HELENIUM.

RUDBECKIA, in *Gardening*, contains plants of the herbaceous, biennial, and perennial kinds, of which the ſpecies cultivated are, the broad jagged-leaved rudbeckia (R. laciniata); the narrow jagged-leaved rudbeckia (R. digitata); the hairy rudbeckia (R. hirta); the purple rudbeckia (R. purpurea); the narrow ſimple-leaved rudbeckia (R. anguſtifolia); and the three-lobed rudbeckia (R. triloba).

Method of Culture.—All the ſorts of theſe plants may be increaſed by off-ſets, parting the roots and ſeeds. The off-ſets in the perennial ſorts ſhould be taken off, and planted out in the early autumn: when the ſtems decay, the roots may alſo be divided, and planted out at the ſame time, or in the early ſpring months. And as theſe plants are often liable to go off ſoon, ſome ſhould be frequently raiſed to keep up the ſtock; and others have a tendency to become biennial, and decay without increaſing the root: they ſhould have the flower-ſtems cut down in the early ſummer, to encourage the growth of the root off-ſets, for ſlipping in the following autumn.

However, all the ſorts may be raiſed from ſeed, and the biennial ſorts muſt always be raiſed annually in that way; likewiſe ſuch of the perennial kind as are biennially inclined, ſowing the ſeeds in April, in a border of light earth, raking them in; and when the plants are two or three inches high, pricking them out in nurſery-rows till autumn, then planting them out where they are to remain. They ſhould have a light dry ſoil, and rather warm ſituation. They all afford much ornament and variety in the borders and clumps, among other flowering plants.

RUDDER, in *Navigation*, a piece of timber turning on hinges in the ſtern of a ſhip; and which oppoſing ſometimes one ſide to the water, and ſometimes another, turns or directs the veſſel this way or that.

The rudder becomes gradually broader, in proportion to its

its diſtance from the top, or to its depth under water. The back, or inner part of it, which joins to the ſtern-poſt, is diminiſhed into the form of a wedge through its whole length, ſo as that the rudder may be the more eaſily turned from one ſide to the other, where it makes an obtuſe angle with the keel. The hinges, which are bolted round the ſtern-poſt to the after-extremity of the ſhip, are called *googings*, and are furniſhed with a large hole on the after-part of the ſtern-poſt. The other parts of the hinges, which are bolted to the back of the rudder, are called *pintles*, being ſtrong cylindrical pins, which enter into the googings, and reſt upon them. The length and thickneſs of the rudder are nearly equal to thoſe of the ſtern-poſt. The rudder is turned upon its hinges, by means of a long bar of timber, called the *tiller*, which enters nearly in an horizontal direction into the ſhip, paſſing under the upper or middle deck tranſom; and its operation is directed by the tiller-rope, which in large veſſels is wound about a wheel. (See Tiller.) The power of the rudder is reducible to that of the lever, and the oblique action of the water upon it is to be determined by the reſolution of forces.

In order to explain the action of the rudder on the ſhip, it ſhould be conſidered that if, inſtead of leaving the rudder exactly in a right line with the keel, ſo as to be a kind of prolongation of it, it be turned to one ſide or the other, as B D (*Plate* IV. *Navigation*, *fig*. 4.), it receives an immediate impulſe from the water, which glides along the ſhip's bottom, in running aft from A to B; and this fluid impels it towards the oppoſite ſide, while it continues in that ſituation, ſo that the ſtern, to which the rudder is confined, receives the ſame movement; and the ſhip receiving an impulſe ſideways, her ſtern turns accordingly from B to *b*, on any point whatever C, while her head paſſes from A to *a*. It muſt be obſerved, that the water ſtrikes the rudder obliquely, and only with that part of its motion which acts according to the ſine of incidence, in impelling it in the direction N P, with a force which depends not only on the rapidity of ſailing, but alſo on the greatneſs of the ſine of incidence; a force which is conſequently in the compound ratio of the ſquare of the greater or leſs velocity of the ſhip's motion, and of the ſquare of the larger or ſmaller ſine of incidence, which depends upon various circumſtances. So that, if the veſſel runs three or four times more ſwiftly, the abſolute ſhock of the water upon the rudder will be nine or ſixteen times ſtronger under the ſame angle of incidence, and will be augmented in a greater proportion, if the ſine of incidence be increaſed. This impulſion, or, what is the ſame, the power of the helm, is always very feeble, when it is compared with the whole weight of the veſſel; but it acts with a very long arm of a lever, which occaſions it to work very advantageouſly in turning the ſhip; for the helm is fixed at a very great diſtance from the centre of gravity G, as well as from the point C, upon which the ſhip is ſuppoſed to turn, with reſpect to the point of percuſſion B: and if the direction P N of the impreſſion of the water upon the rudder be prolonged, it is evident that it will paſs perpendicularly at the point R, widely diſtant from the centre of gravity G; therefore the abſolute effort of the water is very powerful. It is not therefore ſurpriſing, that this machine impreſſes the ſhip with a conſiderable circular movement, by forcing the ſtern from B to *b*, and the head from A to *a*, and even much farther, when the velocity of the ſhip is preſerved; becauſe the effect of the helm always keeps pace with the rapidity of the ſhip's way.

Amongſt all the obliquities which may be given to the rudder, there is one ſituation which is more favourable than any of the others, to make it produce with more rapidity the effect of turning the ſhip, in order to change her courſe. To be convinced of this, we have only to conſider that, if the obtuſe angle A B D (*fig*. 4.) were to be leſſened, the impulſe of the water on the rudder would augment, at the ſame time that it would more oppoſe the ſailing of the ſhip, ſince the angle of incidence would be more open, and would preſent a greater ſurface to the ſhock of the water, by oppoſing its paſſage more perpendicularly: but then the direction N P of the effort of the helm upon the ſhip would paſs at a ſmaller diſtance from the centre of gravity G towards R, and would leſs approach the perpendicular N L; according to which, it is abſolutely neceſſary that the power ſhould act with greater effect to turn the ſhip. Therefore, it is evident, that, if the obtuſe angle A B D were too much leſſened, the greater ſhock of the water could not counterbalance the loſs occaſioned by the diſtance between the direction N P and N L, or by the great obliquity which would be given to the ſame direction N P of the abſolute effort of the helm with the keel A B. If, on the other hand, the angle A B D were made more obtuſe, the direction N P of the effort of the rudder would become more advantageous to turn the ſhip, ſince it would approach more the perpendicular N L, and ſince the prolongation of N P would augment G R, by paſſing at a greater diſtance from the centre of gravity G. But the rudder would then be ſtruck too obliquely; for the angle of incidence would be more acute; ſo that it would only preſent a ſmall part of its breadth to the ſhock of the water, and would of courſe receive but a faint impulſion. All this proves that the greateſt diſtance G R from the centre of gravity G will not counterbalance the too great obliquity of the ſhock of the water. Whence it muſt be concluded, that when the water ſtrikes the rudder too obliquely, or too perpendicularly, a great deal of the impulſion, or of the effect it ſhould produce, is loſt. Therefore, between theſe two extremes, there is a middle poſition, which muſt be the moſt favourable.

The diagonal N P of the rectangle I L (*fig*. 4.) repreſents the abſolute direction of the effort of the water upon the rudder: N I expreſſes the portion of this effort which oppoſes the ſhip's head-way, or which forces her a-ſtern in the direction of the keel. It is eaſy to perceive that this portion N I of the whole power of the helm contributes little to turn the veſſel; for, if I N were prolonged, it would be ſeen that its direction paſſes at a very ſmall diſtance G V from the centre of gravity G, and that the arm of the lever B N = G V, to which the force is as it were affixed, is at moſt equal only to one half of the breadth of the rudder. But it is not ſo with reſpect to the relative force N L, which acts perpendicularly to the keel. If the firſt force, N I, is almoſt uſeleſs, and even hurtful, by retarding the velocity; the ſecond, N L, is capable of a very great effect, ſince it is applied at a great diſtance from the centre of gravity G of the ſhip, and acts on the arm of a lever G E, which is very long. Thus it appears, that, between the two effects N L and N I, which reſult from the abſolute effort N P, there is one which is always oppoſing the ſhip's head-way, contributing but little, therefore, to the motion of her turning; whilſt the other alone produces that movement of evolution, without retarding her velocity.

As to the moſt advantageous angle made by the helm, with the line prolonged from the keel, geometricians have fixed it at 54° 44′ (See Dynamics, Mechanics, and Windmill.) But it has been ſaid, that, in determining this

this angle, they have presumed that the ſhip is as narrow at her floating line, or at the line deſcribed by the ſurface of the water round her bottom, as at the keel; whereas all veſſels increaſe in breadth from the keel upward to the extreme breadth, where the floating line, or the higheſt water-line, is terminated; and, therefore, the angle above ſtated is too large. For the rudder is impreſſed by the water, at the height of the floating line, more directly than at the keel, becauſe the fluid exactly follows the horizontal outlines of the bottom; ſo that a particular poſition of the helm might be ſuppoſed neceſſary for each different incidence which it encounters from the keel upwards. But as a middle poſition may be taken between all theſe points, it will be ſufficient to conſider the angle formed by the ſides of the ſhip, and her axis, or the middle line of her length, at the ſurface of the water, in order to determine afterwards the mean point, and the mean angle of incidence. The angle 54° 44′, it is ſaid, is too open, and very unfavourable to the ſhip's head-way, becauſe the water acts upon the rudder there with too great a ſine of incidence, as being equal to that of the angle which it makes with the line prolonged from the keel below; but above, the ſhock of the water is almoſt perpendicular to the rudder, becauſe of the breadth of the bottom, or that of the ſhip's ſides. If then the rudder is only oppoſed to the fluid, by making an angle of 45°, or 45° 1′, with the line prolonged from the keel, the impreſſion, by becoming weaker, will be leſs oppoſed to the ſhip's head-way, and the direction N P (*fig.* 4.) of the abſolute effort of the water upon the rudder, approaching nearer to the lateral perpendicular N L, will be placed more advantageouſly, ſince the prolongation of the abſolute effort paſſes at a greater diſtance G R from the centre of gravity of the ſhip. To which it is added, that experience daily teſtifies, that a ſhip ſteers well, when the rudder makes the angle D B E no more than 35°. If this angle be made 45°, and the abſolute effort N P be diſcompoſed, we ſhall have N I equal to the other ſide N L of the ſame ſquare; ſo that the part of the whole power which oppoſes the head-way of the ſhip would be only equal to that which produces the movement of rotation; inſtead of which, if D B E were 54° 44′, N I would become much greater than N L, in proportion to the ſines of the angles which are oppoſed to them in the triangles P I N or P L N, and the ſhip would loſe much more of her velocity than in the firſt ſituation of the rudder, which is thought to be beſt adapted to veſſels in general, ſubject, however, to occaſional alteration, as they ſhall make an angle more or leſs open with their ſides a-ſtern. Hence it has been concluded, as a general poſition, that the moſt advantageous angle will always be found between 35° and 45°. From Bouguer's treatiſe (ubi infra), it appears, that, in moſt ſhips, the angle of the rudder with the prolonged line of the keel ſhould be 46° 40′. L. Euler recommends an obliquity ſomewhat leſs than 54° 44′, for the greateſt action of the rudder; and eſtabliſhes this rule, that an obliquity of about 48° will, in general, produce the beſt effort.

Thoſe who duly conſider the action of the *helm* and *tiller* (for an account of which, ſee thoſe articles) will eaſily conceive, that the greater the ſhip's velocity is, the more powerful is the action of the rudder, ſince it acts againſt the water with a force which increaſes as the ſquare of the velocity of the fluid, whether the ſhip has head-way, or ſtern-way; obſerving always, that in theſe two circumſtances the effects are contrary; for, if the ſhip goes a-ſtern, the rudder will be ſtruck from I to N (*fig.* 4.); and, inſtead of being puſhed from N to P, it will be ſo from N to R; ſo that the ſtern being moved in the ſame direction, the head will take a contrary one, and move towards the ſame ſide as the tiller B F.

It ſhould be obſerved, in the uſe of the rudder, that there is one part of its effort which impedes the ſhip's ſailing, when it is ſtruck by the water which runs rapidly along the ſhip's bottom. If it makes an angle of 45° with the keel prolonged, it receives only half the impulſion it would, if acted upon perpendicularly; becauſe the abſolute impulſe diminiſhes from two cauſes. The ſurface which oppoſes the ſhock of the water is reduced to a leſs extent than it was at firſt, and the angle of incidence diminiſhes likewiſe; ſo that by this, the impulſe has diminiſhed one half. Conſidering next the impulſion N P, which remains (*fig.* 4.), it will appear that there is only one part N I which is oppoſed to the ſailing, and which is leſs than N P, in the proportion as the ſine total is to the ſine of 45°, the meaſure of the angle of incidence V N B equal to N P I; for the angle V N L is right, as well as the angle P N B; ſo that, if you take away the common angle L N B, the two angles P N L and V N B will remain equal between themſelves; but, as the angle I P N is equal to its alternate angle P N L, it follows that I P N is always equal to V N B, whether the angle made by the rudder be more or leſs open with the keel prolonged. So that, if the ſurface of the rudder which receives the ſhock be 80 feet ſquare ſuperficies, it will firſt be reduced, by its being expoſed to the courſe of the fluid, to an effort of 40 feet ſurface, then to 28 or 29; becauſe, in the firſt place, there is only one part of the velocity of the water which contributes to the ſhock, and that is proportional to the relation of the ſquare of the ſine total to that of the ſine of incidence; and, ſecondly, becauſe out of the abſolute impulſe N P, which reſults from this laſt oblique ſhock, there is only a part N I which oppoſes the velocity of the ſhip proportional to the abſolute force N P, in the ſame relation as there is between the ſine total and the ſine of incidence; that is to ſay, that when the rudder makes, in the largeſt ſhips, an angle of 45°, it impedes the ſhip's rapidity of ſailing, in the direction of the keel, with an effort N I, equivalent to the impulſion which a ſurface of 28 or 29 feet ſquare might receive, if it were expoſed perpendicularly to the ſhock of the water. So that, if the ſhip ſails 12 knots an hour, or 19 feet a ſecond, the effort of the rudder N I, which oppoſes the ſhip's way, will be 12,499 or 12,945 pounds; ſalt water weighing $\frac{1}{35}$th more than freſh.

It follows, from all that has been ſaid of the rudder, that it ought to be employed as little as poſſible; that is to ſay, the ſhip and her ſails ought to be ſo diſpoſed, that the ſmalleſt motion of this machine may bring her to her courſe, if ſhe deviates from it, or make her perform any evolution which may be thought proper.

The ingenious writer of the article *Seamanſhip* in the Enc. Brit. ſuggeſts, that the theory of M. Bouguer and ſome other French mathematicians is founded on principles that are erroneous. They aſſume, as we have above ſuppoſed, that the impulſe of a fluid is in the proportion of the ſquare of the ſine of the angle of incidence; and alſo that its action on any ſmall portion, ſuch as a ſquare foot of the ſails or hull, is the ſame as if that portion were detached from the reſt, and were expoſed, ſingle and alone, to the wind or water in the ſame angle. Both theſe principles, it is affirmed, are erroneous; and the error is very conſiderable in caſes which moſt frequently occur in practice, that is, in the ſmall angles of inclination. The error of this theory, eſpecially in caſes of great obliquity, may be ſeen in the following

following table: in which the first column exhibits the angle of incidence; the second, the impulsions really observed; the third, the impulses, if they had followed the duplicate ratio of the sines; and the fourth, the impulses according to the simple ratio of the sines.

Angle of Incidence.	Impulsions observed.	Impulses in dupl. Ratio of Sines.	Impulses in simple Ratio of Sines.
90	1000	1000	1000
84	989	989	995
78	958	957	978
72	908	905	951
66	845	835	914
60	771	750	866
54	693	655	809
48	615	552	743
42	543	448	669
36	480	346	587
30	440	250	500
24	424	165	407
18	414	96	309
12	406	43	208
6	400	11	105

The error in the second principle of the theory is still greater, and the action on one part of the sail or hull is so greatly modified by its action on another adjoining part, that a stay-sail is often seen hanging like a loose rag, although there is nothing between it and the wind; and this merely because a great sail in its neighbourhood sends off a lateral stream of wind, which completely hinders the wind from getting at it. Till the theory of the action of fluids be established, therefore, we cannot tell what are the forces which are acting on every point of the sail and hull: therefore we cannot tell either the mean intensity or direction of the whole force which acts on any particular sail, nor the intensity and mean direction of the resistance to the hull; circumstances absolutely necessary for enabling us to say what will be their energy in producing a rotation round any particular axis. In like manner, we cannot, by such a computation, find the spontaneous axis of conversion (see ROTATION), or the velocity of such conversion. In short, we cannot pronounce with tolerable confidence *à priori* what will be the motions in any case, or what dispositions of the sails will produce the movement we wish to perform. The experienced seaman learns by habit the general effects of every disposition of the sails; and though his knowledge is far from being accurate, it seldom leads him into any very blundering operation. Perhaps he seldom makes the best adjustment possible, but seldomer still does he deviate very far from it; and in the most general and important problems, such as working to windward, the result of much experience and many corrections has settled a trim of the sails, which is certainly not far from truth, but (it must be acknowledged) deviates widely and uniformly from the theories of the mathematician's closet. The honest tar, therefore, must be indulged in his joke on the useless labours of the mathematician, who can neither hand, reef, nor steer.

Bouguer Traité de la Manœuvre des Vaisseaux. Falconer's Marine Dict. art. *Helm*; and Euler's Complete Theory of the Construction and Properties of Vessels, translated by Mr. Watson, 1776, book ii. chap. vii. viii. ix.

A narrow rudder is best for a ship's sailing, provided she can feel it, that is, be guided and turned by it; for a broad rudder will hold much water when the helm is put over to any side; but if a ship have a fat quarter, so that the water cannot come quick and strong to her rudder, she will require a broad rudder.

The aftmost part of the rudder is called the *rake* of the rudder.

Large canal boats have *clasp-rudders*, about half their length being moveable on hinges, so as to fold and shorten them before the entering of a lock.

RUDDER-*Coats*, are coverings made of well-tarred canvas, to prevent the water from running in at the rudder-hole.

RUDDER-*Irons*, in a *Ship*, are the cheeks of that iron of which the pintle is part, which is fastened and nailed down about the rake of the rudder.

RUDDER-*Pendants*. See PENDANTS.

RUDDER-*Rope*. See ROPE.

RUDDER-*Tackle*. See TACKLE.

RUDDIMAN, THOMAS, in *Biography*, was born in the parish of Boyndie, Banffshire, in the year 1674, where he received the first rudiments of his education, and in 1690 he was sent to King's college, Aberdeen, where he obtained a bursary. He took the degree of M. A. in 1694, and in the following year he was elected master of the public school of Laurence-Kirk. In 1700 he removed to Edinburgh, and two years afterwards he was appointed librarian to the faculty of advocates. In 1709 he published Johnson's metrical paraphrase of Solomon's Song, and soon after he added a very accurate glossary to the folio edition of Gawin Douglas's translation of the Eneid. His situation at the advocates' library was so favourable to his literary pursuits, that he declined an invitation from the magistrates of Dundee, to the office of rector of the grammar-school in that town. In 1714 he published his "Rudiments of the Latin Tongue," which became a very popular book in Scotland, and was used in many schools in South Britain. In 1725 he edited "Buchanani Opera omnia," in two vols. folio, to which he added notes critical and explanatory. About the same time he commenced the business of printer, in conjunction with his brother Walter. In 1720 he published the first part of his "Grammaticæ Latinæ Institutiones," which was very soon followed by his "Grammatical Exercises." Of the various works which issued from the press of the Ruddimans, the most important were the "Greek Testament," and an edition of the works of Livy: the last is reckoned an extremely correct edition. He also edited Anderson's "Diplomata et Numismata Scotiæ," to which he prefixed a learned preface. He exhibited great critical acumen in his vindication of "Buchanan's Version of the Psalms," against the objections of Mr. Mann, and by "Critical Observations on Burrman's Commentary on Lucan's Pharsalia." Some treatises on disputed points of Scottish history involved him in controversies, in which he met with much abuse, but he did not lose his own temper, though he was a warm advocate for the national independence of Scotland, and much attached to the house of Stuart. At an advanced age his eye-sight began to fail him, and he resigned the office of librarian to the faculty of advocates in 1752. He died in January 1757, at the age of 83. Chalmer's Life of Ruddiman.

RUDDOCK, in *Ornithology*, an English name for the *rubecula*, more commonly known by the name of the *red-breast*, or *robin-red-breast*.

RUDELSHOFEN, in *Geography*, a town of Germany, in the margraviate of Anspach; four miles E. of Uffenheim.

RUDELSTADT, a town of Silesia, in the principality of Schweidnitz; 16 miles W. of Schweidnitz. N. lat. 50° 42′. E. long. 15° 59′.

RUDEN,

RUDEN, a ſmall iſland in the Baltic, near the coaſt of Pomerania, amidſt ſhoals and ſand-banks, which render it probable that it was formerly much larger; and this conjecture is confirmed by another circumſtance, *viz.* that in the year 1264 it had two church-villages, called "Ruden" and "Carven." On this iſland is a caſtle; and between it and the little iſland of Die is a ſand eight miles long and two broad. N. lat. 53° 40′. E. long. 13° 48′.

RUDEN, or *Tydal*, a mountain which ſeparates the province of Jamptland in Sweden, from the province of Drontheim in Norway.

RUDENHAUSEN, a town of Germany, in the county of Caſtel; 28 miles W.S.W. of Bamberg.

RUDENTURE, in *Architecture*, the figure of a rope, or ſtaff, ſometimes plain, ſometimes carved; with which a third part of the fluting of columns is frequently filled up.

It is thus called from the Latins *rudens*, *cable*, whence ſome call it a cabling; and the columns, whoſe flutings are thus filled, they call *rudented*, or *cable columns*.

There are alſo rudentures in relievo, laid on the naked of pilaſters, not fluted; an inſtance of which we have in the church of St. Sapienza at Rome.

RUDERATION, RUDERATIO, in *Building*, a term uſed by Vitruvius for the laying a pavement with pebbles, or little ſtones.

To perform the ruderation, it is neceſſary the ground be firſt well beaten, to make it firm, and to prevent its cracking. Then a ſtratum of little ſtones is laid, to be afterwards bound together with mortar, made of lime and ſand, called by Vitruvius *ſtatumen*.

If the ſand be new, its proportion to the lime may be as three to one; but if dug out of old pavements, or walls, as five to two.

RUDERATION, Daviler obſerves, is uſed by Vitruvius, lib. vii. cap. 1. for the coarſeſt and moſt artleſs kind of maſonry; where a wall is, as it were, cobbled up.

RUDGELEY, in *Geography*, a market-town in the pariſh of Rudgeley, eaſt diviſion of the hundred of Cuttleſtone, county of Stafford, England, is ſituated on the ſouth bank of the river Trent, at the diſtance of 9½ miles E.S.E. from the town of Stafford, and 131½ miles N.W. by N. from London. It has been long celebrated on account of its great annual fairs for horſes, particularly thoſe of the coach breed. The market day is Tueſday, weekly; and the fairs are held on the 6th of June and 20th of October. The church, which ſtands on the north ſide of the town, is not remarkable as a building, but it contains ſeveral handſome monuments to the memory of the Chetwynd and Weſton families. The living is a vicarage in the patronage of the dean and chapter of Lichfield.

The ancient owners of Rudgeley were of the ſame name with the town, and ſeem to have continued in poſſeſſion till the reign of Henry VI. In the time of Edward III. ſome of the family were ſheriffs of the county; and one was a knight of the ſhire during the ſame period. Erdeſwick ſtates that this manor ſubſequently belonged to the biſhops of Lichfield, and was alienated by biſhop Sampſon to the crown in 1547.

On the oppoſite bank of the Trent from Rudgeley, are ſeveral villages named Ridwane, and diſtinguiſhed from each other by the adjunct Hamſtall, Pipe, and Maveſyn or Malveyſin. Of theſe, the laſt is the moſt important; and its church is intereſting to the antiquary, on account of the numerous ancient monuments it contains in memory of the Maveſyns, lords of the manor, ſeveral of whom were military characters of conſiderable eminence. Hugo Maveſyn, the founder of the church, is repreſented by a ſtone figure in chain armour, armed and equipped for battle, lying under a pointed arch in the north wall of the church. Adjoining, under another ſimilar arch, is the recumbent figure of ſir Henry Maveſyn, a knight croiſader. Like his predeceſſor, he appears completely armed, and dreſſed in chain mail; but differs from him in having his legs croſſed, and his ſhield charged with croſs bars. The other tombs are altar-ſhaped, and are ſituated in the middle of the church. That of ſir Robert Maveſyn recalls to memory a melancholy ſtory, thus related by Mr. Pennant: "In the beginning of the reign of the uſurping Henry, when the kingdom was divided againſt itſelf, two neighbouring knights, ſir Robert Maveſton, and ſir William Handſacre, of Handſacre, took arms in ſupport of different parties: the firſt to aſſert the cauſe of Bolingbroke; the laſt that of the depoſed Richard. They aſſembled their vaſſals, and began their march to join the armies, then about to commence battle near Shrewſbury. The two neighbours, with their reſpective followers, unfortunately met not far from the ſeats. Actuated by violent party rage a ſkirmiſh enſued: ſir William was ſlain on the ſpot. What a picture is this of the miſery of civil diſſention? What a tale the following of the ſudden viciſſitude of hatred to love, between contending families? Margaret, one of the daughters, and coheireſs, of ſir Robert Maveſton, gave her hand to ſir William, ſon of the knight ſlain by her father, and with her perſon and fortune compenſated the injury done by her houſe to that of Handſacre."

About two miles to the north-weſt of Rudgeley, cloſe to the river Trent, ſtand the church and village of Colwich. The firſt is very ancient, and is prebendal to the cathedral of Lichfield. Here are ſeveral tombs in memory of the Anſons, anceſtors of the preſent lord Anſon; alſo of the Wolſelys, proprietors of Wolſely park, which is ſituated on the ſouthern bank of the Trent, and diſplays much fine and pictureſque ſcenery. Cannock chace, which extends to the ſouthward, and contains an area of nearly forty miles ſquare, was formerly a foreſt, but has been long ſtripped of its foliage, and is now a heathy waſte, only remarkable for the extenſive proſpects it affords, and for its richneſs in coal-mines. On its eaſtern boundary is Beaudeſert park, the princely ſeat of the earl of Uxbridge, which is placed on the declivity of a lofty ſloping eminence, ſheltered on all ſides by "beautiful riſing grounds, emboſomed with trees, and commanding in front, over the tops of far ſubjacent woods, a moſt extenſive and diverſified view; ſo that it well vindicates the propriety of its name." The houſe was erected in the reign of queen Elizabeth, by Thomas, ſecond lord Paget. It is a handſome ſtructure of ſtone, built in the form of a half H, and has been of late years greatly improved by its noble owner. On the ſummit of the hill on which it is ſituated, may be ſeen the remains of an ancient Britiſh poſt, called Caſtle-hill. It is formed by two deep ditches, and an immenſe rampart, and has one entrance on the eaſt and another on the weſt. Near the baſe of the hill on its eaſt ſide, ſtands the village of Fairwell, the church of which was formerly attached to a priory of Benedictine nuns. Originally it was the property of canons regular, or hermits, but at the requeſt of ſeveral of the brethren it was beſtowed on the nunnery in 1140, by Roger de Clinton, biſhop of Lichfield, who further endowed it with conſiderable poſſeſſions. King Henry II. was likewiſe a great benefactor to this ſociety. Pennant's Journey from Cheſter to London, 4to. Lond. 1782. The Hiſtory and Antiquities of Staffordſhire, &c. by the Rev. Stebbing Shaw, B. D. F. S. A. vol. i. fol. Lond. 1798.

RUDHAN, a town of Perſia, in the province of Kerman; 60 miles N.W. of Sirgian.

RUDIARIUS, in *Antiquity*, a veteran gladiator, who had got a difcharge from the fervice.

He was thus called, becaufe, as a mark of difmiffion, a rod was put into his hands, called *rudis;* which fee.

The *rudiarii* were alfo called *fpectatores*.

RUDIMENTS, Rudimenta, the firft principles, or grounds, of any art or fcience, called alfo the elements thereof.

RUDIS, a knotty, rugged ftick, which the prætor, among the Romans, gave the gladiators, as a mark of their freedom and difmiffion.

The rudis feems to have been beftowed both on flaves and freedmen; with this difference, that it procured for the former no more than a difcharge from any farther performance in public, upon which they commonly turned *laniftæ*, fpending their time in training up young fencers; but the latter, who had hired themfelves out for thefe fhows, were reftored to a full enjoyment of their liberty. Kennet, Rom. Ant. p. 280.

Hence the Latin phrafe, *rude donare*, to make a gladiator free, to difcharge him from fighting any more. They were hence called *rudiarii*, and had a cuftom of hanging up their arms in the temple of Hercules, the patron of their profeffion, and were never called out again without their confent.

RUDISHEIM, in *Geography*, a town of Germany, in the Rhingau, celebrated for its wine; 19 miles W. of Mentz.

RUDKIOPING, a fea-port town of Denmark, on the W. coaft of the ifland of Langeland, and the only town in the ifland; the inhabitants carry on a confiderable trade in corn and provifions. N. lat. 54° 37′. E. long. 10° 45′.

RUDMAS Day, in our *Old Writers*, the feaft of the Holy Crofs. There are two of thofe feafts, one on the third of May, being the Invention of the Crofs; and the other the fourteenth of September, called *Holy Rood-day*, and is the Exaltation of the Crofs.

The word is compounded of the Saxon *rode*, *i. e. crux*, and *mafs-day*, *i. e. feaft-day*.

RUDNA, in *Geography*, a town of Hungary; 12 miles N.N.W. of Kemnitz.

RUDNIK, a town of Servia; 40 miles N.N.E. of Jenibafar.

RUDNIKI, a town of Lithuania, in the palatinate of Wilna; 15 miles S.S.W. of Wilna.

RUDNIKZA, a town of European Turkey, in Servia; 46 miles S. of Belgrade.

RUDOLFSOWITZ, a town of Silefia, in the lordfhip of Plefz, on the Biela; three miles S.E. of Plefz.

RUDOLFSTEIN, a town of Germany, in the principality of Culmbach; five miles N.W. of Hof.

RUDOLFWERTH, Neustadtein, or *Novomefto*, a town of Auftria, in the duchy of Carniola, fituated on the Gurk, and founded in the year 1365, by the Auftrian archduke Rodolph IV. privileged, and called after his own name. It has a provoftfhip or collegiate church, erected in the year 1509, four other churches, and two convents. By incurfions of the Turks in the fifteenth and fixteenth centuries, fucceffive fires, and the plague, this town has been very much reduced from its former flourifhing condition; 44 miles S.S.W. of Pettau. N. lat. 45° 52′. E. long. 15° 41′.

RUDOLPHIA, in *Botany*, a genus eftablifhed by Willdenow, in the Tranfactions of the Society *Naturæ Scrutatorum* at Berlin, v. 3. 151, is named in honour of Charles Afmund Rudolph, a German phyfician, the author of fome botanical obfervations. Such at leaft is the account of De Theis, taken probably from the above publication, which we have not feen. The genus may alfo ferve as a memorial of John Henry Rudolph, author of an inaugural differtation on fuch plants of the *Flora Jenenfis*, as belong to the *Polyandria Monogynia* of Linnæus; fee *Dryandr. Bibl. Banks.* v. 3. 161.—Willd. Sp. Pl. v. 3. 918. Poiret in Lamarck Dict. v. 6. 331.—Clafs and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminofæ*, Juff.

Eff. Ch. Calyx two-lipped. Standard of the corolla very long, lanceolate. Stamens all connected. Legume flat, with many feeds.

1. R. *volubilis*. Twining Rudolphia. Willd. n. 1.—"Leaves ovate, pointed; heart-fhaped at the bafe, and fomewhat peltate."—Native of very lofty mountains, in the Weft Indian ifland of Porto Rico. The *ftem* is fhrubby, without prickles, twining up the trunks of trees; its bark black and warty; the young branches downy. *Leaves* fimple, alternate, ftalked, rigid, entire; fhining on the upper fide; downy when young. *Footftalks* with two joints, channelled between them, on the upper fide. *Clufters* fcattered, thrice the length of the leaves. *Flower-ftalks* three together. *Flowers* fcarlet. *Willdenow*.

2. R. *peltata*. Peltate Rudolphia. Willd. n. 2. (Erythrina planifiliqua; Linn. Sp. Pl. 993. Corallodendron folio fingulari oblongo, filiquâ planâ; Plum. Ic. 92. t. 102. f. 1.)—Leaves oblong-lanceolate, fomewhat heart-fhaped, peltate.—Native of Hifpaniola. Willdenow afferts this to be diftinct from the foregoing. The common *flower-ftalk*, as reprefented by Plumier, is a foot and half long, racemofe at the extremity.

M. Poiret reduces to this genus the *Butea* of Koenig, and we heartily wifh we could follow him, in order to get rid of a name fo abfurd and reprehenfible in its original application; fee Plaso and Butea. We fear however that neither the character of the legumes, nor the habits of the plants, will fupport fuch a meafure.

RUDOLPHINE Tables. See Catalogue *of the Stars*.

RUDOLSTADT, or Rudelstadt, in *Geography*, a town of Germany, in the county of Schwartzburg Rudolftadt, from which a branch of the houfe of Schwartzburg derives its title, fituated on the Saal; 24 miles S.E. of Erfurt. N. lat. 51° 40′. E. long. 11° 19′.

RUDRA, in *Mythology*, a name of the Hindoo deity Siva. In fome of their theogonical books, Siva, in the form of Rudra, is made to fpring from a wrinkle in the forehead of Brahma, with five heads and ten arms, as he is reprefented in the plates of the Hindoo Pantheon. When five-headed, he is named Pancha-muki. (See that article.) Rudra is faid to have thus fprung into a new form, to enable Brahma to people the world with fuitable inhabitants; his earlier efforts having been productive of a refractory race. (See Muni.) The name of Rudra is generally applicable to Siva, in his character of Fate and Deftiny, and of Time. Under the article Mahakala he is called Kal-Agni-Rudra, interpreted Time, Fire, Fate, and defignative of his deftructive energies. (See Kal-agni-rudra.) In the Inftitutes of Menu, (fee Menu,) the "eleven Rudras" are mentioned, but it has not been explained what that number efpecially adverts to. Rudra is underftood to be the deity of pregnant women, as is his confort, known as fuch in her character of Rudri, or Rudrani. (See Rudrani.) He is alfo called the god of tears and lamentation: being, as time or fate, the lord of punifhment, and thereby caufing thefe refults. Sometimes he is called Maha Rudra, or the great Rudra. This occurs in an extract in the article Kama.

RUDRANI, or Rudri, is a name and form of the goddefs

goddefs Parvati, confidered then as the fakti or energy of her lord Siva, in his form of Rudra. (See thofe feveral articles; alfo RAUDRI.) In this character fhe is fometimes called the patronefs of pregnant women. (See IDITA, ILITA, and ILITHYA.) She is invoked under the appellation of "Rudrani the beloved of Siva," in the article LAKSHMI of this work.

RUDSTAKES, in *Agriculture*, a provincial term applied to the ftakes to which cattle are tied in the ftall.

RUDTSDORF, in *Geography*, a town of Bohemia, in the circle of Chrudim; nine miles E. of Leutmifchl.

RUE, PIERRE DE LA, in *Biography*, an ecclefiaftical compofer in the firft ftage of correct counterpoint. He was contemporary with Jofquin, and one of the compofers for the papal chapel during the pontificate of Sixtus IV. who reigned from 1471 to 1484. De la Rue, or as he is called by writers in Latin, Petrus Platenfis, was one of the moft voluminous compofers of this early period. What country gave him birth, is now difficult to afcertain; Walther calls him a Netherlander; Glareanus, a Frenchman; others fuppofe him to have been a Spaniard. It is, however, certain that he was in high favour with prince Albert, and princefs Ifabella, of the Low Countries; that a work under his name was publifhed at Antwerp, with this title: "El Parnaffo Efpanol de Madrigales y Villancicos à quatro, cinco y feis voces;" befides maffes and motets to Latin words; and that he was a very learned contrapuntift.

Many of his compofitions for the church are ftill extant in the mufeum collection of maffes and motets, fome of which were publifhed as early as the year 1503, immediately after the invention of mufical types.

RUE, CHARLES DE LA, a learned French Benedictine monk, was born at Corbie, in Picardy, in the year 1684. He took the vows at the age of 19, in the abbey of Meaux, having already given evidence that he poffeffed a ftudious difpofition, by the progrefs which he had made in the languages, and in the belles lettres. In 1712 the learned Montfaucon admitted him into his friendfhip, became the guide of his ftudies, and freely communicated to him the ftores of knowledge which he poffeffed. So well did the pupil avail himfelf of thefe advantages, that he foon became a very ufeful affiftant to his mafter in his learned labours. In 1713, Montfaucon had publifhed the remains of Origen's "Hexapla," and de la Rue was fixed on to give a complete edition of that learned father's works, with the exception of the Hexapla. In 1733 he publifhed the two firft volumes, with proper prolegomena, and many ufeful as well as very learned notes. The other volumes were publifhed by his nephew Vincent, whom he had affociciated with himfelf in his work, after the death of Charles, which happened in 1739. The manner in which the third and fourth volumes of this great work were executed, fhews that the nephew was fully adequate to the tafk confided to him. This edition is entitled "Origenis Opera omnia, quæ Græcè vel Latinè extant, et ejus nomine circumferentur, ex variis Editionibus et Codicibus Collecta, recenfita, Latinè verfa at Annotationibus illuftrata." Vincent de la Rue died in the year 1762. Moreri.

RUE, in *Botany*. See RUTA.

RUE, in the *Materia Medica*, the ruta graveolens, or common rue, has a ftrong, ungrateful odour, and a bitter, hot, penetrating tafte; the leaves are fo acrid as to irritate and inflame the fkin, if they be much handled; and in its natural and uncultivated ftate, it is faid to poffefs thefe qualities more powerfully. Its virtues are extracted both by water and rectified fpirit, but more powerfully by the latter. On infpiffating the fpirituous tincture, very little of its flavour rifes with the menftruum; moft of the active parts of the rue being concentrated in the extract. In diftillation with water, an effential oil feparates, which is of a yellowifh or brownifh colour, a moderately acrid tafte, and penetrating fmell; the decoction, infpiffated, yields a moderately warm, pungent, and bitterifh extract. The feeds and capfules contain more oil than the leaves. From the experiments of Beaumé it appears, that the recent plant contains but a very fmall portion of effential oil: thus, from 21 lbs. of the leaves he fcarcely obtained a drachm, while 10 lbs. of the feeds yielded two ounces.

Rue was much ufed by the ancients, who afcribed to it many excellent qualities. Hippocrates commends it as a refolvent and diuretic, and attributes to it the power of refifting contagion, and the action of other kinds of poifons; fo that it was employed with this intention by Mithridates (fee Plin. N. Hift. l. 28. c. 8.): this quality, though allowed by Boerhaave, is now generally difcredited. (Cullen's Mat. Med. vol. ii. p. 365.) According to Bergius, it is "alexiteria, pellens, emmenagoga, fudorifera, rubefaciens." It is, however, acknowledged to be a powerful aftringent, and, like other medicines of the fetid kind, to poffefs attenuating, deobftruent, and antifpafmodic powers, and to be peculiarly adapted to phlegmatic habits, or weak and hyfterical conftitutions, fuffering from retarded or obftructed fecretions. A ftrong infufion of it, exhibited per anum, has been found of great fervice in relieving the convulfions of infants, arifing from flatulence and other inteftinal irritations. It is employed by fome as a tea, and alfo externally in difcutient and antifeptic fomentations. Among the common people, the leaves are fometimes taken with treacle, on an empty ftomach, as anthelmintic. A conferve, made by beating the frefh leaves with thrice their weight of fine fugar, is the moft commodious form for ufing the herb in fubftance. The dofe of the powdered leaves may be from grs. xv to ℈jj, given twice or thrice a day.

The officinal preparations are *oleum rutæ*, and *extractum rutæ graveolentis*. The "oleum herbæ florefcentis rutæ" of the Dublin pharmacopeia, or oil of rue, is procured in the quantity of 59 grains of oil from 21 pounds of rue, which oil has the ftrong ungrateful odour and tafte of the plant. When recently drawn the colour is yellow, but by age it deepens to a brown, and depofits a brownifh refinous fediment. It congeals at 40° Fahrenheit. This oil is ftimulant, and antifpafmodic: it is fometimes given in hyfteria, and the convulfive affections of infants attendant on dentition, and is fometimes ufed as a rubefacient in palfy. The dofe is from ♏ ij to ♏ v, triturated with fugar or mucilage. The "extractum foliorum rutæ graveolentis," Edin. "extractum foliorum rutæ," Dub., or extract of rue, is prepared by the former difpenfatory in the fame manner as the extract, and by the latter, like other fimple extracts: and by whichever procefs it is prepared, it is inodorous, but has a bitter acrid tafte. The medicinal properties are different from thofe of the plant, the ftimulant and narcotic powers of which depend on the volatile oil it contains, which is diffipated during the infpiffation of the extract. The dofe is from grs. x to ℈j, in pills. Lewis. Woodville. Thompfon.

RUE, *Dog's*. See SCROPHULARIA.

RUE, *Goat's*. See GALEGA.

RUE, *Meadow*. See THALICTRUM.

The leaves of meadow-rue, mixed with other greens, are fomewhat laxative, according to Dodonæus; but a decoction of the root is more fo, and may be well fubftituted for rhubarb.

Rue, *Wall*, or *White maidenhair, ruta muraria*, a fpecies of *afplenium*; which fee.

This plant is found growing out of the joints of old walls in various parts of England, where it is gathered for medicinal ufe; but as it cannot be cultivated in gardens fo as to grow to advantage, it is needlefs to fay more of it.

This is one of the five capillary herbs mentioned in the Difpenfatory, and has the fame virtues with the reft of the maiden-hairs; it is fometimes ufed in pectoral decoctions and diuretic apozems.

Rue, *Wild Affyrian.* See Peganum.

Its virtues agree with the garden rue, but it is more acrimonious.

Rue, in *Geography*, a town of France, in the department of the Somme, and chief place of a canton, in the diftrict of Abbeville; 12 miles N.W. of Abbeville. The place contains 1346, and the canton 9736 inhabitants, on a territory of $332\frac{1}{2}$ kiliometres, in 16 communes. The chief trade of this town is in fifh, fheep, wool, horfes, and cattle.

Rue, a river of Wales, in the county of Montgomery, which runs into the Severn, three miles S. of Welfhpool.—Alfo, a river of France, which runs into the Dordogue, near Bort.

Rue *Ruw*, a town of Switzerland, in the canton of Friburg, capital of a bailiwick; 10 miles W. of Gruyeres.

RUEBLAND, a town of the duchy of Carinthia; fix miles S.S.E. of Spital.

RUECCO, a river which rifes in Carniola, and runs into the fea a little to the N.E. of Trieste, paffing during its fhort courfe through immenfe rocks.

RUEDA, a town of Spain, in the province of Leon; 11 miles E.S.E. of Leon.—Alfo, a town of Spain, in the province of Leon; 16 miles S.W. of Valladolid.

RUEDOCK. See Ruadock.

RUELLE, a French term, formerly introduced into our language, is a diminutive of *rue, ftreet*, and fignifies, literally, *little ftreet*.

Its ufe, among us, was for an alcove, or other genteel apartment, where the ladies receive vifits either in bed or up. The poets go reading their works from ruelle to ruelle, to befpeak the approbation and intereft of the ladies. The term, however, is now difufed.

RUELLIA, in *Botany*, a genus of Plumier's, named in honour of a French phyfician and botanift, Dr. John Ruelle, who publifhed, in 1536, a treatife "De Naturâ Stirpium," chiefly a tranflation of Diofcorides, which is celebrated by Plumier for the excellence of its latinity. Ruelle, though phyfician to Francis I., quitted the profeffion of phyfic, and entered into the church. He died a canon of Paris, in 1537.—Plum. Gen. 12. t. 2. Linn. Gen. 324. Schreb. 423. Willd. Sp. Pl. v. 3. 362. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 56. Purfh 420. Brown. Prodr. 477. Dill. Elth. t. 248 and 249. Juff. 103. Lamarck Dict. v. 6. 337. Illuftr. t. 550. Gærtn. t. 54.—Clafs and order, *Didynamia Angiofpermia.* Nat. Ord. *Perfonatæ*, Linn. *Acanthi*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, permanent, divided, more or lefs deeply, into five linear, acute, ftraight, equal, permanent fegments. *Cor.* of one petal, fomewhat irregular; the upper part of the tube dilated and inclining; limb five-cleft, fpreading, obtufe; the two upper fegments moft reflexed. *Stam.* Filaments four, fhorter than the corolla, fituated in the dilated part of the tube, approaching each other, and connected, in pairs; anthers fcarcely projecting beyond the tube, each with two parallel, fimple cells. *Pift.* Germen fuperior, roundifh; ftyle thread-fhaped, the length of the ftamens; ftigma in two acute fegments, the lowermoft involute. *Peric.* Capfule nearly cylindrical, pointed at each end, almoft feffile, of two cells, and two valves, feparating by the elafticity of their taper bafe. Partition contrary to the valves, and combined with them. *Seeds* feveral, roundifh, compreffed, each fubtended by an awl-fhaped, afcending prop.

Eff. Ch. Calyx in five deep, equal fegments. Corolla fomewhat bell-fhaped, flightly irregular. Stamens approximated in pairs. Anthers of two parallel cells. Capfule of two elaftic valves, and two cells; partition from the centre of each valve. Seeds feveral, with awl-fhaped props.

This genus has generally been fuppofed, by botanifts of the Linnæan fchool, to differ from *Jufticia*, merely in having four ftamens inftead of two. The elaftic bivalve capfule, with props to the feeds, was confidered as common to both, and very juftly; though a few fpecies have been admitted, in which thefe characters are altogether wanting, as *R. balfamea* and *uliginofa*.

Mr. Brown has inveftigated *Ruellia* with no lefs care than Justicia, fee that article; for indeed a ftudent of tropical plants could not fail foon to difcover, that he was able to proceed but a very little way, without underftanding thefe genera, and the family to which they belong. The able botanift juft mentioned feparates from *Ruellia* all fpecies that have only two feeds in each cell, fuch as *R. intrufa* of Vahl, and the Linnæan *Jufticia gangetica*; and even thefe, he thinks, require fubdivifion. Others are to be removed on account of their feparate partition, unconnected with the valves of the capfule, like *R. Blechum*, &c. *R. depreffa* belongs, it feems, to a different natural order.

The number of fpecies, which in Willdenow is 46, becomes thus greatly reduced. In the new edition of Hort. Kew. eleven are, under Mr. Brown's infpection, enumerated, two of them not among Willdenow's. Four more are defcribed in his own Prodromus, from New Holland. To all thefe *reptans* of Forfter, and probably *fecunda* of Vahl, are to be affociated, nor is it fuppofed that feveral more fpecies may not be found. We fhall exhibit thefe acknowledged ones (only omitting *ringens*; fee Hygrophila,) as a fpecimen of the genus, feveral of them being much recommended by their beauty. Unfortunately they moftly require the heat of a ftove, a few only will fucceed with the protection of a green-houfe, in this country. They are generally perennial herbs; fometimes fhrubby.

1. R. *ovata.* Ovate-leaved Ruellia. Cavan. Ic. v. 3. 28. t. 254. Willd. n. 4. Ait. n. 1.—Leaves feffile, elliptic-oblong, acute at each end, entire, villous. Flowers axillary, ternate, nearly feffile. Stem decumbent.—Native of Mexico, from whence it was tranfmitted to the botanic garden at Madrid. The late marchionefs of Bute fent it to Kew in 1800. This is a perennial, herbaceous, ftove-plant, flowering in July and Auguft. The *root* is fibrous. *Stems* fcarcely a fpan long, obfcurely quadrangular, leafy, hairy; proftrate at the bafe; afcending at the extremity. *Leaves* oppofite, near two inches long, foft, downy and fringed. *Flowers* about the top of the ftem, large, longer than the upper leaves, deep blue with a white tube. *Stigma*, according to Cavanilles, fpatulate, undivided.

2. R. *ftrepens.* Whorled Ruellia. Linn. Sp. Pl. 885. Mant. 422. Willd. n. 5. Ait. n. 2. Purfh n. 1. (R. ftrepens, capitulis comofis; Dill. Elth. 330. t. 249.)—Leaves ftalked, ovate, acute, entire. Stalks three-flowered, very fhort. Stem erect.—Native of North America. On dry hills, in fhady woods, from Virginia to Carolina, flowering in June and July. *Purfh.* *Stem* fquare, with a few fhort branches. *Leaves* two inches long, roughifh with fhort fcattered hairs. *Flowers* large, pale blue, making two or three

three apparent whorls, from the upper leaves. *Bracteas* lanceolate, fringed, rising above the *calyx*, whose segments are awl-shaped, very narrow, and hairy, rather longer than the ripe *capsule*.

3. R. *patula*. Spreading Ruellia. Jacq. Misc. 2. 358. t. 119. Willd. n. 6. Ait. n. 3.—Leaves stalked, ovate, entire, very obtuse, downy. Flowers ternate, nearly sessile. Stem much branched, spreading. Capsule above twice the length of the calyx.—Native of the East Indies; imported by sir J. Banks, in 1777. This is a shrubby species, flowering copiously in the stove, in July and August. The *leaves* are shorter and broader than in the foregoing, rounded, and somewhat heart-shaped. *Flowers* light blue. *Calyx* small. The whole plant is finely downy.

4. R. *lactea*. White Mexican Ruellia. Cavan. Ic. v. 3. 28. t. 255. Willd. n. 9. Ait. n. 4.—Leaves stalked, ovate, fringed, slightly toothed. Stalks about three-flowered, very short. Stem woolly, erect. Capsule shorter than the calyx.—Native of Mexico. It has been dispersed from the garden of Madrid, to different parts of Europe, and proves a tolerably hardy green-house plant, flowering in summer. The *stem* is herbaceous, erect, a foot high, square, covered with long, dense, woolly hairs. *Leaves* three or four inches long, and two broad. *Flowers* of a pale blueish-white, the central one without *bracteas*. Segments of the *calyx* hairy, very long and slender.

5. R. *clandestina*. Covert-flowering Ruellia. Linn. Sp. Pl. 885. Willd. n. 10. Ait. n. 5. (R. capsulis teretibus; Dill. Elth. 328. t. 248.)—Leaves stalked, oblong, obtuse, somewhat toothed; tapering at the base. Stalks three-flowered, rather shorter than the leaves. Capsule nearly cylindrical, longer than the calyx.—Native of Barbadoes and Santa Cruz. A perennial stove plant, flowering in July and August, but seldom cultivated. The *root* consists of many long, thick, fleshy fibres. *Stem* a span high, clothed with numerous, large, undulating *leaves*. *Flowers* large, blue, on slender elongated stalks. *Calyx* linear and very narrow, scarcely above half the length of the *capsule*, which is obscurely quadrangular when ripe, containing a great number of flat, downy *seeds*, bordered with a white membrane. The *corolla* of the earliest flowers is said to be small and imperfect.

6. R. *paniculata*. Panicled Ruellia. Linn. Sp. Pl. 885. Willd. n. 18. Ait. n. 6. (Speculum veneris majus, impatiens; Sloane Jam. v. 1. 158. t. 100. f. 2.)—Leaves ovate, pointed, rough, entire. Stalks many-flowered, forked, divaricated, longer than the leaves. Upper segment of the calyx rather the broadest. Native of the West Indies. Sloane speaks of it as common about Kingston in Jamaica, growing among bushes. Miller and Linnæus cultivated this plant, and it may be met with sometimes in stoves, flowering in summer. The habit is somewhat shrubby, and the herbage hoary. *Leaves* copious, from two to four inches long, on stalks about half their length. *Flower-stalks* axillary, chiefly about the upper part of the stem, and extending beyond the leaves, so as to give the whole plant a panicled appearance. *Bracteas* oblong, obtuse. Each *flower* is nearly sessile, of a bright light blue, with a long slender tube. Segments of the *calyx* hispid, linear, very narrow, one of them twice as broad as the rest. Sloane says the *capsule* throws out the *seeds* with violence, when it is either touched or wetted at the end.

7. R. *tuberosa*. Tuberous-rooted Ruellia. Linn. Sp. Pl. 885. Willd. n. 19. Ait. n. 7. (Gentianella flore cæruleo, integro vasculo seminali ex humidi contactu impatiente; Sloane Jam. v. 1. 149. t. 95. f. 1.)—Leaves ovate-wedge-shaped, crenate. Flower-stalks deeply-three-cleft. Stem simple.—Native of Jamaica, in bushy places near Kingston, flowering after the rainy season. The perennial *root* consists of many long fleshy knobs. *Stem* erect, herbaceous, a foot high, a little hairy. *Leaves* spreading, minutely and sparingly hairy, each tapering down into a long *footstalk*. *Flower-stalks* slender, axillary, solitary, shorter than the leaves. *Calyx* very long and slender, rough with close bristles. *Corolla* large, of a fine blue. *Capsule* the length of the calyx; we do not perceive it to be more angular than that of *R. clandestina*, though Dillenius indicates the contrary. *Seeds* numerous.

8. R. *biflora*. Two-flowered Ruellia. Linn. Sp. Pl. 886. Willd. n. 21. Ait. n. 8. (R. oblongifolia; Michaux Boreali-Amer. v. 2. 23? Pursh n. 2?)—"Flowers in pairs, sessile.—Native of Carolina, from whence it was sent to Kew, in 1765, by Mr. John Cree. It is kept in the greenhouse, being an herbaceous perennial, flowering in July. We have seen no authentic specimen, nor have we any further knowledge of this species than what occurs in Linnæus. *R. oblongifolia* of Michaux, suspected by Mr. Pursh to be the same plant, is described as "ascending, all over minutely and densely downy, with erect, nearly sessile, obovate-oblong *leaves*, and mostly solitary *flowers*." Pursh adds that "the *bracteas* are the length of the *calyx*, whose thread-shaped segments are the length of the tube of the *corolla*." He adds that it grows "in sandy pine woods of Georgia, flowering in June and July," and that "the *flowers* are a yellowish-blue," a colour not very intelligible to us; but the author only saw them dried.

9. R. *ocymoides*. Brasil-leaved Ruellia. Cavan. Ic. v. 5. 9. t. 416. Ait. Hort. Kew. Epit. 373.—Stem branched, erect. Leaves ovate, obtuse, entire; glaucous beneath. Flowers axillary, ternate. Bracteas ovate. Calyx tubular at the base.—Native of Mexico; cultivated in the garden of Madrid, and introduced at Kew in 1798. It is biennial, flowering in the stove from July to September, and may perhaps be perennial in its native country. The *stem* is about six inches high, branched from the bottom, somewhat downy like the rest of the plant. *Leaves* opposite, on long stalks, concave; dark green above; glaucous beneath. *Flowers* sessile, with an ovate stalked *bractea* at the base of each. *Calyx* with a perceptible tube, though much shorter than the last; its segments awl-shaped, rather unequal. *Corolla* pale blue, with a white tube.

10. R. *formosa*. Large Scarlet Ruellia. Ait. n. 10. Andr. Repos. t. 610. Curt. Mag. t. 1400.—Leaves stalked, ovate, entire, downy on both sides. Stalks axillary, alternate, very long, with few flowers. Corolla somewhat ringent. Native of Brasil. Said to have been introduced into England by sir Charles Cotton, in 1808. It proves a great ornament to our stoves, which are decorated all summer long with its very large and splendid scarlet *flowers*. The *stem* is in some degree shrubby, erect, three or four feet high, square, finely hairy, as well as the rest of the herbage, whose colour is a greyish-green. *Flower-stalks* twice or thrice as long as the leaves. Segments of the *calyx* deep and linear. Lobes of the *corolla* emarginate. *Capsule* obovate, the length of the calyx. *Seeds* numerous, lenticular, rough. Very different from the *macrophylla* of Vahl's Symbolæ, v. 2. 72. t. 39, which, according to Mr. Brown, is no *Ruellia*, having but two seeds in each cell, and still generically different, as he thinks from *R. intrusa*, &c. mentioned in our introductory part of this article.

11. R. *fulgida*. Lesser Scarlet Ruellia. Ait. n. 11. Andr. Repos. t. 527.—Leaves stalked, ovate, pointed, crenate, hairy. Tufts many-flowered, on long axillary stalks. Corolla somewhat ringent, with a nearly cylindrical tube.

tube.—Native of the Weft Indies. It made a part of a fine collection of ftove plants, brought over by the late much-lamented earl of Seaforth, and given by his lordfhip to A. B. Lambert, efq. This plant firft flowered in Mr. Lambert's ftove, in June, 1807. Its habit is fhrubby. *Leaves* different from the laft, in being crenate and wavy. *Flowers* remarkably abundant, their ftalks affembled in a corymbofe manner. *Corolla* of a rich orange-fcarlet, but fcarcely one-third the fize of the *R. formofa*. *Seeds* with a white border.

12. R. *fecunda*. Yellow Ruellia. "Vahl. Symb. v. 3. 84." Willd. n. 36.—"Leaves ovate, fomewhat heart-fhaped, entire, villous. Clufters axillary, turned one way." —Native of the Eaft Indies. *Herbage* downy. *Leaves* ftalked, an inch long, obtufe; the younger ones hoary, rather pointed. *Footftalks* widely fpreading, fcarcely fhorter than the leaves. *Clufters* almoft a fpan long; the partial flower-ftalks fhort and diftant. *Bracteas* fetaceous, ftill fhorter. *Calyx* hairy. *Corolla* fmooth, yellow, an inch long. *Germen* villous and hoary. *Vahl.* Mr. Brown, not having perhaps inveftigated the fruit of this fpecies, has marked its genus as doubtful.

13. R. *reptans*. Creeping Ruellia. Forft. Prodr. 44. Willd. n. 37.—"Leaves ftalked, ovate, obtufe, bluntly ferrated. Flower-ftalks terminal, fomewhat fpiked."—Native of the ifland of Tanna. We have feen no fpecimen, but Mr. Brown has afcertained this to be a true *Ruellia*.

14. R. *auftralis*. Southern Ruellia. Cavan. Ic. v. 6. 62. t. 586. f. 1. Brown n. 1.—Flowers axillary, nearly feffile, folitary or ternate. Segments of the calyx awl-fhaped, rough, feparate to the bafe. Leaves ftalked, elliptic-oblong, entire, fmooth. Stem diffufe.—Native of New South Wales, from whence we received fpecimens from Dr. White in 1792. Mr. Brown has alfo obferved it in the tropical part of New Holland. The *ftem* is of humble growth, rather fhrubby, more or lefs diffufe, branched, flender, quadrangular, fmooth. *Leaves* moft crowded towards the tops of the branches, fmall, hardly an inch long; paler beneath. Tube of the *corolla* not much longer than the calyx; its limb dilated and fpreading, with rounded, entire, nearly uniform fegments. We know nothing of the colour. The figure in Cavanilles is not characteriftic. Its *flowers* are much too fmall in the limb. The name too is faulty.

15. R. *pumilio*. Dwarf Ruellia. Brown n. 2.—"Flowers axillary, folitary, nearly feffile. Bracteas minute. Calyx fmooth, tubular at the bafe. Leaves narrow-oblong, obtufe. Stem diffufe."—Gathered by Mr. Brown at Port Jackfon, New South Wales.

16. R. *acaulis*. Humble Ruellia. Brown n. 3.—"Stem fhort. Leaves oblong-wedge-fhaped, obtufe. Stalks axillary, fingle-flowered, feveral times longer than the capfule. Calyx nearly fmooth, without bracteas."—Gathered by fir Jofeph Banks and Dr. Solander, in the tropical region of New Holland.

17. R. *bracteata*. Bracteated Ruellia. Brown n. 4.—"Flowers axillary. Bracteas leafy, large, deciduous. Tube of the corolla elongated; its limb nearly equal. Capfule with a taper bafe. Leaves oblong or elliptical. Stem erect."—Gathered by Mr. Brown, in the tropical part of New Holland.

By a miftake, as we prefume, *R. ringens* of Linnæus is retained as fuch in Hort. Kew. without any remark, and even with the erroneous fynonym, which is directed to be ftruck out in Mr Brown's Prodromus, 479, where the plant in queftion makes a new genus. See HYGROPHILA.

Mr. Purfh has three North American fpecies, befides thofe to which we have adverted above, called *hybrida*, *ciliofa*, and the *humiftrata* of Michaux. Thefe we dare not admit, becaufe it does not appear that their generic characters have been critically examined by any body; at leaft not with a reference to the above limitations of *Ruellia*.

RUEMANNSFELDEN, in *Geography*, a town of Bavaria; 36 miles E. of Ratifbon.

RUENGAS, a country of Africa, S. of Monoemugi, about S. lat. 7°.

RUERLOO, a town of Holland, in the county of Zutphen; 4 miles W. of Borckeloe.

RUESCAR, a town of Spain, in the province of Grenada; 15 miles E. of Almeria.

RUESTA, a town of Spain, in Aragon, on the Aragon; 24 miles W. of Jaca.

RVEUTZENDORFF, a town of Auftria; 4 miles E.N.E. of Entzerltorff.

RUFF, or RUFFLE, in *Military Language*, a beat on the drum. Lieutenant-generals have three ruffles, major-generals two, brigadiers and governors one, as they pafs by the regiment, guard, &c. See DRUM.

RUFF-*trees*. See ROOF-*trees*.

RUFFACH, in *Geography*, a town of France, in the department of the Upper Rhine; 8 miles S. of Colmar.

RUFFE, in *Ichthyology*, the Englifh name of the *cernua*, or fmall gilded pearch, a fifh common in our rivers, and much refembling the pearch in figure, though of a more flender form.

The ruffe is called by the generality of authors *cernua fluviatilis*; and by fome *charus acerina* and *afpredo*. It is called by Johnfon and Charleton alfo *fcrollus*. Willughby, as well as thefe authors, has mentioned the fcrollus as another fpecies of fifh; but it is proved, by obfervation, that they are evidently the fame fpecies. Artedi makes this fifh a pearch, or *perca*; and accurately diftinguifhes it from the other fifh of that genus by the name of the pearch with only one fin on the back, and with a cavernous head. In the Linnæan fyftem it is the PERCA *Cernua*; which fee.

This fifh may be preferved in glafs jars with frefh water, and be made very tame. It muft be fed, for it cannot fubfift on the animalcula of river-water, as fmall dace can.

No fifh fhews the circulation of the blood in a finer manner than ruffes, whofe fins are exceedingly tranfparent. Befides, it is a creature vaftly tenacious of life, and will live twenty or thirty minutes out of water, without receiving much damage. Phil. Tranf. N° 478. p. 26.

RUFFE, in *Ornithology*, the name of a male fpecies of bird, the female of which is called *reeve*, and the Latin name for which is *avis pugnax*, or the fighting bird.

This fpecies is the TRINGA *pugnax* of Linnæus; which fee.

The feathers of the male affume in feveral parts a variety of colours; but they are diftinguifhed by a very remarkable circle of long feathers, furrounding their necks; whence their name: on the back of their necks they have a tuft of feathers, which fpread wide on both fides; thefe feathers around the neck are black in fome birds; and in others white, yellow, or ferruginous; and they frequently differ in colour, even in the fame bird; the coverts of the wings are brown or afh-coloured; the feathers on the breaft black or dufky; the four exterior feathers of the tail of a cinereous brown, and the four middle barred with black and brown; the bill is black towards the end, and red at the bafe; the legs are yellow. In moulting they lofe the neck-feathers, nor do they recover them till after their return in the following fpring, when a fet of fmall pear-fhaped yellow

 pimples

pimples break out on the face above the bill. The male birds of the firſt year want theſe marks: and the older they are, the more numerous are the pimples, and the fuller and longer the ruffs. The length of the male to the tip of the tail is one foot, the breadth two; of the reeve ten inches, the breadth nineteen: the weight of the former, when juſt taken, is ſeven ounces and a half, and of the latter only four. The reeves never change their colour, which is pale brown; the back ſpotted with black, ſlightly edged with white; the tail brown; the middle feathers ſpotted with black; the breaſt and belly white; and the legs of a pale dull yellow. They come over to us in vaſt numbers early in the ſpring, and diſappear about Michaelmas, building in ſome parts of Lincolnſhire, particularly in the fenny country about Croyland. They are found alſo in the iſle of Ely, and in the Eaſt Riding of Yorkſhire, and for about three weeks at Martin-mere, in Lancaſhire. The reeves lay four eggs, which are white, marked with large ruſty ſpots, in a tuft of graſs, the firſt week in May, and ſit about a month. Soon after their arrival, the males begin to *hill*, *i. e.* to collect on ſome dry bank, near a pool of water, in expectation of the females, who reſort to them. Each male keeps poſſeſſion of a ſmall piece of ground, which it runs round till the graſs is worn quite away, and nothing but a naked circle left; and when a female lights, the ruffs immediately fall to fighting. When a fowler diſcovers one of thoſe hills, he places his net at night, and at day-break reſorts to his ſtand; and at the firſt pull takes thoſe birds that are within reach; he then places his ſtales, or ſtuft birds, to entice thoſe that are traverſing the fen. In this way a fowler will take forty or fifty dozen in a ſeaſon. When they firſt come over, there are many more males than females among them; but theſe are ſo continually fighting, that their numbers ſoon decreaſe below an equality. They are fed after they are taken with bread and milk, hemp-ſeed, and ſometimes boiled wheat; to which, if expedition is required, they add ſugar, and thus they become very fat. They are killed by cutting off the head with a pair of ſciſſars; and they diſcharge a great quantity of blood, conſidering their ſize. They are dreſſed like woodcocks, with their inteſtines; and when killed at the proper time, they are reckoned by the epicures very delicious. Ray and Pennant.

Ruffe is alſo the name of a particular ſpecies of pigeon, called by Moore the *columba cucullata rudis*.

It is in ſhape very like that ſpecies of pigeon called the *jacobine*, but is larger, and has a longer beak. The iris of the eye is ſometimes red, ſometimes pearl-coloured; the feathers of the hood and chain are much longer than the jacobine, though they do not come down ſo low to the ſhoulders of the wings, nor are they ſo compact and cloſe, but are apt to blow about with every little blaſt of wind, and fall more backward off the head, and lie in a rough confuſed manner.

It is a common thing to match the jacobine pigeon with this ſpecies, with intent to improve its chain by the length of the ruffe's feathers; but the event is, that the pigeon is always worſe inſtead of better, being longer beaked, and looſer in its head and chain, without any real advantage.

RUFFEC, in *Geography*, a town of France, and principal place of a diſtrict, in the department of the Charente; 34 miles S. of Poitiers. The place contains 2110, and the canton 12,668 inhabitants, on a territory of 250 kiliometres, in 20 communes. N. lat. 46° 2′. E. long. 0° 17′.

RUFFI, Antony de, in *Biography*, a lawyer and hiſtorian, was born at Marſeilles in 1607, and in proceſs of time he became a counſellor in the ſeneſchalcy of Marſeilles, an office of conſiderable importance, and which he diſcharged with diligence and great integrity. He was made counſellor of ſtate in 1654, and died in 1689, at the age of 82. His leiſure time, he had, during his long life, employed in learned enquiries, of which the fruits were, 1. An elaborate "Hiſtory of Marſeilles," fol. 2. "The Life of Gaſpard de Sinicane, known by the name of the Chevalier de Coſte." 3. "The Hiſtory of the Counts of Provence:" and he left in MS. "A Hiſtory of the Generals of the Gallies." He had a ſon, Louis Antony, who purſued a ſimilar line of ſtudy, and added to his father's Hiſtory of Marſeilles a ſecond volume, in an edition publiſhed in 1696. He was author, likewiſe, of "Diſſertations Hiſtoriques et Critiques ſur l'Origine des Comtes des Provence, de Venaiſſin, de Forcalquier, et des Vicomtes de Marſeille;" and in 1716 he publiſhed "Une Diſſertation Hiſtorique, Chronologique, et Critique ſur les Evêques de Marſeille." He died in 1724, at the age of 66.

RUFFIEUX, in *Geography*, a town of France, in the department of Mont Blanc, and chief place of a canton, in the diſtrict of Chambéry. The place contains 1048, and the canton 5110 inhabitants, on a territory of 100 kiliometres, in 8 communes.

RUFFINUS, in *Biography*, ſurnamed by ſome authors *Toranius*, a celebrated eccleſiaſtical writer and ſcripture commentator, who flouriſhed in the fourth and fifth centuries, was probably a native of Aquileia, but the time of his birth is unknown. Having made choice of the eccleſiaſtical profeſſion, he was baptized in the year 369, and became a preſbyter of the church in that city. Here he contracted a moſt intimate friendſhip with St. Jerome, who, in his letters to his friends, extolled in the higheſt terms the virtues and ſanctity of Ruffinus, though at a later period he proved his moſt bitter enemy. In or about the year 371 Ruffinus quitted Aquileia, with the determination of devoting himſelf to the auſterities of the monaſtic life, under the monks in the deſerts of Egypt. Coming to Rome in his way to Africa, his deſign recommended him to the confidence of Melania, a Roman widow of noble family and vaſt opulence, who reſolved to accompany him to that country, and to expend her riches in the eſtabliſhment of monaſtic and charitable inſtitutions. In Egypt, Ruffinus ſpent ſeveral months in converſing with the monks, whoſe ſolitary cells were ſcattered throughout the deſerts of Nitria, and in attending the lectures of Didymus, maſter of the catechetical ſchool in Alexandria. By the Arians, who at this time were protected by the emperor Valens, Ruffinus was perſecuted, thrown into priſon, cruelly treated, and at length baniſhed to a diſtant deſert. His female friend, Melania, however, found means to purchaſe his redemption, and removed with him from Egypt into Paleſtine, where they viſited the holy place, and took up their reſidence at Jeruſalem. In this city, Ruffinus, ſupported by the munificence of his patroneſs, built a convent for upwards of fifty females, who renounced the world and devoted themſelves to a religious life, over whom Melania preſided. Connected with this convent were apartments for the accommodation of the pilgrims who came to viſit the holy city, and who were received, and hoſpitably entertained, at the expence of the foundreſs. Here Ruffinus ſpent all his leiſure time in ſtudy and compoſition. About the year 390, a violent quarrel aroſe between Epiphanius, and John, patriarch of Jeruſalem, concerning the opinions of Origen, in which Ruffinus took ſuch a part as to give great offence to his friend Jerome. Their friendſhip was now broken off, but was in a few years renewed through the mediation of Theophilus, patriarch of Alexandria. In the year 397, Ruffinus and Melania took their leave of Jeruſalem, and embarked for Italy.

Italy. Having arrived at Rome, Ruffinus almoſt immediately publiſhed a Latin verſion of the firſt book of the "Apology for Origen," which was followed by another piece, intended to prove that the works of Origen had been corrupted and interpolated, and a defence of him drawn up from his own letters. At this period our author publiſhed his tranſlation of Origen's "Book of Principles," with a preface, in which he applauded the high opinion which, in the earlier part of his life, Jerome had entertained of that author and his writings. This conduct was warmly reſented by Jerome, who publiſhed "An Apology" for himſelf, in which he attacked Ruffinus in the moſt acrimonious terms, treating him as a heretic. About the year 400 he publiſhed an eloquent and indignant reply to the accuſations in his "Two Books of Invectives." Ruffinus, whatever might be the nature of his arguments, was in other reſpects the leaſt powerful, and he thought it adviſeable to retire to Aquileia. He was ſummoned to Rome by Anaſtaſius, to vindicate himſelf againſt the accuſations of Jerome, but he did not think it fit to obey the ſummons, contenting himſelf with ſending a declaration of the conformity of his faith with that of the Catholic church, and ſtating that, with reſpect to his tranſlation of Origen's work, he had neither approved nor diſapproved, but barely refuted the ſentiments of that writer. Not ſatisfied with this declaration, Anaſtaſius condemned him as a heretic; but the papal anathema ſeems to have produced little effect on Ruffinus, ſince it did not prevent him from continuing his controverſy with Jerome, or interrupt his tranquillity or his ſtudies. In the year 410, the ravages of the Viſigoths in Italy, under Alaric, compelled him to fly from Aquileia, when he took refuge in the iſland of Sicily, where he appears to have died, either in the ſame or the ſucceeding year. Various characters have been given of this father. Moſheim obſerves, that "he would have obtained a very honourable place among the Latin writers of this century, had it not been his misfortune to have had the powerful and foul-mouthed Jerome for his adverſary:" and Dupin acknowledges, "that though very ill uſed by St. Jerome, he was one of the ableſt men in his time: perhaps he had not ſo much learning as that father, but his temper was better and leſs violent." His ſtyle is neat, and ſufficiently pure in point of latinity. In his commentaries on divers parts of the ſcriptures, he explains the text in an elegant and natural way, chiefly adhering to the literal ſenſe, without entangling himſelf in allegories. In his character of a tranſlator from the Greek to the Latin, he takes conſiderable liberties, but he honeſtly acknowledges them. His original works, beſides the pieces in controverſy with Jerome, already noticed, comprize commentaries on different parts of the Old Teſtament; two books of Eccleſiaſtical Hiſtory, added by him to his verſion of Euſebius, and continuing the hiſtory of the church to the death of the emperor Theodoſius. Other works have been aſcribed to him. The whole of what belongs to Ruffinus, excepting his apologies for Origen and declaration to Anaſtaſius, were publiſhed in a folio volume at Paris, in 1580. He tranſlated the works of Joſephus, the Eccleſiaſtical Hiſtory of Euſebius, and many other works from the Greek to the Latin. Moreri. Dupin. Moſheim.

RUFINUS, miniſter of ſtate to the emperors Theodoſius and Arcadius, was a native of Eluzzo, now named Eauſe, a town of France, in the department of Gers, according to the modern diviſions of that kingdom, which in the time of Rufinus was a celebrated city, and paſſing from the Romans to the Goths, was taken from them by Clovis. Rufinus was brought up to the profeſſion of the law, and being poſſeſſed of a bold and ready elocution, with much addreſs, and an advantageous perſon, he attracted ſome conſiderable ſhare of notice at the court of Conſtantinople, and about 390 was raiſed by Theodoſius to the poſt of maſter of the offices. In 392 he was nominated to the conſulſhip, with Arcadius for a colleague; and during the ſame year he was entruſted with the important poſt of prefect of the Eaſt. He diſguiſed his ambition and other vices under the maſk of piety, by which he ſecured the confidence of the emperor, and obtained the friendſhip of Ambroſe, and other dignified eccleſiaſtics. Having built a ſumptuous palace and church at Chalcedon, he aſſembled the moſt illuſtrious biſhops of the Eaſt to aſſiſt at the dedication, taking occaſion, at the ſame time, to receive the rite of baptiſm, which in that age was often deferred to a late period. By nature he was cruel and vindictive, and committed many atrocious acts: he ſtimulated his maſter to order the dreadful maſſacre of Theſſalonica: he procured the diſgrace and exile of the brave general Promotus, who had chaſtiſed his inſolence by a blow: and he effected the ruin of the prefect Tatianus, and the execution of his ſon Proculus, in order to make way for his own prefecture of the Eaſt. "The puniſhment of the two prefects," ſays Gibbon, "might, perhaps, be excuſed by the exceptionable parts of their own conduct: the enmity of Rufinus might be palliated by the jealous and unſociable nature of ambition. But he indulged a ſpirit of revenge, equally repugnant to prudence and to juſtice, when he degraded their native country of Lycia, from the rank of Roman provinces; ſtigmatized people with a mark of ignominy; and declared that the countrymen of Tatianus and Proculus ſhould ever remain incapable of holding any employment of honour or advantage, under the imperial government."

After the death of Theodoſius, in 395, Rufinus ſucceeded to abſolute authority over the Eaſtern empire, in the name of Arcadius, and he made uſe of his power for the gratification of his paſſions, eſpecially that of avarice. He exhibited a very remarkable inſtance of his arbitrary and violent conduct in the treatment of Lucian, who had purchaſed his favour, and the office of count of the Eaſt. This unfortunate perſon, whoſe adminiſtration is ſaid to have been exemplary, affronted the emperor's uncle by the refuſal of an unjuſt requeſt. On the complaint of Arcadius to Rufinus, the latter, without acquainting any one with his deſign, ſet off for Antioch, and performing the journey with great celerity, entered that capital in the dead of the night, and commanded the prefect to be brought before him. Without pretending to hear any thing in proof of his innocence, he cauſed Lucian to be ſcourged to death. In the mean time his own fall was rapidly approaching. To ſecure his authority, and with a view of raiſing himſelf to a partnerſhip in the empire, he had planned the marriage of his daughter to the emperor. But the chamberlain, Eutropius, contrived to place in his view Eudoxia, the beautiful daughter of Frank Bauto. He became enamoured at the ſight, and Rufinus, after his return, was mortified by the emperor's marriage with his daughter's rival. This diſappointment, and the fear of loſing the power which he poſſeſſed, inſpired him, it is ſaid, with plotting the deſtruction of his ſovereign, and with inviting the Huns and Goths to invade the empire, in order to create a general confuſion. The famous Stilicho was at this time omnipotent in the Weſtern empire as miniſter of the young Honorius, brother to Arcadius; and claiming from the appointment of Theodoſius the guardianſhip of both his ſons, he prepared to march into the Eaſt, in order to aſſert his authority there. At the head of the armies of both parts of the empire he had croſſed the Alps, and was near Theſſalonica, when Rufinus,

finus, dreading his approach, procured an order from Arcadius for the Eaftern forces to feparate from Stilicho and march to Conftantinople. The general did not venture to difobey, and placed them under the command of Gainas, the Goth, with whom he had concerted his plan. The army arrived before the capital of the Eaft, in November 395, and the emperor, with Rufinus, went out to meet it. At the diftance of a mile from the capital, in the field of Mars, the troops halted. Arcadius and his minifter advanced, according to an ancient cuftom, refpectfully to falute the power that fupported the throne. Rufinus expected that his partizans would take that opportunity of proclaiming him emperor, and had actually prepared the purple robe, diadem, and royal donative for the occafion. By the direction of Gainas, however, the wings wheeled round and inclofed their victim, and upon a fignal given, a foldier plunged his fword into his breaft. Rufinus fell, groaned, and expired at the feet of the affrighted emperor. His mangled body was abandoned to the brutal fury of the populace of both fexes, who haftened in crowds, from every quarter of the city, to trample on the remains of the haughty minifter, at whofe frown they had fo lately trembled. His right hand was cut off and carried through the ftreets of Conftantinople, in mockery, to extort the contributions for the avaricious tyrant, whofe head was publicly expofed, borne aloft on the point of a long lance. According to the favage maxims of the Greek republics, his innocent family would have fhared the punifhment of his crimes; but they fortunately took refuge in a fanctuary, which protected them from the raging madnefs of the people, and they were permitted to fpend the remainder of their lives in the exercifes of Chriftian devotions, as they were called, in the peaceful retirement of Jerufalem.

Rufinus is faid to have been well verfed in elegant literature, yet a poet has been the bittereft foe to his memory. Claudian has made him the fubject of two books of invectives, probably for the purpofe of ingratiating himfelf with Stilicho, the avowed enemy of Rufinus. Univer. Hift. Gibbon, vol. v.

RUFISCO, in *Geography*, a town of Africa, in the kingdom of Kayor, fituated on the fea-coaft. Its name is a corruption of "Rio-frefco," its Portuguefe appellation. It contains about 300 houfes, and the inhabitants carry on a confiderable trade with Europeans in flaves, fkins, gum, ivory, oftrich feathers, cotton, indigo, &c.; 60 miles W.N.W. of Amboul.

RUFS, a town of Pruffian Lithuania; 20 miles N.W. of Tilfit.

RUFTER-HOOD, among *Falconers*, a plain leathern hood, large and open behind, to be worn by a hawk when fhe is firft drawn.

RUFUMBA, in *Geography*, a town of Mombique, on the Suabo. S. lat. 6° 25′. E. long. 35° 30′.

RUFUS, the Ephefian, in *Biography*, a phyfician and anatomift of confiderable eminence, in the reign of the emperor Trajan, was apparently entitled to the reputation which he obtained by his extenfive knowledge and experience. Galen efteemed him one of the moft able of the phyficians who had preceded him. Rufus appears to have cultivated anatomy, by diffecting brutes, with great zeal and fuccefs. He traced the origin of the nerves in the brain, and confidered fome of them as contributing to motion, and others to fenfation. He even obferved the capfule of the cryftalline lens in the eye. He confidered the heart as the feat of life, and of the animal heat, and as the origin of the pulfe, which he afcribed to the *fpirit* of its left ventricle and of the arteries; and he remarked the difference in the capacity and thicknefs of the two ventricles. He deemed the fpleen to be a very ufelefs vifcus, and his fucceffors have never difcovered its ufe. He examined very fully the organs of generation, and the kidnies and bladder; he has left, indeed, a very refpectable treatife on the difeafes of the urinary organs, and the methods of cure. He alfo wrote a good work on purgative medicines, mentioning their different qualities, the countries from which they were obtained; and a little treatife on the names given by the Greeks to the different parts of the body. Galen affirms alfo that Rufus was the author of an effay on the *materia medica*, written in verfe; and Suidas mentions a treatife of his on the *atra bilis*, with fome other effays; but thefe are loft. See Sprengel, Gefchichte der Arzneikunde, 2 theil, p. 63; and Le Clerc, Hiftoire de la Médecine, part iii. p. 104.

RUFUVEILLE, in *Geography*, a town of France, in the department of the Channel; nine miles W. of Mortain.

RUGBY, a fmall market-town and parifh in the hundred of Knightlow, and county of Warwick, England, is fituated at the diftance of 19 miles E.N.E. from Warwick, 12 miles E. from Coventry, and $84\frac{1}{2}$ miles N.W. by N. from London. This place is called Rocheberie in Domefday-book, as Dugdale conjectures, from the word Roche, fignifying a rock, or quarry of ftone, and Berie, a court, or habitation of note. Hence it has been fuppofed to have been a town of importance in early Saxon times, but the records of its remote hiftory have entirely perifhed. After the Conqueft it formed part of the poffeffions of Turchil de Warwick, from whom it was held by one Eddulfus, whofe pofterity continued to enjoy it till the reign of Edward I., when it was conveyed, by marriage, to the family of Goband, from whom it paffed to the barons of Stafford. The fituation of Rugby is lofty, and commands an extenfive view over the adjacent country. The houfes are difpofed in the moft irregular manner, and are, in general, conftructed of wood. Here is a charity fchool, founded and endowed for the education of thirty boys, by Richard Elborow, efq.; alfo a grammar-fchool, which was founded by Laurence Sheriff, efq., in the ninth year of the reign of queen Elizabeth. The latter is a very important eftablifhment, and is under the direction of twelve truftees, who are appointed from among the nobility and principal gentry of the county. By judicious management the property of this fchool, though originally trifling, has become extremely valuable, yielding a rent of 2000*l.* *per annum*, and when the prefent leafes fhall expire, the rent will doubtlefs be confiderably increafed. The truftees hold regular meetings for the tranfaction of bufinefs; and in Auguft an annual examination of the pupils takes place before them. There are fourteen exhibitioners fent from this fchool to the univerfities, each of whom is allowed 40*l.* a-year. When vacancies occur, they are filled up at the annual examinations, which are attended by a member from both univerfities, appointed for the purpofe by the vice-chancellor. The fcholars at prefent amount to about 330 in number, of whom 50 are on the foundation. The old buildings of this fchool having been found unfuitable to its extended condition from the period of their erection, a new ftructure has been raifed nearly on the fame fcite, fince the year 1808. This edifice is built in the ftyle of architecture prevalent in the reign of queen Elizabeth, when the fchool was founded, and is admirably adapted to the purpofes for which it was erected. It is compofed of white brick, but the angles, cornices, and dreffings to the windows and entrances, are of ftone. The principal front extends 220 feet in length, and has a tower gateway in the centre, which leads into the principal court, a fine area 90 feet long, by 75 wide, with a plain cloifter on three fides.

On the south side of the court are, the dining-hall for the boys in the head-master's house, and three schools for different classes; the west side is occupied by the great school, and that on the north by the French and writing schools. The head-master's house is placed at the eastern end of the south front; and between it and the schools is a range of building, divided into small apartments, appropriated to the use of the students. About sixty boys are thus accommodated; the remainder lodge with the other master, or at boarding-houses in the town. This building was designed and erected by Henry Hakewill, esq., architect.

The church of Rugby is not worthy of notice, but the church-yard is remarkable for various eccentric inscriptions. The market-day here is Saturday, weekly; and fairs are held on the 17th February, 31st March, 15th May, 7th July, 21st August, Monday before the 29th of September, 22d November, and 10th December. No manufacture of any importance is carried on in this town, but it has acquired a small trade for the supply of the adjacent country, since the formation of the Oxford canal, which passes about a mile to the northward, and forms a branch of the system of inland navigation, which connects all the principal rivers and towns in England.

Adjoining to Rugby, on its north-eastern side, is an eminence called Castle mount, from the circumstance of its having been formerly the scite of a castle. Dugdale is of opinion that this fortress was one of those erected in king Stephen's time, when he was threatened with invasion by the empress Maud, whose crown he had usurped. It was most probably demolished by order of king Henry II. in the third year of his reign. The only vestiges of it now visible are parts of the moat and some embankments.

According to the parliamentary returns for 1811, Rugby parish contains 335 houses, and 1805 inhabitants, of whom nearly 1000 reside in the town. The Antiquities of Warwickshire, &c. by William Dugdale, fol. London, 1657. Beauties of England and Wales, vol. xv. 1814, by I. N. Brewer.

RUGEL, a town of Baden, near the Rhine; 10 miles N.N.W. of Friburg.

RUGEN, an island in the Baltic, separated from the coast of Pomerania, by a strait not above a mile wide; about 60 miles in circumference, without including the indentations of the coast. Its name is said to be derived from the Rugi, who first inhabited the Pomeranian coast beyond the Oder, but afterwards removed on this side of that river, taking up their chief residence in the country called after their name. On the decease of the last prince of Rugen, duke Wartislav XI., in 1478, Rugen became united with Pomerania. In 1168 it was subdued by Waldemar I., king of Denmark, its temple was demolished, the pagan worship suppressed, and Christianity established. There the divines of Rugen became vassals to the crown of Denmark. At the treaty of Westphalia, Rugen was added to Sweden, as a particular principality. At the peace of Roschild in 1658, and also at that of Copenhagen in 1660, Denmark ceded to Sweden the whole jurisdiction, civil and ecclesiastical, which it had previously exercised over certain lands in the principality of Rugen. This island is not only encompassed by the sea, but so penetrated by it, that several other islands and peninsulas are thus formed. The soil is fruitful, particularly in all kinds of grain, so that some thousands of lasts are annually shipped off for Stralsund. It breeds likewise large stocks of cattle, and yields a large quantity of fish; but Pomerania supplies it with fuel. The nobility are numerous, and invested with considerable privileges. The president of the provincial tribunal, who must be a native, and a nobleman, is the prefect or governor, and he is assisted in the administration by a secretary and purveyor. Rugen contains 27 parishes, and 21,240 inhabitants. Its capital is Bergen. N. lat. 54° 30′. E. long. 13° 30′.

RUGENWALDE, a town of Hinder Pomerania; 20 miles N.E. of Cosslin. N. lat. 54° 33′. E. long. 16° 7′.

RUGGA, a town of Africa, in Tunis, anciently called "Carago;" 40 miles S. of Cairoan.

RUGGARD, a town of Denmark, in the island of Funen; 10 miles W. of Odensee.

RUGGED Isle, a small island near the S. coast of Ireland, and county of Cork. N. lat. 51° 30′. W. long. 9° 2′.

Rugged *Point*, a cape on the N. coast of Cumbava. S. lat. 8° 9′. E. long. 118° 58′.

RUGGIOLA, a sort of Spanish slate, serving in many places in the room of tiles and brick. It is a flaky stone of the nature of some of our grey slates, and is cut out of a mountain near Cordova; a plate of this being well heated on both sides, will retain its warmth for twenty-four hours.

The people of Cornwall and some parts of Yorkshire use a stone, which is of a talcky nature, to warm themselves when in bed, applying it at the feet of the bed. This they call the warming stone, from its use, and it will retain a sensible heat six or eight hours, after once moderately warming. Plot's Oxfordshire, p. 258.

RUGLERSREUT, in *Geography*, a town of Saxony, in the principality of Culmbach; three miles N. of Gefrees.

RUGLES, a town of France, in the department of the Eure, and chief place of a canton, in the district of Evreux; 21 miles S. of Evreux. The place contains 1564, and the canton 12,105 inhabitants, on a territory of 240 kiliometres, in 26 communes.

RUGLEN. See Rutherglen.

RUGMAN, Jonas John, in *Biography*, a learned Icelander, was born in 1636, and received his early education at the school of Hulum. He afterwards set out for Copenhagen, in order that he might enter himself at the university, but Denmark and Sweden being, at that time, engaged in war, he was made prisoner on the way, in 1658, and carried to Gottenburg, where he was patronized by a person named Brahe, who placed him at Wissenborg school, whence he was sent to the academy of Upsal, with a pension from the king. He became acquainted with Olof Verelius, the Swedish historian and antiquary, who, immediately after the peace, sent him to Copenhagen, and thence to Iceland, for the purpose of collecting ancient manuscripts, a great number of which he brought to Sweden. He went again to Copenhagen in 1665, and brought back with him a transcript of Oluf Trygvessen's History, "Ex Codice Wormiano Membranaceo." When the college of antiquities was established at Upsal in 1667, he was one of the earliest members, but died in two years afterwards, at the age of 43. He was author of many learned works, the titles of which are given in the General Biography. Among them may be mentioned "Fragmenta quædam Legum veterum collecta ex diversis Scriptoribus et Historiis, Lingua eadem;" "Versio Svetica Historiæ Veteris Islandica Lingua scriptæ de Regibus Norvagorum, quæ vulgo Konuriga-Sagur nuncupantur." Gen. Biog.

RUGOSUM, Folium, in *Botany*. See Leaf.

RUGUPORUM, in *Geography*, a town of Hindoostan, in Golconda; 25 miles S.W. of Warangole.

RUHELAND, a town of Germany, in the principality of Blankenburg; five miles S.S.W. of Blankenburg.

RUHLA,

RUHLA, a town of Saxony, in the principality of Eifenach, celebrated for its manufacture of knives; four miles S. of Eifenach.

RUHLAND, or RULAND, a town of Upper Lufatia, on the river Elfter; 27 miles N. of Drefden. N. lat. 51° 27'. E. long. 13° 50'.

RUHNKEN, DAVID, in *Biography*, an eminent critic, was born in 1723, at Salop, in Pomerania, of parents in a reputable fituation of life. He received the early part of his education at his native place, after which he went to the Frederician college at Konigfberg, from whence, at 18, he proceeded to the univerfity of Wittemberg, where he paid particular attention to the lectures of Ritter on jurifprudence and hiftory, and thofe of Berger on Roman eloquence and antiquities; he did not, however, neglect other important branches of ftudy, *viz.* the mathematics and philofophy. He was intended, by his parents, for the church, and they were defirous that he fhould conclude his ftudies with a courfe of theology; but the ardour which he had imbibed for philological enquiries induced him to repair to Leyden, where the learned Hemfterhuys was then in the height of his reputation. To this profeffor he particularly attached him-felf, who, in return, recommended him feveral private pupils. Ruhnken refolved to fettle in that country, as well on account of the felect fociety, as of the philofophical liberty for which Holland was, at that period, peculiarly diftinguifhed. In the year 1749, being the fixth year of his refidence at Leyden, he firft made himfelf known as a critic by a Latin epiftle to the celebrated Valckenaer on Homer's hymns, and Hefiod, which was followed, in 1751, by another to Ernefti, on Callimachus and Apollonius Rhodius. Both of thefe difplayed confummate fkill in the Greek language, with great compafs of erudition and elegance of tafte. At this time, by the advice of Hemfterhuys, he renewed his ftudy of jurifprudence, in order to qualify himfelf for a profefforfhip, thofe of polite literature being pre-occupied; and in 1752 he edited fome Greek commentaries upon a part of the Code and Digeft with a Latin verfion and learned notes. He next edited "Timæi Lexicon Vocum Platonicarum," a piece which gave full fcope to that grammatical criticifm in which he particularly excelled. "This," according to the learned Brunk, "in the whole circle of Greek literature, is both the fhorteft and moft learned work." In the year 1755, Ruhnken vifited Paris, where he remained a year moft affiduoufly occupied in copying and collating MSS. in the public libraries. After his return, in 1757, he was appointed reader of the Greek in the univerfity, and upon this occafion he pronounced an oration "De Græcis Artium et Doctrinarum Inventrice." In four years after this, he fucceeded to the chair of hiftory and eloquence, delivering for his inaugural fpeech an oration "De Doctore Umbratico." By this appellation, fays his biographer, he meant to characterize the man of letters who confines himfelf to the *fhade* of his own fchool, furrounded by admiring fcholars, and fhunning the commerce of the world at large; and the picture which he drew was fo well delineated, that it gave offence to certain perfons who fuppofed it to be defigned as a portraiture of themfelves. About this period he refufed a profefforfhip at Gottingen, recommending Heyne to fill the office. In his forty-firft year he married a beautiful young woman of eighteen, by whom he had two daughters, but the comfort of this alliance was, in a few years, deftroyed by an apoplectic attack, which deprived his wife of fight and fpeech. He feems hitherto to have lived in a focial unfhackled manner, enjoying the company of his friends, and participating in all common amufements. He was remarkably fond of hunting, or rather courfing, a fport of which he was a great mafter, few furpaffing him in the breed of his greyhounds, or in agility in leaping over the water-ditches, fo frequent about Leyden. This paftime, apparently fo very uncongenial to a literary mind, he continued almoft to the laft year of his life, and he thought it enabled him to refume his ftudies with peculiar fpirit and effect. In the year 1767 he was Rector Academiæ, and on quitting his office he pronounced a very elegant eulogy on Hemfterhuys, who had died in the preceding year. In 1774 he was made librarian to the univerfity, in which ftation he took great pains in making additions to the ftock of valuable books. He preferved his health to an advanced age, till at length he became fubject to catarrhal and dropfical complaints, under which he funk in May 1798, in the 76th year of his age. He was the editor of many learned works, among which are the following: "Rutilius Lupus," with "Aquila Romanus," and "Julius Rufianus;" "De Figuris fententiarum;" "De Vita et Scriptis Longini;" "Velleius Paterculus;" "Homer's Hymns;" a very much enlarged edition of "Timæi Lexicon;" an edition of the "Works of Muretus:" the two laft were publifhed in the year 1789. He afterwards employed himfelf in an edition of the Scholiafta of Plato; and an improved edition of Scheller's Latin dictionary. This learned man placed all his glory in philological acquirements, which he feemed to regard as the higheft fpecies of knowledge. He not only made very light of theological ftudies himfelf, but difcouraged them in all young men who poffeffed ftrong natural talents and promifing abilities. A very tenacious memory had ftored his mind with a vaft mafs of critical matter, efpecially of every thing that related to grammar, which he applied with much clearnefs and fagacity. He was one of the moft correct Grecians of his age, and was furpaffed by none in the purity and elegance of his latinity, both in fpeaking and writing. He left very little property behind him, excepting a library, rich in valuable printed books and manufcripts, which were purchafed by the ftates of Holland for the univerfity of Leyden, upon the condition of annuities for life to his widow and daughters.

RUHR, in *Geography*. See ROER.

RUHRORT. See ROERORT.

RUHTE, a town of Weftphalia, in the bifhopric of Hildefcheim, at the conflux of the rivers Innerfee and Leine; feven miles N.W. of Peine.

RUJAMPET, a town of Hindooftan, in Tellingana; 22 miles S. of Ramgur.

RUIB, a fmall ifland in the Pacific ocean, near the coaft of Waygoo. N. lat. 0° 4'. E. long. 130° 20'.

RUIJUEAH, a town of Hindooftan, in Lahore; 36 miles W. of Lahore.

RUINART, THIERRY, in *Biography*, a learned French writer, who flourifhed at the clofe of the 17th and at the beginning of the 18th centuries, was born at Rheims in the year 1657. When very young he took the habit among the Benedictine monks of the congregation of St. Maur, and, after going through the ufual courfe of philofophy and divinity in the abbey of St. Peter at Meaux, devoted his chief attention to the ftudy of the facred fcriptures, the fathers, and the ancient ecclefiaftical writers. Thefe branches of learning he cultivated with fo much ardour and fuccefs, that he was foon felected by father Mabillon to be his affiftant in his learned labours. In 1689 he fhewed his talents as an author, by publifhing at Paris "Acta primorum Martyrum fincera et felecta, collecta et edita cum notis," with a learned preface, in which

which he undertakes to refute the hypothefis of Dodwell, "De paucitate Martyrum." This work was feveral times reprinted with confiderable additions. The next publication was an improved edition, in 1694, of "Victoris Vitenfis Hiftoria Perfecutionis Vandalicæ." In 1699 he publifhed a new and greatly efteemed edition of "S. Gregorii Turgonenfis Epifcopi, Opera Omnia, necnon Fredegarii Scholaftici Epitome et Chronicon cum fuis continuatoribus et aliis antiquis Monumentis:" he was the author and editor of many other works, and in 1709 he publifhed a fketch of the "Life of Father Mabillon," and he died in the fame year at the age of 52. His works afford abundant evidence that he was a man of deep refearch and profound learning: they recommend themfelves by their accuracy, perfpicuity, and neatnefs of ftyle. The author, however, was not more refpected for his learning, than he was efteemed for his humility, modefty, and piety.

RUINES, in *Geography*, a town of France, in the department of the Cantal, and chief place of a canton, in the diftrict of St. Flour; fix miles E.S.E. of St. Flour. The town contains 649, and the canton 7994 inhabitants, on a territory of 275 kiliometres, in 15 communes.

RUININE OIL, a name given by fome authors to the oil of the palma Chrifti, which is very common in the Weft Indies, and is ufed by the common people in lamps. It is a delicate, fweet, and tranfparent oil, and has no peculiar operation in phyfic. They often give it in glyfters from one fpoonful to three at a time, and it has only the effect of common oil; but the leaves of the plant are one of the grand medicines of the Negroes; bruifed and applied to the head, they are thought to be an almoft infallible remedy for the head-ache, of whatever kind, or from whatever caufe. See CASTOR-*Oil*.

RUINS, a term particularly ufed for magnificent buildings fallen to decay by length of time, and of which there only remains a confufed heap of materials.

Such are the ruins of the tower of Babel, of the tower of Belus, two days journey from Bagdat, in Syria, on the banks of the Euphrates; which are now no more than a heap of bricks, cemented by bitumen; and of which we only perceive the plan to have been fquare.

Such alfo are the ruins of a famous temple, or palace, near Schiras, in Perfia, which the antiquaries will have to have been built by Ahafuerus; and which the Perfians now call Tchelminar, or Chelminar; *q. d.* the forty columns; becaufe there are fo many columns remaining pretty entire, with the traces of others; a great quantity of baffo relievos, and unknown characters, fufficient to fhew the magnificence of the antique architecture. The ruins of Palmyra may alfo be reckoned in the clafs of famous ruins.

RUISCH, RACHEL, in *Biography*, was born at Amfterdam in 1664, the daughter of Frederick Ruifch, or Ruyfch, the celebrated profeffor of anatomy. The very early difpofition fhe exhibited for drawing flowers, and the extreme accuracy and minutenefs with which fhe had copied prints without affiftance, induced her father to place her under the tuition of William Van Aelft, an eminent flower-painter.

In a few years fhe became the rival of her mafter, and at length furpaffed him; and indeed, as far as a neat and correct imitation of a fingle flower, a leaf, or an infect goes, fhe has been equalled by few. The great defect in her productions is a want of combination, the parts being feparated, and the maffes weak; which is the more to be lamented, as her choice of objects was remarkably elegant, and her manner of treating them perfection itfelf, even to illufion.

Her extraordinary talents recommended her to the peculiar patronage of the elector palatine, who in 1708 appointed her his paintrefs; and he was fo great an admirer of her works, that he poffeffed a confiderable portion of them, and rewarded their author munificently. She continued to exercife her talents, with almoft unimpaired fuccefs, to a very advanced period of her exiftence, and died at Amfterdam in 1750, at the age of 86.

RUISSEAU, GRAND, in *Geography*, a fettlement in the Indiana territory, on the left bank of the Miffifippi.

RUISSKAR, a fmall ifland on the eaft fide of the gulf of Bothnia. N. lat. 61° 24′. E. long. 21° 8′.

RUIVAINS, a town of Portugal, in the province of Tras os Montes; nine miles S. of Montalegre.

RUIZIA, in *Botany*, named by Cavanilles in honour of Don Hippolito Ruiz, a Spanifh botanift, who ftudied under the celebrated Mutis in South America, and who in conjunction with Pavon, another pupil of Mutis, publifhed the fplendid *Flora Peruviana*.—Cavan. Diff. 3. 117. Schreb. 466. Willd. Sp. Pl. v. 3. 798. Ait. Hort. Kew. v. 4. 221. Juff. 275.—Clafs and order, *Monadelphia Polyandria*. Nat. Ord. *Columniferæ*, Linn. *Malvaceæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, double; outer of three, ovate, concave, acute, deciduous leaves; inner of one leaf, permanent, cloven into five, lanceolate fegments. *Cor.* Petals five, obliquely fickle-fhaped, rounded at the tip, undivided, flat, fpreading, faftened to the bundle of ftamens. *Stam.* Filaments numerous, generally from thirty to forty, fhorter than the corolla, united at their bafe into the form of a pitcher, inclofing the germen; anthers oblong, incumbent. *Pift.* Germen fuperior, globofe, ten-furrowed; ftyles ten, fhort; ftigmas fimple. *Peric.* Capfules ten, compreffed, membranaceous, woody on the back, boat-fhaped, of one cell, united into a globular, umbilical whorl. *Seeds* two, roundifh, or flightly triangular, pointed.

Obf. This genus is nearly akin to ASSONIA; fee that article.

Eff. Ch. Calyx double; outer of three leaves. Styles ten. Capfules ten, of one cell, with two feeds, and difpofed in a circle.

1. R. *cordata*. Heart-leaved Ruizia. Willd. n. 1. Cavan. Diff. t. 36. f. 2.—Leaves heart-fhaped, lanceolate, wavy.—Native of the Ifle of Bourbon, where it flowers in March and April. *Stem* fhrubby, branched. *Leaves* alternate, ftalked, numerous, ovate, pointed, notched. *Stipulas* awl-fhaped, whitifh, powdery, deciduous. *Flowers* in umbel-like terminal corymbs, fulphur-coloured, each on a fhort ftalk.

2. R. *lobata*. Lobed Ruizia. Willd. n. 2. Cavan. Diff. t. 36. f. 1.—Leaves heart-fhaped, five-lobed, notched.—Found alfo in the Ifle of Bourbon, flowering in February and March. A handfome *fhrub*, five or fix feet high, much branched, with a greyifh-white *bark*. *Leaves* crowded together at the extremities of the branches, alternate, ftalked, fmooth above, white and dufty beneath, the older divided into five, rarely into feven, lobes. *Stipulas* awl-fhaped, erect, downy or powdery, deciduous. *Flowers* like thofe of the above fpecies in form and colour.

3. R. *variabilis*. Various-leaved Ruizia. Willd. n. 3. Jacq. Hort. Schoenbr. v. 3. 24. t. 295. (R. palmata and R. laciniata; Cavan. Diff. t. 37. f. 1, and 2.)—Leaves of the flowering branches palmate; thofe of the barren ones digitate.—Native of the Ifle of Bourbon, and introduced at Kew, in 1792, where it flowers in May. A very handfome *fhrub* of rather humble, but diffufe, growth. *Stems* wavy, furrowed, brown. *Leaves* alternate, ftalked, dark green above, whitifh underneath, extremely curious for the variety

variety of their ſhape, expreſſed in the ſpecific character, and which is admirably ſhewn in Jacquin's figure. *Flowers* in umbel-like corymbs, of a pale red or crimſon colour, with deep red claws. The name of this is by miſtake engraved *R. diverſifolia,* inſtead of *variabilis* in Jacquin's plate.

In Commerſon's MSS. this genus was called *Kænigia.*

RUKHADORFF, in *Geography*, a town of Auſtria; four miles N.N.E. of Sonneberg.

RUKI, a town of Mingrelia, in which the palace of the prince is ſurrounded with a thick wall, ſeated on a river which runs into the Black ſea; 200 miles W. of Teflis.

RUKKIA, in *Zoology*, a name given by ſome to a peculiar kind of ſquirrel, found in the iſland of Ceylon.

RUKMENI, in *Hindoo Mythology*, is the name of one of the wives of Kriſhna, who being an incarnation of Viſhnu, his heavenly conſort Lakſhmi, is repreſented to have alſo deſcended in this form of Rukmeni to accompany him. In many authorities ſhe appears to be the ſame perſon as Radha, Kriſhna's favourite wife: but others make a difference, ſtating that Rukmeni was his legal worldly wife, and that Radha is a perſonification of religion. Others again ſay, that Rukmeni was the ſpiritual ſpouſe. If, however, it be admitted, that ſuch a perſon as Kriſhna ever exiſted, we may farther admit, that he had a plurality of wives, and that the two women in queſtion were among them. A liſt of his wives, eight in number, will be found under KRISHNA. Rukmeni is uſually the firſt on the liſt. She is ſaid to have been the daughter of a Raja Bhiſhmaka; and another of her names is Kantamati. On the death of Kriſhna, Rukmeni, with ſeveral others of his wives, burnt themſelves, in view to an immediate reunion with their lord in Vaikontha, the paradiſe of Viſhnu. This ſelf-immolation is called *Sati*; and under that article ſome account is given of it. Rukmeni is related to have borne a ſon to Kriſhna, of whom very frequent mention is made in Hindoo writings, being no other indeed than Kama, the god of love, incarnated in the perſon of their ſon Pradyamna. As the mother of the Hindoo Cupid, we here find Lakſhmi (recollecting that Rukmeni is that goddeſs in another form) correſponding, as in many other inſtances, with the Venus of Weſtern mythologiſts. See KAMA, LAKSHMI, PRADYAMNA, and RETI, for farther notice of theſe fables. Under KRISHNA, RADHA, and VAIKONTHA, will alſo be found ſome particulars connected with the ſubjects of this article. It may be farther noticed, that in temples dedicated to the worſhip of Kriſhna, ſtatues of Rukmeni are commonly ſeen. Caſts, ſaid to be of her, are alſo common. In other *avataras*, or *deſcents* of Viſhnu, his conſort is ſaid to have accompanied him under the name of Rukmeni. See hereon under WITTOBA.

RULE, or RULER, *Regula*, a very ſimple inſtrument, ordinarily of hard wood, thin, narrow, and ſtraight, ſerving to direct the drawing of right lines.

The rule is of principal uſe in all the mechanical arts.

To prove whether or no it be juſt, draw a line by it on paper; then turn the rule about, the right end to the left, and apply the ſame edge this way to the line; if the edge now agree exactly with the line, the ruler is true.

Deſmarets has a fine poem on the amours of the rule and compaſs. The ſtone-cutters' rule is uſually four feet long, and divided into feet and inches.

The maſons' rule is twelve or fifteen feet long, and is applied under the level to regulate the courſes, to make the piedroits equal, &c.

RULE, *Parallel*, or *Ruler*. See PARALLEL.

RULE is alſo applied to certain inſtruments which have other conſiderable uſes beſides that of drawing lines. Such are the carpenters' joint-rule, Everard's and Coggeſhall's ſliding-rules, &c.

RULE, *Carpenters' joint*, is an inſtrument uſually of box, 24 inches long, and $1\frac{1}{2}$ broad, each inch being ſubdivided into eight parts. On the ſame ſide with theſe diviſions is uſually added Gunter's line of numbers.

On the other ſide are the lines of timber and board-meaſure, the firſt beginning at $8\frac{1}{2}$, and continued to 36, near the other end; the latter is numbered from 7 to 36, 4 inches from the other end. (*Plate* VI. *Surveying*, *fig.* 14.) The diviſion of the timber-line is formed from a conſideration, that 1728 inches make a ſolid foot, in the following manner: thus, 9 is ſo placed againſt one of the diviſions of inches, or parts on the other ſide of the rule, beginning from the right hand, that its ſquare, which is 81 inches, multiplied by that number of inches and parts, muſt make 1728 inches; which, dividing 1728 by 81, muſt be placed againſt $21\frac{1}{3}$ from the right hand; and 10 muſt be placed againſt $17\frac{28}{100}$ inches; becauſe 1728 divided by the ſquare of 10 or 100, gives $17\frac{28}{100}$, &c. But becauſe a ſquare whoſe ſide is 1, 2, &c. to 8 inches, requires more than 24 inches in length, as a multiplier, in order to produce 1728 inches; and ſince the length of the rule is only 24 inches, there is a table upon the left end of it, which ſupplies its defect of length. In this table the upper row of figures, *viz.* 1, 2, 3, 4, 5, 6, 7, 8, denotes inches, or the lengths of the ſides of ſquares; and the ſecond and third rows are the correſpondent feet and inches to make up a ſolid foot. It is made by dividing 144 inches by the ſquares of 1, 2, 3, 4, 5, 6, 7, 8.

The line of board-meaſure is thus divided: ſuppoſe the diviſion 7 to be marked; divide 144, the number of inches in a ſquare foot, by 7, and the quotient will be $20\frac{4}{7}$ inches; whence the diviſion 7 muſt be againſt $20\frac{4}{7}$ inches on the other ſide of the rule. To mark the diviſion 8, divide 144 by 8, and the quotient, which is 18 inches, muſt be placed on the line of board-meaſure againſt 18 inches on the other ſide, &c. But becauſe the ſide of a long ſquare, that is, 1, 2, 3, 4, 5 inches, requires the other ſide to be more than 24 inches, the whole length of the rule; there is a table annexed, formed by dividing 144 inches by each of the numbers in the upper row, and then each of the quotients by 12, to reduce them into feet.

RULE, *uſe of the carpenters' joint.* The application of the inches in meaſuring lengths, breadths, &c. is obvious. That of the Gunter's line, ſee under GUNTER's *Line.* The uſe of the other ſide is all we need here illuſtrate.

1. *The breadth of any ſurface, as board, glaſs, &c. being given, to find how much in length makes a ſquare foot.*—Find the number of inches the ſurface is broad, in the line of board-meaſure, and right againſt it, on the inches ſide, is the number of inches required. Thus, if the ſurface were 8 inches broad, 18 inches will be found to make a ſuperficial foot.

Or, more readily, thus. Apply the rule to the breadth of the board or glaſs, that end marked 36 being even with the edge; the other edge of the ſurface will ſhew the inches and quarters of inches which go to a ſquare foot.

To find the content of a given ſurface. Find the breadth, and how much makes one foot; then turn that over as many times as you can upon the length of the ſurface, and ſo many feet does the ſurface contain.

2. *Uſe of the table at the end of the board-meaſure.* If a ſurface be one inch broad, how many inches long will make a ſuperficial foot? Look in the upper row of figures for

1 inch, and under it, in the second row, is 12 inches, the answer to the question.

3. *Use of the line of timber-measure.* This resembles the former; for, having learnt how much the piece is square, look for that number on the line of timber-measure; the space thence to the end of the rule is the length, which, at that breadth, makes a foot of timber. Thus, if the piece be 9 inches square, the length necessary to make a solid foot of timber is $21\frac{1}{3}$ inches. If the timber be small, and under 9 inches square, seek the square in the upper rank of the table, and immediately under it are the feet and inches that make a solid foot. Thus, if it be 7 inches square, 2 feet 11 inches will be found to make a solid foot.

If the piece be not exactly square, but broader at one end than another, the method is, to add the two together, and take half the sum for the side of the square. For round timber, the method is, to girt it round with a string, and to allow the fourth part for the side of the square. But this method is erroneous; for hereby you lose above $\frac{1}{5}$th of the true solidity. See Sliding *Rule* and Timber.

Rule, *Caliber.* See Caliber.

Rule, *Everard's sliding.* } See Sliding *Rule.*
Rule, *Coggeshall's sliding.* }

Rule, *Regula,* also denotes a certain maxim, canon, or precept to be observed in any art or science. Thus we say, the rules of grammar, of logic, of philosophizing, &c.

School philosophers distinguish two kinds of rules; *viz. theoretical,* or *rules of knowing,* which relate to the understanding, being of use in the discovery of truth; and *practical,* or *rules of acting,* which relate to the will, and serve to direct it to what is good and right.

For the management and application of these two sorts of rules, there are two distinct arts; *viz. logic* and *ethics:* see each respectively.

Rules *of knowing, regulæ sciendi,* are such as direct and assist the mind, in perceiving, judging, and reasoning.

Rules *of acting, regulæ agendi,* are those by which the mind is guided in her desires, pursuits, &c.

Authors are extremely divided about the regard to be had to the rules of poetry fixed by the ancients, Aristotle, Horace, Longinus, &c. and admitted by the modern critics, as Bossu, &c. some contending, that they must be inviolably observed; others pleading for liberty to set them aside on occasion. Rules, it is complained, are fetters; rank enemies to genius; and never religiously observed by any, but those who have nothing in themselves to depend on. Voiture frequently neglected all the rules of poetry, as a master who scorned to be confined by them.

The theatre has its particular rules, as the rule of twenty-four hours, the unities of action, time, and place, &c. If it be true, says Moliere, that plays conducted according to the rules do not please, but those which are not, do, the rules must be naught. For myself, when a thing hits and diverts me, I do not enquire whether I have done amiss, nor whether Aristotle's rules forbid me to laugh.

Rules *of philosophizing.* See Philosophizing.

Rule, in *Arithmetic,* denotes a certain method of performing particular arithmetical operations, as the rules of addition, subtraction, multiplication, and division; which four are called the fundamental rules of arithmetic, all other operations being dependant on one or more of these. See Addition, Subtraction, &c.

From the combination of these rules various others are derived, and, we must add, many more than ought to be distinctly characterized. Thus, our writers on arithmetic give us the rules of barter, simple interest, brokerage, factorage, rebate and discount, exchange, tare and tret, and a vast variety of others, which are, in fact, only so many examples in the rule of proportion (or, as it is commonly called, the rule of three), and ought, therefore, to be included under that general term.

At a time when arithmetic and geometry formed almost the only subjects of a mathematical education, long spun-out treatises of arithmetic, and extensive elementary works on geometry, were at least excusable; but since the improvements that have been made in analysis, the two former subjects form but a very small part of what is necessary to be known, for a person to have any pretensions to the character of a mathematician; and it is, therefore, astonishing that writers on those subjects, particularly those on arithmetic, have not thought of contracting their works, by condensing under one head a number of different rules, now given under distinct titles, and transforming others, such as position, alligation, &c. to introductory treatises on algebra, to which branch they more properly belong. By a judicious arrangement of this kind, the two subjects of arithmetic and elementary algebra might be very well condensed into the usual size of an arithmetic, and a boy be made to acquire a competent knowledge of both subjects, in less time than is usually employed in taking him through arithmetic only.

Rule *of Three,* or *Rule of Proportion,* by some former writers called also the *Golden Rule,* is one of the most extensive and useful rules in arithmetic, teaching how to find a fourth proportional to three given numbers.

The rule of three has commonly been divided into two cases, *direct* and *inverse,* a distinction, however, which is totally useless, and which has been avoided by some of our best modern writers; it may not, however, be amiss to explain, in this place, the difference that was formerly understood between the direct and the inverse rule of three.

The *rule of three direct,* is when more requires more, or less requires less, as in this example. If 3 men will perform a piece of work, as, for instance, dig a trench 48 yards long in a certain time, how many yards will 12 men dig in the same time? Here it is obvious, that the *more* men there are employed, the *more* work will they perform; and therefore, in this instance, more requires more. Again; if 6 men dig 48 yards in a given time, how much will 3 men dig in the same time? Here less requires less; for the *less* men there are employed, the *less* will be the work done in the same time. And all questions falling under either of these cases are said to be in the rule of three direct.

The *rule of three inverse,* is when more requires less, or less requires more, as in this example. If 6 men dig a certain quantity of trench in 14 hours, how many hours will it require for 12 men to dig the same quantity? Or thus: If 6 men perform a piece of work in 7 days, how long will 3 men be in performing the same work? These examples are both in the inverse rule; for in the first, more requires less, that is, 12 men being *more* than 6, they will require *less* time to perform the same work; and in the latter, the number of men being *less,* they will require a *longer* time. All questions of this class are said to be in the rule of three inverse. These two cases, however, as we before observed, may be included under one general rule, as follows.

Rule.—Of the three given terms, set down that which is of the same kind with the answer towards the right hand; and then consider, from the nature of the question, whether the answer will be more, or less, than this term. If the answer is to be greater, place the less of the other two terms on the left, and the remaining term in the middle; but if it is to be less, place the greater of the two given quantities on the left, and the less in the middle; and in either case, multiply the second and third terms together, and divide by the first term for the answer, which will always be of the same denomination as the third term.

 Not

Note 1.—If the firſt and ſecond terms contain different denominations, they muſt both be reduced to the ſame denominations; and if the third term be a compound number, it is generally moſt convenient to reduce it to the loweſt denomination contained in it.

Note 2.—The ſame rule is applicable, whether the given quantities be integral, fractional, or decimal.

Examples.

If an acre of land be worth 73*l.* 1*s.*, how much land may be bought for 250*l.* 10*s.*?

Integral.

£ s. : £ s. :: Acre.
As 73 1 : 250 10 :: 1
20 20

1461 : 5010 :: 1
1

1461)5010(3 acres.
4383

627
4

1461)2508(1 rood.
1461

1047
40

1461)41880(28$\frac{324}{487}$ perches.
2922

12660
11688

$\frac{972}{1461} = \frac{324}{487}$.

By Fractions.

As $73\frac{1}{20}$: $250\frac{1}{2}$ :: 1
Or, as $\frac{1461}{20}$: $\frac{501}{2}$ :: $\frac{1}{1}$
Whence $\frac{20}{1461} \times \frac{501}{2} \times \frac{1}{1} = \frac{5010}{1461} =$
3 acres, 1 rood, 28$\frac{324}{487}$ perches.

By Decimals.

As 73.05 : 250.5 :: 1
1

73.05)250.50(3.4291 = 3 ac. 1 r. 28.656 p.
21915

31350
29220

21300
14610

66900
65745

11550
7305

4245

Example 2. If 3 pounds be bought for 17*s.* how many will 170*s.* buy? Since as 17*s.* are to 170*s.* ſo are 3 pounds to the pounds required; the number will be found thus:

17*s.* : 170*s.* :: 3lb.
3

17)510(30lb.
51

00

Example 3. If 3 pounds and 4 ounces coſt 2*s.* 4*d.* what will 2 pounds coſt? The operation will be thus:

3 lb. 4 oz. : 2 lb. :: 2*s.* 4*d.*
16 16 12

52 32 28
28

256
64

52)896(17*d.*$\frac{12}{52}$ of a penny.
52

376
364

12

In many caſes of commerce and accompts, we have more compendious ways of working queſtions that come under the rule of three than by the rule itſelf; which, by reaſon of their expediting practice, are called *practice*, and conſtitute a particular rule of themſelves.

According to the above rule, it will be obſerved, that the third term is of the ſame kind or name as the fourth term or anſwer, and the ſecond of the ſame name with the firſt; ſo that the analogy in both pair of terms is between quantities of the ſame kind; which is, in fact, neceſſary to conſtitute a proportion, according to Euclid's definition: whereas, by ſome ſtrange overſight, it will be found that moſt of our writers on arithmetic, by making the middle term like the anſwer, have neceſſarily to conſider the ratio of incongruous quantities, or at leaſt the ratio between the abſtract numbers by which they are expreſſed.

Rule *of Compound Proportion*, or *Double Rule of Three*, or, as it is otherwiſe called, the *Rule of Five*, is the method of ſolving, at one operation, ſuch queſtions as would require two or more ſtatings by the common or ſimple rule of three.

Rule.—1. Set down the terms expreſſing the condition of the queſtion, in one line. 2. Under each conditional term ſet its correſponding one in another line. 3. Multiply the producing terms of one line, and the produced term of the other line continually, and take the reſult for a dividend. 4. Multiply the remaining terms continually, and let the product of them be a diviſor. 5. The quotient of this diviſion will be the term required.

By producing terms here, are meant whatever neceſſarily and jointly produce any effect; as the cauſe and the time; length, breadth, and depth; buyer and his money; ſeller and his goods; all neceſſarily inſeparable in producing their ſeveral effects.

In a queſtion where a term is underſtood, and not expreſſed, that term may be expreſſed by unity.

Example.—If 250*l.* ſerve ſix perſons for nine months; how long will 1000*l.* ſerve four perſons at the ſame rate?

Here the terms which exprefs the condition are,

	£	Per.	Mon.
	250 :	6 :	9
correfponding terms	1000 :	4 :	Q

where Q is put to reprefent the term required.

Among the conditional terms, fix perfons and nine months are producing, and 250*l.* is produced: among their correfponding terms, four perfons and Q are producing, and 1000*l.* is produced.

But it being impoffible to multiply the producing terms in the fecond line, and the produced in the firft, becaufe Q is unknown; therefore, multiply the producing terms of the firft line by the produced in the fecond, and divide by the product of the reft.

Then will $Q = \frac{6 \times 9 \times 1000}{4 \times 250} = 6 \times 9 = 54$. See Mr. Dodfon's Anti-Logarithmic Canon, p. 38, et feq.

But if the notion of producing and produced terms fhould feem obfcure, thofe who have a knowledge of the doctrine of compound ratios will eafily perceive that, in the foregoing queftion, Q is to 9 months in the compound ratio of four perfons to fix perfons inverfely, and of 1000*l.* to 250*l.* directly, that is, $\frac{Q}{9} = \frac{6}{4} \times \frac{1000}{250}$, therefore $Q = \frac{6 \times 9 \times 1000}{4 \times 250} = 54$, as before. And in like manner may other queftions, relating to the compound rule of proportion, be ftated and folved, however complex.

The above rule may be expreffed fomewhat fimpler, as follow:

Rule 2.—Set that term, which is of the fame kind with the anfwer, on the right, and take any two of the other given terms which are of the fame name, and confider, from the nature of the queftion, whether, if thefe three were the only given terms, the anfwer ought to be more or lefs than the above-mentioned right-hand term, and arrange thefe two terms accordingly, as in the rule of three.

Confidering ftill the fame right-hand term as common to every ftating, take two other terms which are of the fame kind, and arrange them as above, according as, in this cafe, the anfwer ought to be more or lefs than the right-hand term; and proceed in the fame manner with every pair of terms that are of the fame name. Then multiply all the firft terms together for a divifor, and all the other terms together for a dividend, and the quotient thence arifing will be the anfwer fought.

Example.—If 248 men, in 5 days of 11 hours each, can dig a trench 230 yards long, 3 wide, and 2 deep; in how many days, of 9 hours each, will 24 men dig a trench 420 yards long, 5 wide, and 3 deep?

$$\left.\begin{array}{lrcr} \text{Men} & 24 & : & 248 \\ \text{Hours} & 9 & : & 11 \\ \text{Length} & 230 & : & 420 \\ \text{Width} & 3 & : & 5 \\ \text{Depth} & 2 & : & 3 \end{array}\right\} :: 5 \text{ days, } \textit{common term.}$$

Then $\frac{248 \times 11 \times 420 \times 5 \times 3}{24 \times 9 \times 230 \times 3 \times 2} = 288\frac{32}{207}$ days, the term required.

Rule, *Central.* See Central.

Rule, in a monaftic fenfe, is a fyftem of laws, or conftitutions, by which religious houfes are eftablifhed and regulated; and which the religious make a vow to obferve at their entrance.

The monaftic rules are all to be approved of by the pope, in order to make them valid. The rule of St. Benedict is, by fome authors, called the *holy* rule.

Thofe of St. Bruno and St. Francis are, of all others, the moft auftere. See Carthusians.

When a religious cannot fupport the aufterities of his rule, he fues for a difpenfation.

Rule, in the *Canon Law.* The rule *de verifimili notitia, of probable notice*, in the Romifh church, renders all provifions to a benefice, vacant by death, null, if it appear, that, from the day of the deceafe to the day of the date of the provifions, or to the day when the courier arrives from Rome, there has not been time fufficient for regular notice of the perfon's deceafe to be conveyed to the pope.

Provifions are even null, if it be proved the courier fet out before the perfon was deceafed. This rule was, according to the old conftitution, ftrictly obferved in France; in other countries the pope finds frequent occafions to difpenfe with it. See Provisions.

Rule *of twenty Days, Regula viginti Dierum.* By this rule, if an ecclefiaftic refign his benefice, to make the refignation valid, the refigner muft furvive its admiffion in the court of Rome twenty days. If he die before the expiration of the twenty days, the refignation is void, and the benefice becomes vacant by death.

This rule does not hold of the provifions of ordinary collators; nor of fimple and pure refignations into the hands of the ordinary; but only in cafe of provifions of the pope, difpatched on refignations *in favorem.*

This rule anciently extended to fuch as refigned in time of health, as well as of ficknefs. Pope Boniface reftrained it to the latter; whence it is commonly called *regula de infirmis refignantibus.*

Rule *de Publicandis.* By this rule, the refignee of a benefice, if he have a provifion from the court of Rome, is obliged to publifh the refignation, and take poffeffion within fix months; or, if he have it from the ordinary collator, within one month. Otherwife, if the refigner die, the refignation becomes null.

Rules *of Court*, in *Law*, are certain orders made, from time to time, in the courts of law, which attornies are bound to obferve, in order to avoid confufion; and both the plaintiff and defendant are at their peril alfo bound to pay obedience to rules made in court relating to the caufe depending between them. It is to be obferved, that no court will make a rule for any thing that may be done in the ordinary courfe; and that if a rule be made, grounded upon an affidavit, the other fide may move the court againft it, in order to vacate the fame, and thereupon fhall bring into court a copy of the affidavit and rule. On the breach and contempt of a rule of court an attachment lies; but it is not granted for difobedience to a rule, when the party has not been perfonally ferved; nor for difobeying a rule made by a judge in his chamber, which is not of force to ground a motion upon, unlefs the fame be entered. A rule of court is granted every day, whilft the courts of Weftminfter fit, to prifoners of the king's bench, or Fleet prifon, to go at large about their private affairs.

Rules, *Clerk of the.* See Clerk.

Rule *Water*, in *Geography*, a river of Scotland, which runs into the Teviot, 4 miles S.W. of Jedburgh.

RULER, Parallel. See Parallel *Ruler.*

RULLE, in *Geography*, a town of Weftphalia, in the bifhopric of Ofnabruck; 7 miles N.E. of Ofnabruck.

RUM, a fpecies of vinous fpirit, drawn by diftillation from fugar-canes.

The word rum is the name it bears among the native Americans.

Rum

Rum is very hot and inflammable, and is in the fame ufe among the natives of the fugar-countries, as brandy among the French.

Rum differs from what we fimply call fugar-fpirit, in that it contains more of the natural flavour or effential oil of the fugar-cane; a great deal of raw juice, and parts of the cane itfelf, being often fermented in the liquor, or folution of which the rum is prepared.

The unctuous or oily flavour of rum is often fuppofed to proceed from the large quantity of fat ufed in boiling the fugar; which fat, indeed, of courfe, will ufually give a ftinking flavour to the fpirit in our diftillation of the fugar liquor, or wafh, from our refining fugar-houfes; but this is nothing like the flavour of the rum, which is really the effect of the natural flavour of the cane. The method of making rum is this:

When a fufficient ftock of the materials is got together, they add water to them, and ferment them in the common method, though the fermentation is always carried on very flowly at firft; becaufe at the beginning of the feafon for making rum in the iflands, they want yeaft, or fome other ferment, to make it work; but by degrees, after this, they procure a fufficient quantity of the ferment, which rifes up as a head to the liquor in the operation, and thus they are able afterwards to ferment and make their rum with a great deal of expedition, and in large quantities.

When the wafh is fully fermented, or to a due degree of acidity, the diftillation is carried on in the common way, and the fpirit is made up proof; though fometimes it is reduced to a much greater ftrength, nearly approaching to that of alcohol or fpirit of wine, and is then called double-diftilled rum. It might be eafy to rectify the fpirit, and bring it to much greater purity than we ufually find it to be of; for it brings over in the diftillation a very large quantity of the oil; and this is often fo difagreeable, that the rum muft be fuffered to lie by a long time to mellow before it can be ufed; whereas, if well rectified, it would grow mellow much fooner, and would have a much lefs potent flavour.

The beft ftate to keep rum in, both for exportation and other ufes, is doubtlefs that of alcohol, or rectified fpirit. In this manner it would be tranfparent in one-half the bulk it ufually is, and might be let down to the common proof ftrength with water when neceffary. For the common ufe of making punch, it would likewife ferve much better in the ftate of alcohol; as the tafte would be cleaner, and the ftrength might always be regulated to a much greater exactnefs than in the ordinary way.

The only ufe to which it would not ferve fo well in this ftate, would be the common practice of adulteration among our diftillers; for when they want to mix a large portion of cheaper fpirit with the rum, their bufinefs is to have it of the proof ftrength, and as full of the flavouring-oil as they can, that it may drown the flavour of the fpirits they mix with it, and extend its own. If the bufinefs of rectifying rum was more nicely managed, it feems a very practicable fcheme to throw out fo much of the oil, as to have it in the fine light ftate of a clear fpirit, but lightly impregnated with it; in this cafe it would very nearly refemble arrac, as is proved by the mixing a very fmall quantity of it with the taftelefs fpirit, in which cafe the whole bears a very near refemblance to arrac in flavour.

Rum is ufually very much adulterated in England; fome are fo barefaced as to do it with malt-fpirit; but when it is done with melaffes-fpirit, the taftes of both are fo nearly allied, that it is not eafily difcovered. The beft method of judging of it is by fetting fire to a little of it; and, when it has burnt away all the inflammable part, examining the phlegm both by the tafte and fmell. Shaw's Effay on Diftillery.

Mr. B. Edwards, in his "Hiftory of the Weft Indies," vol. ii. has given the following account of the procefs for extracting rum from the fugar-cane, or from the very dregs and feculencies of the plant, by fermentation and diftillation. He commences his account with obferving, that the ftill-houfes on the fugar-plantations in the Britifh Weft Indies, vary greatly in point of fize and expence, according to the fancy of the proprietor, or the magnitude of the property. In general, however, they are built in a fubftantial manner of ftone, and are commonly equal to the boiling and curing-houfes together. (See Sugar.) For a plantation making, *communibus annis*, 200 hogfheads of fugar of 1600 weight, our author conceives, that two copper ftills, the one of 1200, and the other of 600 gallons, wine meafure, with proportionate pewter worms, are fufficient. The fize of the tanks (or tubs) for containing the cold water in which the worms are immerfed, muft depend upon circumftances; if the advantage can be obtained of a running ftream, the water may be kept abundantly cool in a veffel barely large enough to contain the worm. If the plantation has no other dependance than pond-water, a ftone tank is much fuperior to a tub, as being longer in heating, and if it can be made to contain from twenty to thirty-thoufand gallons, the worms of both the ftills may be placed in the fame body of water, and kept cool enough for condenfing the fpirit, by occafional fupplies of frefh water.

For working thefe ftills and worms, it is neceffary to provide, firft, a dunder-ciftern, of at leaft three thoufand gallons; fecondly, a ciftern for the fcummings; and laftly, twelve fermenting vats, or cifterns, each of them of the contents of the largeft ftill, *viz.* 1200 gallons. In Jamaica, cifterns are made of plank, fixed in clay; and are univerfally preferred to vats or moveable veffels, for the purpofe of fermenting. They are not fo eafily affected by the changes of the weather, nor fo liable to leak as vats, and they laft much longer. But in the Britifh diftilleries, fermenting cifterns, it is faid, are unknown. To complete the apparatus, it is neceffary to add two or more copper pumps for conveying the liquor from the cifterns, and pumping up the dunder, and alfo butts or other veffels for fecuring the fpirit when obtained; and it is ufual to build a rum-ftore adjoining the ftill-houfe.

The ingredients or materials for the procefs confift of melaffes, or treacle drained from the fugar; fcummings of the hot cane-juice, from the boiling-houfe, or fometimes raw-cane liquor, from canes expreffed for the purpofe: lees, or, as it is called in Jamaica, "dunder," from the Spanifh *redunder*, the fame as *redundans* in Latin; and water. Dunder, in the making of rum, ferves the purpofe of yeaft in the fermentation of flour. It is the lees or feculencies of former diftillations; and fome planters preferve it for ufe from one crop to another; but this is faid to be a bad practice. Some fermented liquor, compofed of fweets and water alone, ought to be diftilled in the firft inftance, that frefh dunder may be obtained. This is a diffolvent menftruum, and occafions the fweets with which it is combined, whether melaffes or fcummings, to yield a far greater proportion of fpirit than can be obtained without its affiftance. The water which is added acts in fome degree in the fame manner by dilution.

In the Windward iflands, the procefs, we are told, is conducted as follows: the ingredients, *viz.* fcummings, one-third; lees or dunder, one-third, and one-third of water, are well mixed in the fermenting cifterns, and when they are pretty cool, the fermentation will rife, in twenty-four hours,

to

to a proper height for admitting the firſt charge of melaſſes, of which ſix gallons for every hundred gallons of the fermenting liquor, is the general proportion to be given at twice; *viz.* three *per cent.* at the firſt charge, and the other ſeven *per cent.* a day or two afterwards, when the liquor is in a high ſtate of fermentation; the heat of which, however, ſhould not, in general, be ſuffered to exceed from 90° to 94° Fahrenheit. The infuſion of hot water will raiſe, and of cold water abate the fermentation. The quantity of melaſſes above-mentioned, added to a third of ſcummings, gives $11\frac{1}{2}$ *per cent.* of ſweets, ſix gallons of ſcummings being reckoned equal to one gallon of melaſſes. When the fermentation falls by eaſy degrees from the fifth to the ſeventh or eighth day, ſo as then to become fine, and throw up ſlowly a few clear beads or air-globules, it is ripe for diſtillation; though when the liquor is firſt ſet at the beginning of the crop (the houſe being cold, and the ciſterns not ſaturated) it will not be fit for diſtillation under ten or twelve days. When this is the caſe, at a longer or ſhorter period, the liquor or waſh being conveyed into the largeſt ſtill, which muſt not be filled higher than within eight or ten inches of the brim, leſt the head ſhould fly, a ſteady and regular fire muſt be kept up until it boils, after which a little fuel will ſerve. In about two hours the vapour or ſpirit, being condenſed by the ambient fluid, will force its way through the worm in the ſhape of a ſtream, as clear and tranſparent as cryſtal, and it is ſuffered to run until it is no longer inflammable. The ſpirit thus obtained is known by the appellation of "low wines." To make it rum of the Jamaica proof, it undergoes a ſecond diſtillation. Between the practice of the Jamaica diſtillers, and that of thoſe of the Windward iſlands, there is ſome little variation in the firſt proceſs. This conſiſts chiefly in the more copious uſe of dunder. As dunder ſerves to diſſolve the tenacity of the ſaccharine matter, it ſhould be proportioned, not only to the *quantity*, but alſo to the *nature* of the ſweets. If the ſweets in the fermenting ciſtern conſiſt of melaſſes alone, which is generally the caſe after the buſineſs of ſugar-boiling is finiſhed, when no ſcummings are to be had, a greater proportion of dunder is neceſſary; becauſe melaſſes are a body of greater tenacity than cane-liquor, and are rendered ſo viſcous and indurated by the action of fire, as to be unfit for fermentation without the moſt powerful ſaline and acid ſtimulators. For the ſame reaſon, at the beginning of the crop, when no melaſſes can be had, and the ſweets conſiſt of cane-juice or ſcummings alone, very little dunder is neceſſary. In ſuch caſe twenty *per cent.* at the utmoſt will be ſufficient. Dunder, in a large quantity, injures the *flavour*, though it may increaſe the *quantity* of the ſpirit. Dr. Shaw ſays, that the Engliſh diſtillers add many things to the fermenting liquor or waſh, in order to augment the vinoſity of the ſpirit, or to give it a particular flavour. He obſerves, that a little tartar, nitre, or common ſalt, is ſometimes thrown in at the beginning of the operation, or in their ſtead a little of the vegetable or finer mineral acid. Theſe are thought to be of great uſe in the fermenting of ſolutions of treacle, honey, and ſimilar ſweet and rich vegetable juices, which contain a ſmall proportion of acid. A ſimilar practice is ſaid to prevail among the diſtillers in St. Chriſtopher's, ſome of which conſider an addition of ſea-water to the fermenting liquor as a real and great improvement. Shaw recommends the juice of Seville oranges, lemons, and tamarinds, or other very acid fruits, and, above all other things, an aqueous ſolution of tartar; but Mr. Edwards is of opinion, that dunder alone anſwers every purpoſe. Dr. Shaw alſo recommends to the diſtiller to introduce into the fermenting ciſtern a few gallons of the rectified ſpirit, which, he ſays, will revert, with a large addition, to the quantity of ſpirit that would otherwiſe have ariſen from the diſtillation. It is ſuggeſted by Mr. Edwards, that a ſmall quantity of vegetable aſhes, thrown into the rum-ſtill, will be found ſerviceable. The alkaline ſalts are ſuppoſed to attenuate the ſpirit, and keep back the groſs and fetid oil, which the diſtillers call the "faints," but if too freely uſed, they will alſo keep back a proportion of the fine eſſential oil, on which the flavour of the rum wholly depends. After all, the moſt important object of attention in making good rum is probably "cleanlineſs;" for all adventitious or foreign ſubſtances deſtroy or change the peculiar flavour of the ſpirit. It ſhould, indeed, be an invariable practice with the manager or diſtiller to take care that the ciſterns are ſcalded, and even cleanſed with ſtrong lime-water, every time when they are uſed; not merely on account of the rum, but becauſe it has often happened that the vapour of a foul ciſtern has inſtantly killed the firſt perſon that has entered it without due precaution.

The following improved method of conducting the proceſs, or of compounding the ſeveral ingredients, is very general in Jamaica, *viz.*

Dunder one half, or		50 gallons	
Sweets 12 *per cent.*	Melaſſes	6 gallons	42 gallons.
	Scummings	36 gallons (equal to ſix gallons more of melaſſes)	
Water		8 gallons	
		100	

Of this mixture, or "waſh," as it is ſometimes called, 1200 gallons ought to produce 300 gallons of low-wines; and the ſtill may be twice charged or drawn off in one day. The method of adding all the melaſſes at once, which is done ſoon after the fermentation commences, renders the proceſs ſafe and expeditious; whereas by charging the melaſſes at different times, the fermentation is checked, and the proceſs delayed.

The low-wines obtained in the manner above deſcribed, are drawn off into a butt or veſſel, and, as opportunity ſerves, are conveyed into the ſecond ſtill of 600 gallons, to undergo a further diſtillation. The ſteam begins to run in about an hour and a half, and will give, in the courſe of the day, 220 gallons, or two puncheons, of oil-proof rum, *i. e.* of ſpirit in which olive oil will ſink; and thus the manufacture, if ſo it may be called, is complete. There will remain in the ſtill a conſiderable quantity of weaker ſpirit, commonly about 70 gallons, which is returned to the low-wine butt. Thus 220 gallons of proof-rum are made, in fact, from 530 gallons of low-wines, or about 113 of rum from 1200 of waſh. By this proceſs the Jamaica diſtiller may fill weekly, working only by day-light (a neceſſary precaution in this employment), and at a ſmall expence of labour and fuel, twelve puncheons of rum, containing each 110 gallons of the Jamaica ſtandard. The proportion of the whole rum to the crop of ſugar, is commonly eſtimated

in

RUM

in Jamaica as three to four. Thus a plantation, ſuch as we have above deſcribed, is ſuppoſed to ſupply annually 150 puncheons of rum of 110 gallons each, or 82 gallons of Jamaica proof to each hogſhead of ſugar; and this quantity is ſometimes fairly made from canes planted in rich and moiſt lands; but on a general eſtimate, Mr. Edwards thinks this to be too great an allowance; and that 200 gallons of rum to three hogſheads of ſugar, which is in the proportion of about two-thirds rum to the crop of ſugar, is nearer the truth. The following ſtatement warrants the above concluſion. The general ſupply of ſcummings to the liquor-houſe is ſeven gallons out of every 100 gallons of cane-liquor. Suppoſing, therefore, that 2000 gallons of cane-juice are required for each hogſhead of ſugar of 16 cwt., the ſcummings, on a plantation making 200 hogſheads *per annum*, will be 28,000 gallons, equal to 4666 gallons of melaſſes.

Add the melaſſes from the curing-houſe, which, if the ſugar is of a good quality, will ſeldom exceed 60 gallons *per* hogſhead	12,000
Total of ſweets	16,666 gallons.

This quantity, diſtilled at or after the rate of 12 *per cent.* ſweets in the fermenting ciſtern, will give 34,720 gallons of low-wines, which ought to produce 14,412 gallons of good proof rum, or 131 puncheons of 110 gallons each. When a greater proportion than this is made, either the ſugar diſcharges an unuſual quantity of melaſſes, or the boiling-houſe is defrauded of the cane-liquor by improper ſcumming; which latter circumſtance frequently happens.

It is the practice of late, we are told, with many planters, to raiſe the proof of rum: thus gaining in ſtrength of ſpirit what is loſt in quantity: and ſome managers make it a rule to return the ſcummings to the clarifiers, inſtead of ſending them to the ſtill-houſe. This laſt-mentioned practice reduces the crop of rum more than one-third; but is ſuppoſed to yield in ſugar more than is loſt in rum: and if the price of ſugar is very high, and that of rum very low, it may be prudent to adopt this method.

For the duty, &c. on rum, ſee *Foreign* SPIRITS.

RUM, in *Geography*, a town of Tonquin, on the coaſt. N. lat. 19° 35′. E. long. 105° 18′.—Alſo, a river of America, which runs into the Miſſiſippi, N. lat. 45°. W. long. 93° 48′.

RUM, one of the Hebrides, or Weſtern iſlands of Scotland, is ſituated to the weſtward of the iſle of Skye, and is compriſed, politically, in the pariſh of Small-Iſles, and in the county of Argyle. It derived its name from the Gaelic, *Rhum*, ſignifying extent, in alluſion to its being the largeſt iſland in the pariſh to which it belongs. It is computed to meaſure eight miles in length, and nearly the ſame in breadth; and to contain about 22,000 ſquare acres. Rum is in general rugged, mountainous, and barren, and more adapted for paſturage than for agriculture. Horſes are reared in this iſland for ſale, and though diminutive in ſize, are remarkably high mettled and hardy. Here are likewiſe reared a conſiderable number of ſheep, which are the beſt ſtock with which a mountainous country, like Rum, can be ſupplied. The general breed is a ſmall white-faced ſheep, which is much praiſed, both for the delicate flavour of its fleſh, and for the excellence of its wool. This iſland formerly abounded with deer; but that animal is now totally extirpated, owing to the copſe wood, which ſerved as a cover to their fawn, having been deſtroyed. Before the uſe of fire-arms, the method adopted by the inhabitants to kill deer was ſo ſingular as to deſerve notice. On each ſide of a glen formed by two mountains, ſtone dykes were conſtructed at a conſiderable height up the hills, and extended from thence to the lower part of the valley, always drawing nearer to each other, till they approached within three or four feet. This narrow paſs opened into a circular ſpace, incloſed by a wall of ſufficient height to reſtrain the deer, which were purſued hither and deſtroyed. The remains of one of theſe ancient deer-traps are ſtill to be traced. Birds of prey are numerous in Rum; and there are likewiſe a few grouſe, pigeons, termagants, and wild ducks, beſides thoſe birds which frequent the iſland only at ſtated ſeaſons of the year. The air of Rum, from its proximity to the weſtern ocean, is moiſt, and the weather extremely rainy. The only harbour here is Loch-Serefort, which penetrates a conſiderable way into the iſland, on its eaſtern coaſt. It is ſpacious, its ground good, and its depth of water from five to ſeven fathoms. Near the head, on the ſouth ſide of this harbour, a pier has been lately erected. The general appearance of Rum is, that the land ſlopes towards the eaſt; but on the weſt preſents precipices of a tremendous height. At the baſe of the hill Sgormor are found abundance of agates, of that ſpecies called by Cronſtedt "Achates chalcedoniſans," improperly white cornelians. Here are ſeveral remarkable ſtrata; ſuch as grey quartz; a mixture of quartz and baſaltes; a black ſtone ſpotted with white, like porphyry, but with the appearance of lava; fine grit or free-ſtone; and the cinereous indurated bole of Cronſtedt. There being no mill in this iſland, the corn is "gradanned," or burnt out of the ear, inſtead of being thraſhed. This is performed in two ways: firſt by cutting off the ears and drying them in a kiln, and then ſetting fire to them on the floor, and picking out the grains; and ſecondly, by burning the ſheaf entire, which is a moſt ruinous practice, as it deſtroys both thatch and manure. Gradanned corn is conjectured to have been the parched corn of holy writ.

Rum not being a pariſh of itſelf, its population is not ſtated in the parliamentary returns; but it is eſtimated to contain about 500 inhabitants. The Statiſtical Account of Scotland, by ſir John Sinclair, bart. 8vo. vol. xvii. 1796. Beauties of Scotland, vol. v. 8vo. 1808. Carliſle's Topographical Dictionary, 4to. 1813.

RUM *Key*. See RONCADOUR.

RUMAHIE. See ROMAHIE.

RUMB, RUM, or *Rhumb*, in *Navigation*. See RHUMB.

RUMB-*Line*, or *Loxodromia*. See RHUMB-*Line*.

RUMBLE, in *Geography*, one of the ſmaller Shetland iſlands; two miles S. of Yell. N. lat. 60°. W. long. 0° 56′.

RUMBURG, a town of Bohemia, in the circle of Leitmeritz, in which are conſiderable manufactures of linen; nine miles N.N.E. of Kamnitz.

RUMEIL, a town of Aſiatic Turkey, in the province of Diarbekir; 30 miles E. of Niſibin.

RUMELY, a town of Syria, in the pachalic of Tripoli, on the coaſt; 15 miles S. of Bairut. N. lat. 33° 33′. E. long. 35° 28′.

RUMEN, the firſt ſtomach of animals which chew the cud, and which are hence called *ruminants*.

The food is tranſmitted into the rumen without any other alteration in the mouth than being a little rolled and wrapped up together.

For an account of the rumen, ſee *Anatomy of* MAMMALIA.

RUMEX, in *Botany*, the Dock and Sorrel genus; named, as it ſeems, by the Latins themſelves, from *rumex*, a ſort of pike, ſpear, or halberd, which the ſhape of the leaves, in various

various species, much resembles. We cannot but prefer this etymology to that taken from *rumo*, to suck, by which the acid flavour of Sorrel, useful in allaying thirst, was supposed to be indicated.—Linn. Gen. 178. Schreb. 238. Willd. Sp. Pl. v. 2. 249. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 318. Sm. Fl. Brit. 390. Prodr. Fl. Græc. Sibth. v. 1. 244. Brown Prodr. Nov. Holl. 421. Pursh 247. Juss. 82. Lamarck Illustr. t. 271. Gærtn. t. 119. (Lapathum; Tourn. Inst. 504. Acetosa; ibid. 502. t. 287.) —Class and order, *Hexandria Trigynia*. Nat. Ord. *Holeraceæ*, Linn. *Polygoneæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of three obtuse, reflexed, permanent leaves. *Cor.* Petals three, ovate, similar to the calyx, but larger, converging, permanent, forming valves over the seed. *Stam.* Filaments six, capillary, very short; anthers erect, of two lobes. *Pist.* Germen superior, triangular, turbinate; styles three, capillary, reflexed, projecting between the petals; stigmas large, laciniated. *Peric.* none, the converging, triangular, hardened corolla, enfolding the seed. *Seed* solitary, triangular.

Ess. Ch. Calyx of three leaves. Petals three, converging, permanent. Seed solitary, triangular, superior, without a seed-vessel. Stigmas many-cleft.

Obs. *R. digynus* excludes one-third in the number of every part of the fructification, except the stamens. Those species which compose the Sorrel tribe, have flowers with stamens on one plant, flowers with pistils mostly on another, being dioecious, or in some instances monoecious. *R. spinosus* is monoecious; and the perianth of the female flowers becomes hooked and rigid. *R. alpinus* is polygamous. In several species the petals are distinguished by a tumid, hard, mostly coloured, grain, or roundish tubercle, at the back, most conspicuous when the seed ripens; sometimes of equal size in all, sometimes obsolete in two of the petals. This is a genus of hardy, perennial, almost invariably herbaceous plants, nearly allied to Rheum; see that article. They have small pretensions to be considered as ornamental, and, on the contrary, are generally esteemed weeds, because they mostly grow where they are a nuisance and encumbrance. The agriculturist stigmatizes with the name of Docks, all large, biennial or perennial, strong-rooted, rank-growing herbs, and generally pays for their extirpation, according to a settled rate, under that denomination. The roots of the various species of *Rumex* are astringent; their herbage is likewise often so, though sometimes very acid. Every part of the plant is greenish, with a strong tendency to become red by age. Botanists differ about the denomination of the parts of the flower. Analogy and theory teach the whole of the integuments in this genus and *Rheum* to be a calyx; but the three inner divisions in *Rumex* having a separate insertion, somewhat of a different texture or structure, and being so remarkably altered, in most species, as the fruit ripens; while in such species as have, after flowering, an enlarged or hardened calyx these inner segments remain unchanged, never undergoing any alteration in concert with the three outer segments; all this evinces that nature is not always conformable to our rules. The genus *Rumex* therefore is one of those in which we are obliged to use our discretion, as to the denomination of the *calyx* and *corolla*, in spite of arbitrary and absolute principles.

The species in Willdenow amount to 36. They are in general well defined, but several are misunderstood, or given twice; so that we must exhibit as compendious a view as possible of the whole, having also some to add. Eleven are natives of Britain. The Hortus Kewensis enumerates 27, two of which do not occur in Willdenow. They are commodiously disposed in three sections.

Sect. 1. *Stamens and pistils in the same flowers. Valves distinguished by a granular tubercle.*

1. R. *Patientia.* Patience Dock or Rhubarb. Linn. Sp. Pl. 476. Willd. n. 1. Ait. n. 1. Ehrh. Pl. Off. n. 273. (Hippolapathum sativum; Ger. Em. 389. H. hortense; Matth. Valgr. v. 1. 407.)—Flowers united. Valves entire, ovate; one of them minutely granular. Leaves ovato-lanceolate, taper-pointed.—Native of Italy. Long cultivated in kitchen or rustic gardens, having been sometimes used as a pot-herb, and the root occasionally employed as a purgative medicine, in the place of Rhubarb. Hence it is sometimes called Monk's Rhubarb, though that name is now retained rather for the *Rumex alpinus*. The *Patientia* is four or five feet high, erect, smooth, green; its *leaves* from twelve to eighteen inches long, rather narrow. *Flowers* in whorled or tufted clusters, copious, pendulous. *Petals* large, ovate, reticulated with veins; the midrib of one of them swelling, in its lower part, into an oblong, not very evident, grain. We now rather prefer the above cut of Gerarde, to that of Dodonæus cited by Linnæus.

2. R. *sanguineus.* Bloody-veined Dock. Linn. Sp. Pl. 476. Willd. n. 2. Ait. n. 2. Pursh n. 1. Fl. Brit. n. 1. Engl. Bot. t. 1533. (Lapathum sativum sanguineum; Ger. Em. 390.)

β. R. acutus; Curt. Lond. fasc. 3. 21, the description, not the figure. (R. Nemolapathum; Ehrh. Phytoph. n. 94. Linn. Suppl. 212. Bloodless Dock; Petiv. H. Brit. t. 2. f. 6.)—Flowers united. Valves entire, oblong; one of them chiefly granular. Leaves lanceolate, heart-shaped at the base.—Native of Europe, in woods and by way sides. Dr. Sibthorp found it in Greece, and though not very common in England, it occurs in various parts. Mr. Pursh says it grows in shady woods and moist meadows, from Pennsylvania to Virginia, flowering in June and July. The green variety, β, is very common in England, under the shade of trees in rather dry woods. Perhaps it ought to be esteemed the original species; the kind whose stalks and veins contain a crimson juice, being perhaps the variety. This last appears, by Gerarde's herbal, to have been first known here as a pot-herb. Linnæus mentions Virginia only as its native country, and marks it as biennial. With us both varieties are certainly perennial. The plant is erect, three or four feet high, branched, rather slender, and of a delicate appearance. *Flowers* small, in long clusters of very numerous tufts or whorls; their *petals* oblong and obtuse, one of them bearing an extremely large, globular, red grain.

3. R. *spatulatus.* Spatulate Cape Dock. Thunb. Prodr. 67. Willd. n. 3.—"Leaves obovate, obtuse. Valves granular."—Found by Thunberg at the Cape of Good Hope.

4. R. *crispus.* Curled Dock. Linn. Sp. Pl. 476. Willd. n. 7. Ait. n. 3. Pursh n. 2. Fl. Brit. n. 2. Engl. Bot. t. 1998. Curt. Lond. fasc. 2. t. 20. (Lapathum longifolium crispum; Munt. Brit. t. 104.)—Flowers united. Valves ovate, wavy, entire, all granular. Leaves lanceolate, undulated, acute.—In waste ground, pastures, and by way sides, common throughout Europe, as well as in North America, flowering in June and July, and accidentally throughout the summer. This is a very troublesome and unprofitable weed; readily distinguished, as a species, from all other English Docks, by the curved *leaves*, and large entire *valves*, each bearing an ovate grain. These are by accidental error termed *calyx-valves* in *English Botany*. The *root* is tap-shaped, yellowish. *Stem* two or three feet high, branched, nearly smooth to the touch. *Leaves* of a lightish green. *Clusters* rather long; leafy in their lower part.

5. R. *verticillatus.* Whorled American Dock. Linn.

Sp. Pl. 476. Willd. n. 4. Purſh n. 3.—Flowers united. Valves ſomewhat deltoid, entire, all granular. Leaves flat, lanceolate; with tubular, membranous ſheaths embracing the ſtem. Cluſters nearly leafleſs.—In rivulets and ſhady woods, from Canada to Virginia, flowering in July, perennial. *Purſh.* The *ſtem* is ſomewhat zigzag, aſcending, angular and furrowed, ſmooth, inveſted above every leaf with a tubular, pale, membranous, intrafoliaceous *ſtipula*, or ſheath, near an inch long. *Leaves* flat and even. *Flowers* twice the ſize of the laſt, with very large oblong grains, which are often wrinkled. The *petal* itſelf is alſo ſtrongly marked with projecting reticulated veins.

6. R. *Britannica.* Virginian Water-Dock. Linn. Sp. Pl. 476. Willd. n. 5. Purſh n. 4.—Flowers united. Valves ovate, obtuſe, all granular. Leaves flat, lanceolate; with ſcarcely any ſheaths. Cluſters panicled, leafleſs.—Near rivulets in Virginia and Carolina; perennial, flowering in June and July. *Purſh.* This is readily diſtinguiſhed from the laſt, with which Linnæus ſometimes negligently confounded it, notwithſtanding his own clear definition. The want of the tubular ſheathing *ſtipulas* is alone ſufficient. The grains on the *valves* are, moreover, much ſmaller, and Mr. Purſh has well adverted to the panicled infloreſcence, compoſed of numerous, lax, many-flowered *cluſters.* The ſpecific name *Britannica*, not *britannicus*, alludes to former controverſies, of Muntingius and others, about what was the true *Herba Britannica;* but why this American plant ſhould be ſo called, we know no good reaſon, nor is it worth while to examine which of the bad figures in the verboſe and uſeleſs author laſt named, is moſt, or leaſt, like our plant. None of them, we believe, is properly referrible to it. The *Herba Britannica* of the ancients is ſaid to have been a powerful antiſcorbutic, or tonic, and was found on our own, or the neighbouring, coaſts.

7. R. *perſicarioides.* Perſicaria Dock. Linn. Sp. Pl. 477. Willd. n. 9. Ait. n. 4. Purſh n. 5.—Flowers united. Valves lanceolate, taper-pointed, toothed, all granular. Leaves lanceolate, wavy, nearly entire.—In ſhady wet woods, on the banks of ditches, in Virginia and Carolina, flowering in July, annual. Sent to Kew in 1773, by the chevalier Murray, profeſſor at Gottingen, but we preſume it is ſcarcely preſerved, being ſo like our common docks, except the advantage, in this caſe, of having only an annual root. The *cluſters* are accompanied, at each whorl, with a ſtalked leaf, rather ſmaller than thoſe on other parts of the branched *ſtem. Flowers* ſmall, erect. *Valves* narrow, with long ſlender points, and each bearing a large, oblong, ſlightly kidney-ſhaped, ſmooth, tawny grain.

8. R. *criſpatulus.* Criſped Dock. Michaux Boreali-Amer. v. 1. 217. Purſh n. 6.—Flowers united. Valves heart-ſhaped, obtuſe, three-toothed at each ſide; two of them granular. Cluſters leafleſs. Leaves criſped and wavy at the margin; the lower ones oval; upper lanceolate.—Native of Kentucky. *Michaux.* Akin to the laſt. Its habit is ſaid to be like *R. acutus*, but the *valves* inveſting the *ſeed* are much larger. One of them bears no granular tubercle, and the grains of the two others are unequal in ſize. The upper *leaves* are minutely crenulated.

9. R. *ægyptiacus.* Egyptian Dock. Linn. Sp. Pl. 477. Willd. n. 10. Ait. n. 5. (Lapathum ægyptium annuum, parietariæ folio, capſulâ ſeminis longiùs barbatâ; Till. Piſ. 93. t. 37. f. 1.)—Flowers united. Valves with three very long capillary points at each ſide; one only bearing an ovate grain. Gathered near Memphis, by J. B. de Georgis, ſurgeon to the grand duke of Tuſcany, whence it was introduced into the garden at Piſa, and ſoon after, as it appears, ſent to Miller at Chelſea. The *root* is annual. This ſpecies is readily known by the fine capillary teeth of its *valves*, ſpreading in every direction, and giving the *cluſters*, which are long, denſe, and leafy, a hairy appearance. Each *valve* is ſmall, reticulated with ſtrong veins.

10. R. *dentatus.* Sharp-toothed Dock. Linn. Mant. 226. Syſt. Veg. ed. 13. 284. Willd. n. 11. Ait. n. 6. (Lapathum ægyptium, capſulâ ſeminis albâ et crenatâ; Boerh. Ind. Alt. v. 2. 85. Dill. Elth. 191. t. 158. f. 191.)—Flowers united. Valves with awl-ſhaped teeth; all granular. Cluſters denſe, leafy. Leaves lanceolate.—Gathered in Egypt, by the unfortunate Auguſtin Lippi, afterwards murdered by the barbarians of Nubia. This plant was originally confounded, by Linnæus, with the laſt, from which it differs eſſentially, having *valves* thrice as large, bordered with awl-ſhaped teeth, ſcarcely exceeding their own length, each valve bearing a large, pale, ovate grain.—The plant is annual, a ſpan high, branched from the bottom.

11. R. *maritimus.* Golden Dock. Linn. Sp. Pl. 478. Willd. n. 12. Ait. n. 7. Fl. Brit. n. 6. Engl. Bot. t. 725. (Lapathum anthoxanthum; Bauh. Hiſt. v. 2. 987.)—Flowers united. Valves deltoid, with ſetaceous teeth; each bearing a nearly cylindrical grain. Cluſters denſe. Leaves linear.—Native of marſhes in various parts of Europe, chiefly near the ſea. It is perennial, flowering in July and Auguſt. This is moſt akin to *R. ægyptiacus*, with which its denſe leafy *cluſters*, and tawny or golden hue, agree. But the *foliage* is more linear, and the teeth of the *valves*, though almoſt capillary, not one-third ſo long, while the valves themſelves are larger, and every one of them marked with a *grain*, which is oblong, and nearly cylindrical, not ovate. The *ſtem* is ſtrongly angular and furrowed, roughiſh, reddiſh, a little zigzag. *Leaves* ſtalked, bluntiſh, flat. *Whorls* very denſe, and crowded into cylindrical leafy cluſters, often of a rich golden hue. *Seed* very ſmall, compared with our common docks.

12. R. *paluſtris.* Yellow Marſh Dock. Fl. Brit. n. 7. Engl. Bot. t. 1932. Ait. n. 8. (R. maritimus; Ehrh. Herb. n. 74. Curt. Lond. faſc. 3. t. 23. Lapathum aquaticum, luteolæ folio; Bocc. Muſ. v. 2. 143. t. 104. Hydrolapathum minus; Lob. Ic. 286. Ger. Em. 309.)—Flowers united. Valves lanceolate, toothed at the baſe; each bearing an oblong grain. Leaves linear-lanceolate. Whorls diſtant.—Native of marſhes, ditches, and wet waſte places in Germany, Italy, and England. Found in ſeveral ſituations near London; alſo at Acle and Saham in Norfolk. It is perennial, flowering in July and Auguſt. Many botaniſts have confounded this with the laſt, from which it differs in having diſtant leafy *whorls*, and lanceolate *valves*, each furniſhed at the baſe, on each ſide, with three ſlender teeth, much ſhorter than the foregoing. The *leaves* are linear-lanceolate and acute; the radical ones very large. *Stem* furrowed, reddiſh, rough to the touch. The *root*, as Curtis obſerved, is red internally.

13. R. *divaricatus.* Spreading Italian Dock. Linn. Sp. Pl. 478. Willd. n. 13. Ait. n. 10. (Lapathum arvenſe ſubhirſutum, folio retuſo, caule longiùs brachiato, capſulâ ſeminis crenatâ; Till. Piſ. 93. t. 37. f. 2.)—Flowers united. Valves heart-ſhaped, toothed, granular. Leaves heart-ſhaped-oblong, obtuſe, downy.—Native of fields in Italy. *Root* annual. Linnæus truly ſays, that Haller conſidered this as the ſame with *R. pulcher* hereafter deſcribed. We have ſeen no ſpecimen; but though in Tilli's figure the *valves* inveſting the *ſeed* are not very unlike thoſe of *pulcher*, the large oblong *leaf*, not at all contracted in the middle, and hairy as well as its *footſtalk*, has

has a very different appearance. Moreover, this ſpecies is cultivated at Kew, where it was introduced in 1793, by Mr. Hunnemann, and is publiſhed by Mr. Aiton as diſtinct. It flowers in July and Auguſt. See *R. auratus*, n. 30.

14. R. *acutus*. Sharp Dock. Linn. Sp. Pl. 478. Willd. n. 14? Ait. n. 11. Fl. Brit. n. 3. Engl. Bot. t. 724.

β. Lapathum acutum minimum; Dill. in Raii Syn. 141. Bauh. Hiſt. v. 2. 985. (Small Sharp Dock; Petiv. H. Brit. t. 2. f. 4.)—Flowers united. Valves oblong, obſcurely toothed, each bearing a roundiſh prominent grain. Leaves oblong, pointed; ſomewhat heart-ſhaped at the baſe. Cluſters leafy.—Native of marſhy meadows in England, and other parts of Europe, perennial, flowering in July. The *ſtem* is erect, or ſomewhat zigzag, angular, furrowed, ſmooth to the touch. *Leaves* narrow; the lower ones only ſlightly heart-ſhaped; all ſmooth and flat. *Branches* elongated into long ſpreading *cluſters*, conſiſting of numerous, diſtinct, and rather diſtant, *whorls*, each of which is accompanied by a ſmall, lanceolate, ſtalked leaf. The *flowers* are occaſionally polygamous, and ſome of the males have been obſerved by Mr. Sowerby to be furniſhed with twelve *ſtamens*; the greater part of the flowers however have uſually ſix only, in the ſame calyx with the piſtil. The *ſeed* is ſmall. *Valves* oblong and bluntiſh, moſtly entire, though ſometimes toothed at the baſe, each of them bearing a large, red, almoſt globular, *grain*, of the ſame ſize in all.

This is a ſpecies about which there has been more doubt and controverſy than any other. Moſt botaniſts have miſtaken for it our green variety of *R. ſanguineus*, n. 2, and we can by no means be certain how far Mr. Curtis has committed the ſame error. The two plants however are perfectly diſtinct, nor is there any uncertainty in the characters by which we have defined them. The preſent has a large grain on each *valve*, and the whorls are moſt of them, if not all, accompanied by a leaf. The other has two of the *valves* without grains, the third bearing a very large one, and there is only a leaf or two, here and there, at the lower whorls; the long ſeries of them above being leafleſs. By an attention to this laſt character, the figures of old authors, bad as they are, may be determined. With reſpect to Mr. Curtis's fine plate, we confeſs we remain in uncertainty. His *cluſters* are almoſt leafleſs, like the *ſanguineus β*, but his ſeparate *flowers* unqueſtionably belong to the *acutus*. We have no doubt that he confounded theſe ſpecies, and that his expreſſion of two of the *valves* being "generally naked," is calculated to ſquare with both. Two of them are really in *ſanguineus* always naked, nor do we find any uncertainty in this character.

15. R. *obtuſifolius*. Broad-leaved Dock. Linn. Sp. Pl. 478. Willd. n. 15. Ait. n. 12. Purſh n. 7. Fl. Brit. n. 4. Engl. Bot. t. 1999. Curt. Lond. faſc. 3. t. 22. (L. ſylveſtre, folio minùs acuto; Ger. Em. 388. Lob. Ic. 285.)—Flowers united. Valves toothed; one principally grained. Radical leaves heart-ſhaped, obtuſe. Stem roughiſh.—A common and troubleſome weed throughout Europe, flowering in July and Auguſt. The long, perennial tap *root* runs deep into the ground, and is yellowiſh, not red, within. *Stems* numerous, two or three feet high, furrowed; rougheſt in the upper part. Radical *leaves* very large and ſpreading; wavy, more or leſs blunt, not unlike thoſe of horſe-radiſh, but hardly ſo big; their *footſtalks* long and channelled. Stem *leaves* much narrower and more pointed, on ſhorter ſtalks, ſomewhat criſped and crenate. *Cluſters* generally bearing a few leaves, though often deſtitute of any. *Seed* large. *Valves* rather large, oblong-heart-ſhaped, entire at the extremity, but having three ſharp prominent teeth near the baſe. The outermoſt bears an oblong *grain*, ſmaller in proportion to the valve than in moſt of the foregoing, and the grains of the two other valves are hardly diſcernible.

Mr. Curtis recommends frequent mowing as a ſure means of deſtroying this dock. Mr. Purſh ſpeaks of it as a common weed in old paſtures and gardens in North America, though probably introduced from Europe.

16. R. *pulcher*. Fiddle Dock. Linn. Sp. Pl. 477. Willd. n. 16. Ait. n. 13. Fl. Brit. n. 5. Engl. Bot. t. 1576. (Lapathum pulchrum bononienſe ſinuatum; Bauh. Hiſt. v. 2. 988. Fiddle Dock; Petiv. H. Brit. t. 2. f. 10.)—Flowers united. Valves many-toothed; one of them bearing a larger grain than the reſt. Radical leaves fiddle-ſhaped. Stem ſmooth, ſtraggling.—Native of dry gravelly paſtures, and waſte ground, in the more temperate parts of Europe, from England to Greece; perennial, flowering in Auguſt. The radical *leaves*, ſo remarkably contracted in one part as to reſemble a fiddle; the widely ſpreading, almoſt horizontal, *ſtems* and *branches*; and the ſharp numerous teeth of the ſtrongly reticulated *valves*, clearly mark this ſpecies. The outer *valve* bears an oblong reddiſh grain, larger than what uſually occurs on the others. *Seed* very ſmooth and poliſhed, with thin acute angles. A ſmall leaf accompanies each *whorl*, though ſometimes ſcarcely longer than the *flower*. The *petals* are larger and more coloured in ſome Swiſs ſpecimens, than we have noticed them in the flowering ſtate of our Engliſh plants. Willdenow repeats under this ſpecies the ſynonym of Tilli, which properly belongs to *R. divaricatus*; apparently on the authority of Willich. See our remarks under n. 13.

17. R. *aquaticus*. Great Water Dock. Linn. Sp. Pl. 479. Willd. n. 18. Ait. n. 9. Purſh n. 8. Fl. Brit. n. 8. Engl. Bot. t. 2104. Ehrh. Pl. Off. n. 114. (R. Hydrolapathum; Hudſ. 154. Willd. n. 6. Woodv. Med. Bot. t. 178. R. acutus; Ehrh. Pl. Off. n. 104. Lapathum, n. 1588; Hall. Hiſt. v. 2. 271. Hydrolapathum magnum; Lob. Ic. 285. Ger. Em. 389.)—Flowers united. Valves ovate, almoſt entire, bearing ſmall or obſolete grains. Leaves lanceolate, acute; the lower ones heart-ſhaped at the baſe.—Native of ditches, pools, and the borders of rivers, throughout Europe; as well as in North America, from Pennſylvania to Virginia, but, according to Mr. Purſh, not common. With us it is very plentiful and conſpicuous, being by far the largeſt of our docks, and flowering in July and Auguſt.—The *root* is large, knobby, and perennial. *Stems* erect, four or five feet high, angular, and ſtrongly furrowed. *Leaves* a foot long, (more or leſs,) coriaceous, ſmooth, with a glaucous hue, entire, ſometimes minutely curled at the edge. *Cluſters* branched, denſe, moſtly leafleſs. *Flowers* numerous, on ſlender drooping ſtalks. *Valves* ovate, veiny, entire, or very ſparingly notched, each bearing an ovate grain, various in ſize, or ſometimes having only a tumid rib. The former is uſually the caſe with our Britiſh plant, and is conſpicuous in Ehrhart's Pl. Off. n. 114, which he gives as *R. aquaticus* of Linnæus from Upſal; while his n. 104, without grains, is marked, certainly erroneouſly, *acutus* of Linnæus, and is likewiſe from Upſal. The authentic Swediſh ſpecimen, in the Linnæan herbarium, preciſely reſembles the firſt of theſe in habit, while its valves, having ſcarcely any indications of grains, agree with thoſe of the latter. We believe the preſence or abſence of grains, in this caſe, does not afford a ſpecific difference. Hence, however, it readily appears

 why

why authors have been led to describe the same plant twice, and to confound its synonyms.

Sect. 2. *Stamens and pistils in the same flowers. Valves naked, or without grains.*

18. R. *bucephalophorus*. Basil-leaved Dock. Linn. Sp. Pl. 479. Willd. n. 17. Ait. n. 14. Cavan. Ic. v. 1. 31. t. 41. f. 1. Sm. Fl. Græc. Sibth. t. 345, unpublished. (Acetosa ocimi folio neapolitana βουκεφαλοφορα; Column. Ecphr. part 1. 151. t. 150.)—Flowers united. Valves naked, veinless, with hooked teeth. Flower-stalks ternate, roughish; dilated and vaulted when in fruit.—Native of Italy, Barbary, and the Levant. Common in spring in the corn-fields of Greece and the neighbouring islands, according to Dr. Sibthorp, who judged it to be Λαπαθον το μικρον of Dioscorides. It is annual, and has been occasionally raised in our gardens for near 150 years past, for the sake of its curious and singular structure. The *root* is fibrous. *Herb* very variable in luxuriance; sometimes simple, two or three inches high; sometimes branched from the base into several ascending, leafy, simple *stems*, flowering almost all the way up. *Leaves* stalked, ovate, or spatulate, smooth, entire. *Stipulas* membranous, white, long, and taper-pointed. *Flowers* always three together, in a series of whorls, partly axillary, but chiefly leafless. *Flower-stalk* deflexed, red, roughish with minute granulations, as well as the tawny or reddish *calyx* and *petals*. The latter are three-lobed, and become ovate pointed *valves*, each beset at the margin, on each side, with about three awl-shaped, hooked teeth or spines. As the *fruit* advances, each *flower-stalk* becomes lengthened, and dilated towards the *calyx*, being convex above, and vaulted underneath, not properly, as Linnæus says, "plane," neither is it tumid or club-shaped. Columna, by a stretch of fancy, compares the valves in fruit to a bull's head, two segments of the reflexed *calyx* looking like horns.

19. R. *fimbriatus*. Fringed New Holland Dock. Brown n. 1.—"Flowers united. Valves naked, veiny, fringed with hooked teeth. Flower-stalks reflexed and thickened when in fruit."—Gathered by Mr. Brown, near Port Jackson, New South Wales. We have seen no specimen. This species seems very nearly akin to the last.

20. R. *vesicarius*. Bladder Dock, or Sorrel. Linn. Sp. Pl. 479. Willd. n. 20. Ait. n. 16. (Acetosa americana, foliis longissimis pediculis donatis; Bauh. Prodr. 54. Moris. sect. 5. t. 28. f. 7. A. vesicaria peregrina; Besl. Hort. Eyst. vern. ord. 6. t. 15. f. 3.)—Flowers united. Stalks mostly in pairs. All the valves very large, membranous, entire, folded back. Leaves undivided.—Native of Africa. A hardy annual in our gardens, where it appears to have been first cultivated by Tradescant, in 1656. It flowers in July and August. The *stem* is branched, from a span to 18 inches high, smooth. *Leaves* on long stalks, ovate and obtuse, but with two angles at the base, so as to approach a halberd-shape. The plant is chiefly remarkable for the beauty of its large shining membranous *valves*, reticulated with veins, and tinged with a light rose-colour. These invest the ripe *seed*, hanging on capillary drooping stalks in great abundance. The figure in the *Hortus Eystellensis* is much the best, were it not so difficult of access, on account of the unweildiness, and bad arrangement, of that pompous old book.

21. R. *roseus*. Rose-coloured Dock. Linn. Sp. Pl. 480. Willd. n. 21. Ait. n. 17. Sm. Fl. Græc. Sibth. t. 346, unpublished. (Acetosa ægyptia, roseo seminis involucro, folio lacero Lippi; Shaw Specim. n. 5. t. 1?)—Flowers united. Valves unequal, membranous, rounded, reticulated, toothed. Leaves undivided.—Native, as it is said, of Egypt. Dr. Sibthorp found it in the isle of Cyprus, and his fine figure is the only good one we have met with; for the miserable sketch of Shaw appears certainly to have been taken from the *tingitanus*, with whose *leaves* it accords, though not with those of *roseus*; yet from this plate it seems Linnæus borrowed a part of his character, "*foliis erosis*," which does not agree even with his own poor specimen. The true *roseus*, from a simple annual *root*, throws up several spreading, ascending, leafy *stems*, near a span high. *Leaves* on long stalks, undivided, entire, of an oblong, slightly hastate figure, but much narrower than in the last species. The whole *herb* is roughish, with a sort of hoary mealiness. *Flowers*, as well as their *stalks*, and the *valves* investing the *seed*, of an elegant rose-colour; the lobes of the *valves* semi-orbicular, membranous, strongly reticulated with red veins, and bordered with fine sharp teeth.

22. R. *tingitanus*. Tangier Dock. Linn. Sp. Pl. 479. Willd. n. 22. Ait. n. 18. (Acetosa dentata perpetua di Tanger; Zanon. Ist. 14. t. 5. (Lapathum maritimum fœtidum; Bauh. Prodr. 56.)—Flowers united. Valves heart-shaped, obtuse, membranous, entire. Leaves hastate, ovate, jagged.—Native of Barbary, Spain, and Cyprus. Hardy in our gardens, flowering from June to August.—*Root* perennial, creeping. *Stems* about a foot high, ascending, branched. *Leaves* on long stalks, roughish, consisting of a large, ovate, acute, central lobe, with two small transverse ones at the base; all crisped or jagged at the edges, sometimes pinnatifid. *Flowers* in long clusters, two or three together, with a membranous *bractea* under them. *Valves* not half the size of the two last, whitish and shining. Shaw's figure, cited under *roseus*, exactly represents this species, and we find Desfontaines has removed it hither.

23. R. *scutatus*. French, or Garden, Sorrel. Linn. Sp. Pl. 480. Willd. n. 23. Ait. n. 19. (Acetosa rotundifolia hortensis; Moris. sect. 5. t. 28. f. 9. Oxalis franca seu romana; Ger. Em. 397.)—Flowers united. Leaves hastate, somewhat heart-shaped. Stem round. Native of Switzerland, the south of France, and some parts of Germany, in stony places. Cultivated for the use of the table, in every kitchen-garden, since the days of Gerarde. It is a perennial herb, flowering in June and July. The *leaves* are very smooth and rather glaucous, quite entire, supported by long stalks. Their flavour is very gratefully acid, either recent or stewed. *Flowers* small, racemose, pendulous. *Valves* orbicular, entire.

R. glaucus, Jacq. Ic. Rar. t. 67, is a more glaucous and small-leaved variety, whose *stem* is said to be in some degree woody.

24. R. *nervosus*. Three-ribbed Dock. Vahl. Symb. v. 1. 27. Willd. n. 24. (R. persicarioides; Forsk. Ægypt. Arab. 76.)—Flowers united. Valves orbicular, entire, naked. Leaves oblong, three-ribbed. Gathered by Forskall, on the mountains of Hadi, in Arabia. The *stem* is rather shrubby, with round striated *branches*. *Leaves* stalked, oblong; the uppermost lanceolate; all of them acute, entire, fleshy, very smooth, glaucous, an inch or more in length, with three ribs, but no veins. *Stipulas* membranous, sheathing, abrupt. *Panicle* terminal. *Flower-stalks* capillary, thickened under the *flower*, longer than the *fruit*. *Calyx* reflexed. *Valves* orbicular, smooth, without grains. *Vahl.*

25. R. *digynus*. Mountain Sorrel. Linn. Sp. Pl. 480. Willd. n. 25. Ait. n. 20. Pursh n. 9. Fl. Brit. n. 9. Engl. Bot. t. 910. Fl. Dan. t. 14. (Welsh Sorrel; Petiv. H. Brit. t. 3. f. 4.)—Flowers united. Styles two. Valves ovate, entire, naked. Leaves broadly emarginate. —Native of Alpine rivulets, on the mountains of Lapland, Labradore,

Labradore, Siberia, Switzerland, Wales, Scotland, and the north of England, always in very elevated ſpots, at leaſt in our iſland, flowering in June. The *leaves* are nearly all radical, on long ſtalks, kidney-ſhaped, an inch wide, wavy, veiny, pale green, acid, each terminating in a broad ſhallow notch. *Stem* a ſpan high, panicled. *Flower-ſtalks* in ſmall groups or tufts, capillary. *Valves* ovate, emarginate, entire, reddiſh, with no traces of *grains*. The *flowers*, having but two *ſtyles*, afford a deciſive ſpecific character of themſelves, as well as an excellent name. The ſegments of the *calyx* are but two, as well as the *petals*, or *valves*. The *ſeed* is orbicular and flattiſh, having a broad border.

26. R. *lanceolatus*. Lanceolate Cape Dock. Thunb. Prodr. 67. Willd. n. 26.—"Leaves lanceolate, with a reflexed border. Stem angular."—Found by Thunberg at the Cape of Good Hope. We have never ſeen it.

27. R. *graminifolius*. Graſs-leaved Sorrel. — Leaves linear, entire, very narrow. Stipulas ſheathing, imbricated. Panicle angular.—Native of Siberia. Communicated by profeſſor Rudolph to A. B. Lambert, eſq. under the above name, which very aptly deſcribes the numerous, long, graſſy *leaves*. The *ſtem* ſeems ſhrubby. *Flowers* ſmall, in a forked racemoſe *panicle*. Our ſpecimen is not perfect enough to ſhew whether the *ſtamens* and *piſtils* are in the ſame *flower* or not, neither are the *valves* diſcernible. We therefore merely mention here, for further enquiry, this very curious and diſtinct ſpecies, of which we find no publiſhed account.

Sect. 3. *Perfect ſtamens and piſtils in ſeparate flowers.*

28. R. *Lunaria*. Tree Sorrel. Linn. Sp. Pl. 479. Willd. n. 19. Ait. n. 15. (R. polygamus; Cavan. Ic. v. 1. 14. t. 22. Acetoſa arboreſcens, ſubrotundo folio; Pluk. Almag. 8. Phyt. t. 252. f. 3.)—Flowers monoecious. Males with twelve ſtamens. Anthers oblong. Females with ſix abortive ones. Valves rounded, granular. Stem ſhrubby. Leaves ſlightly heart-ſhaped.—Native of the Canary iſlands, from whence it was brought into the Engliſh green-houſes, as ſoon as tender exotics became much cultivated. It flowers in June and July. The *ſtem* is ſhrubby, branched, ſpreading, often reddiſh. *Leaves* alternate, on longiſh ſtalks, fleſhy, entire, ſmooth, of a pale glaucous hue and acid taſte. *Stipulas* ſheathing, broad, membranous, whitiſh. *Flowers* in a large, terminal, branched, racemoſe *panicle*; their particular ſtructure Cavanilles firſt explained, and we have nearly verified his deſcription. He knew not that his was a Linnæan plant, nor did the editors of Hort. Kew. diſcover his ſynonym. Some *flowers* are entirely male, with a three-cleft *calyx*, three very minute unchangeable *petals*, and twelve *ſtamens*, whoſe *anthers* are divided half way down. Other *flowers*, in the ſame panicle, have a ſimilar *calyx* and *petals*, but the latter are ſubſequently enlarged into three orbicular, emarginate, veiny *valves*, each bearing a ſmall *grain*. Theſe flowers have moſtly the rudiments of ſix *ſtamens*, but entirely ineffectual, hardly viſible to the naked eye. We preſume the large capillary tufts, deſcribed by Cavanilles, are the real *ſtigmas*, the *ſtyles* being bent down to the bottom of the flower, as in many other ſpecies, with whoſe *ſtigmas* theſe plumoſe tufts exactly accord. But this we have not aſcertained, as yet, in the living plant. Conſidering the preſent ſpecies as in fact monoecious, not polygamous, we have removed it to this ſection.

29. R. *haſtulatus*. Little-halberd-leaved Sorrel.—Flowers ſeparated, dioecious? Anthers orbicular. Stem ſhrubby, angular. Leaves halberd-ſhaped, revolute. Gathered by Mr. Menzies in Chili. The *ſtem* is woody, with numerous, long, lax, zigzag, angular *branches*. *Leaves* half an inch long, or rather more, entire, minutely roughiſh, obtuſe, tapering at the baſe into a *footſtalk*, about half their own length. *Stipulas* ſhort, membranous, obtuſe. *Flowers* in ſolitary, terminal *cluſters*, with a concave, thick, permanent *bractea*, and ſeveral minute membranous ones, under each little aſſemblage of three partial ſtalks. Segments of the *calyx*, as well as the *petals*, concave, reflexed. *Stamens* ſix, ſhorter than the calyx. *Anthers* of two round lobes, opening externally. We can diſcover no other than male flowers.

30. R. *auratus*. Golden-flowered Dock. (Favrodine dorée; Reynier Mém. de la Société de Lauſanne, v. 2.)—Flowers ſeparated, dioecious? Stamens nine or twelve. Anthers oblong. Petals none in the male. Stem herbaceous, angular. Leaves ovato-lanceolate, ſomewhat crenate, with hairy ribs.—Native of Switzerland. *Reynier, Davall.* Firſt found by M. Favrod, in a meadow not far from the village of Caſtrod. M. Reynier, who conceived this plant to form a diſtinct genus from *Rumex*, on account of the want of *petals*, and the ſuper-abundance of *ſtamens*, named it as above. His own ſpecimen, now in our hands, and thoſe of Mr. Davall, are entirely male. We have never ſeen either female flowers, or *fruit*; nor can we find any indication of this *Rumex* in Haller, or elſewhere. The *habit* of the herb bears a general reſemblance to our common Docks, *acutus*, *criſpus*, &c. The *ſtem* is angular, and ſtrongly furrowed, panicled above, with long leafleſs *cluſters* of innumerable ſmall male *flowers*, of a green and tawny hue, on drooping capillary *ſtalks*. The *leaves* are lanceolate, ovate, or ſomewhat heart-ſhaped; their ribs, veins, and long *footſtalks*, hairy. This laſt character induces a ſuſpicion that the plant before us may poſſibly be the male of *R. divaricatus*, n. 13, a ſpecies concerning which very little is known, and which Haller, on the authority of Willich, reports to have, on cultivation, become the ſame as *pulcher*. Our *auratus* indeed is diſtinct from *pulcher*, but may be a variety of *divaricatus*, become occaſionally dioecious, if it be not always ſo. The three ſegments of the *calyx* are ſpreading, linear, keeled and channelled, rather ſhorter than the *anthers*, which are cloven at the top.

31. R. *alpinus*. Alpine Dock, or Monk's Rhubarb. Linn. Sp. Pl. 480. Willd. n. 27. Ait. n. 21. (Lapathum folio rotundo, alpinum; Bauh. Hiſt. v. 2. 987. Hippolapathum rotundifolium; Ger. Em. 389.)—Flowers monoecious, or polygamous. Valves entire, naked. Leaves heart-ſhaped, obtuſe, rugoſe.—Native of the alps of Switzerland, France, and Savoy, as well as of Greece and the Bithynian Olympus, flowering in July. Cultivated ever ſince Gerarde's time in our gardens, where it thrives, even in the ſmoke of London, and makes a very handſome appearance with its ample rich-green foliage. The *root* is thick, certainly perennial, though Linnæus and Willdenow mark it as biennial, and is ſaid to poſſeſs the medical virtues of Rhubarb; in a weaker degree. *Footſtalks* very long. *Stipulas* membranous, ſheathing. *Stem* two feet high, erect, leafy, round, furrowed, ſmooth. *Cluſters* forming an oblong, denſe, leafy *panicle*, of innumerable green *flowers*, ſome of which have *ſtamens* with a, uſually imperfect, *germen*; others are entirely female. *Valves* heart-ſhaped, ſtrongly reticulated with veins; their midrib a little tumid, but not granular. *Seed* ſmall.

32. R. *ſpinoſus*. Prickly-ſeeded Dock. Linn. Sp. Pl. 481. Willd. n. 28. Ait. n. 22. Sm. Fl. Græc. Sibth. t. 347, unpubliſhed. (Beta cretica, ſemine aculeato; Bauh. Prodr. 57. B. cretica, ſemine ſpinoſo; Bauh. Hiſt. v. 2. 963.)—Flowers monoecious. Calyx of the females of one leaf

leaf, pitcher-ſhaped, with three ſpreading ſpinous points. Stem decumbent. Leaves ſlightly haſtate. — Native of Gibraltar, Zante, Crete, and the neighbourhood of Athens; alſo of the Cape of Good Hope; cultivated here in 1656, by Tradeſcant. This is a proſtrate, annual, widely ſpreading, and rank-growing herb, with the aſpect and green hue of ſome kind of Beet. The *branches* are zigzag, round, ſtriated. *Leaves* ſtalked, ſpreading, about two inches long and one broad, entire and ſmooth. Tufts of female *flowers* ſeſſile, axillary; thoſe of the males much fewer, leafleſs, about the ends of the branches, ſtalked and drooping. *Calyx* and *petals* of the latter alike, concave, obtuſe, equal. *Stamens* ſix. *Calyx* of the former triangular, with ſix ribs, and curious depreſſions between; the three ſegments ſpreading, heart-ſhaped, folded, ſpinous-pointed, finally very hard and rigid. *Petals* ſmall, oblong, triangular, erect, permanent, but ſcarcely enlarged, the body of the *calyx* encloſing the *ſeed*. This ſingular ſpecies, in its *fruit*, as well as habit, approaches the nature of *Beta* and *Spinacia*.

33. R. *giganteus*. Tall Dock. Ait. n. 23.—"Flowers monoecious. Valves naked. Leaves oblong-ovate."—Native of the Sandwich iſlands, from whence it was brought by Mr. Menzies, in 1796. It is a perennial green-houſe plant, flowering from June to Auguſt. *Aiton*.

34. R. *tuberoſus*. Tuberous-rooted Dock. Linn. Sp. Pl. 481. Willd. n. 29. Ait. n. 24. Sm. Fl. Græc. Sibth. t. 348, unpubliſhed. (Oxalis tuberoſa radice; Bauh. Hiſt. v. 2. 991. Ger. Em. 396.)—Flowers dioecious. Valves naked. Leaves oblong-arrow-ſhaped; their lobes ſpreading. Root with oval knobs.—Native of Italy, Aſia minor, and the iſlands of Cyprus and Lemnos. Miller is ſaid to have cultivated this ſpecies, but it ſeems now loſt. The *root* is perennial, with oval or oblong knobs, like thoſe of *Spiræa Filipendula*. *Stems* a foot high. *Leaves* entire, with two divaricated lobes or points at the baſe, ſmooth. *Cluſters* panicled, of an elegant roſe-colour, eſpecially when ripening *ſeed*. *Anthers* orange. *Stigmas* pink. *Valves* orbicular, obtuſe; heart-ſhaped at the baſe, without *grains*.

35. R. *Acetoſa*. Common Sorrel. Linn. Sp. Pl. 481. Willd. n. 31, excluding the laſt variety. Ait. n. 25. Fl. Brit. n. 10. Engl. Bot. t. 127. Woodv. Med. Bot. t. 69. (Oxalis, ſive Acetoſa; Ger. Em. 396.)—Flowers dioecious. Valves granular. Leaves oblong-awl-ſhaped; their lobes converging, often notched.—Native of graſſy paſtures throughout Europe, from the alps of Lapland to Greece, flowering early in June. The *root* is perennial, tapering, running deep into the ground, tufted at the top, and throwing up ſeveral *ſtems*, one to two feet high, round, ſimple, leafy, ſtriated. *Leaves* deep green, paler beneath; the lower and radical ones ſtalked; the upper ſeſſile, ſomewhat revolute, claſping the ſtem; the points at the baſe of all rather directed inward than otherwiſe, and not in any degree divaricated; their edges nearly entire, or ſlightly criſped. *Stipulas* long, tubular, jagged at the ſummit. *Cluſters* compound or aggregate, whorled, reddiſh. *Flowers* drooping, completely dioecious. *Petals* in both oblong-ovate, larger than the *calyx*, which latter is reflexed when in fruit. *Valves* ovate, obtuſe, entire, each bearing an ovate *grain*. Linnæus in Fl. Lapp. ed. 2. 99, and Dillenius in Raii Syn. ed. 3. 143, mention a large alpine variety, for which the former cites Muntingius, (*de vera herba Britannica*,) Acetoſa Hiſpanica maxima, 225. t. 213. This author's plant ſeems rather the *arifolius* hereafter deſcribed, which we can ſcarcely believe to have been found either in Lapland or Merionethſhire. *R. Acetoſa* taſtes gratefully acid, with a pleaſant and wholeſome aſtringency. It is, according to Linnæus, much uſed by the Laplanders for preparing a kind of whey from rein-deer's milk, which will keep a long time, and is in great requeſt among people of all ages.

36. R. *Acetoſella*. Sheep's Sorrel. Linn. Sp. Pl. 481. Willd. n. 32. Ait. n. 26. Purſh n. 10. Fl. Brit. n. 11. Engl. Bot. t. 1674. Curt. Lond. faſc. 5. t. 29. (Oxalis tenuifolia; Ger. Em. 397. O. ſive Acetoſa, minor; Matth. Valgr. v. 1. 406.) — Flowers dioecious. Valves naked. Leaves lanceolate-haſtate.—Native of barren ſandy or gravelly paſtures and fields, throughout Europe, flowering in June and July. This is but half the ſize of the laſt, more ſlender in every part, and more of a red or tawny colour. The *root* is perennial and creeping. *Leaves* numerous; the radical ones haſtate, their tranſverſe lobes ſpreading at right angles with the central lobe, narrow and entire; ſtem-leaves often undivided. *Cluſters* panicled, numerous. *Valves* ovate, nearly entire, all deſtitute of *grains*. The herb is acid.

37. R. *multifidus*. Many-cleft Sorrel. Linn. Sp. Pl. 482. Willd. n. 30. Sm. Fl. Græc. Sibth. t. 349, unpubliſhed. (R. Acetoſella β; Linn. Sp. Pl. 482. Acetoſa minor erecta, lobis multifidis; Bocc. Muſ. v. 2. 164. t. 126. Tourn. Inſt. 503.)—Flowers dioecious. Leaves lanceolate-haſtate; their ſide lobes palmate.—Native of Italy, Sicily, and the Levant. Dr. Sibthorp gathered it on the hills of Greece, as well as near Conſtantinople. Linnæus ſeems never to have ſeen it, and has fallen into a ſtrange error, in quoting Boccone's ſynonym for two different things, within four or five lines. This Willdenow did not preſume to correct, but aggravated the error by one figure. He reminds us of the very ſubmiſſive young man, who ſaw Rouſſeau eat the berries of *Hippophäe*, without daring to tell him they were reputed poiſonous. The preſent ſpecies differs from the laſt merely in the diviſions of its ſide lobes. We have never ſeen its *valves*, but the *flowers* are exactly like *Acetoſella*, of which it may poſſibly be a variety.

38. R. *bidens*. Toothed-valved Sorrel. Brown n. 2.—"Flowers ſeparated. Valves naked, haſtate. Leaves linear-lanceolate, tapering at the baſe."—Gathered by Mr. Brown, in Van Diemen's iſland. Whether this be dioecious or monoecious is not expreſſed.

39. R. *aculeatus*. Prickly-valved Sorrel. Linn. Sp. Pl. 482. Willd. n. 33. Sm. Prodr. Fl. Græc. Sibth. v. 1. 249. (Acetoſa cretica, ſemine aculeato; Bauh. Prodr. 55. Oxalis minor aculeata Candiæ; Bauh. Hiſt. v. 2. 991.)—Flowers monoecious. Leaves lanceolate, ſtalked. Fruit reflexed. Valves fringed with hooked prickles.—Native of Spain, Crete, Greece, and the neighbourhood of Conſtantinople. A very curious little perennial ſpecies, ſomewhat like *Acetoſella* in herbage, except that the *leaves* are more glaucous, and ſimply lanceolate, not haſtate. The *cluſters*, or *ſpikes*, are ſolitary at the top of each branch, and look at firſt ſight like thoſe of ſome *Reſedæ*. *Flowers* ſmall, monoecious in both the Linnæan ſpecimens, though on one there are more males, on the other more females. The latter are ſtrongly curved downwards. *Valves* ovate, curiouſly fringed with rigid, hooked, or forked, prickles; ſome are furniſhed with a ſmall *grain*.

40. R. *luxurians*. Spreading Cape Sorrel. Linn. Mant. 64. Suppl. 212. Willd. n. 34. (R. ſagittatus; Thunb. Prodr. 67. Acetoſa montana pumila, ſegopiri folio; Bocc. Muſ. v. 1. 165. t. 126?)—Flowers monoecious. Leaves haſtate, taper-pointed; ſomewhat heart-ſhaped. Stem much branched, angular, diffuſe. Valves orbicular, naked. —Native of the Cape of Good Hope, according to a ſpecimen

men from Dr. Bladh, in the Linnæan herbarium. The ſynonym of Boccone, which ſurely can have nothing to do with this plant, cauſed it to be thought of Italian origin. Linnæus cultivated it at Upſal, and we have a ſpecimen from the Paris garden, but our Engliſh cultivators ſeem to know nothing of this *Rumex.* The *root* is tuberous like *Spiræa Filipendula*, or *R. tuberoſus*, n. 34, and, of courſe, perennial. *Stems* many, twelve or eighteen inches long, proſtrate, branched, zigzag, leafy, marked with five angles, and ſtriated. *Leaves* on long ſtalks, very acid, purpliſh at the margin, waved, but ſcarcely crenate; their form triangular, with taper ſpreading points; their length an inch and a half or two inches; and they are cut away at the baſe, up to the ſide ribs. *Cluſters* terminal, numerous, compoſing a large ſpreading *panicle*, with fine, capillary, ſingle-jointed *partial ſtalks*. *Flowers* certainly monoecious in the above-mentioned ſpecimen, the only one we have ſeen; the males towards the extremity of the cluſters. *Calyx* in both ſexes oblong, incurved, concave, obtuſe. *Petals* larger, orbicular, reddiſh. *Stamens* ſix, with oblong cloven *anthers*. *Valves* twice as large as the permanent inflexed calyx, orbicular, finely reticulated, and, as far as we can diſcover, deſtitute of *grains*. It might puzzle any reader to determine what the younger Linnæus meant, in the *Supplementum*, by the inner and outer *valves*. The latter are the *calyx*, but there is no authority, nor analogy, to juſtify his phraſeology, nor is the *calyx* awl-ſhaped. We are enabled to ſolve Willdenow's difficulty concerning *R. ſpinoſus* of Thunberg, as we have the real *ſpinoſus* from the Cape, and the preſent plant anſwers ſo exactly to his *ſagittatus*, a ſpecies apparently overlooked by Willdenow.

41. R. *arifolius.* Great Arum-leaved Sorrel. Linn. Suppl. 212. Willd. n. 35. Ait. n. 27. Allion. Pedem. v. 2. 204? (R. abyſſinicus; Jacq. Hort. Vind. v. 3. 48. t. 98. Acetoſa montana lato ari rotundo folio; Bocc. Muſ. v. 1. 165. t. 125? ſee alſo t. 126.)—Flowers dioecious. Leaves all ſtalked, haſtate, with ſimple divaricated lobes. Valves heart-ſhaped, rounded, naked, entire.—This ſpecies is reported to have been brought from Abyſſinia by Mr. Bruce, as every thing communicated by that celebrated traveller was, at one time, ſuppoſed to have been; juſt as the gardeners have ſince attributed every new plant, even the Great Barbary Oat, to Botany Bay. We can ſcarcely doubt that Allioni's is the ſame ſpecies, for few plants vary more ſurprizingly in luxuriance than we have ſeen this; and if ſo, *R. arifolius* is a native of the Alps. We gathered it by the great high road over Mount Cenis, in 1787. To prevent miſtakes, we ſhall deſcribe our ſpecimens, and leave our readers to obſerve how nearly they agree with Jacquin's luxuriant garden ones, which he ſays were from ſix to nine feet high. *Root* perennial. *Stems* from three to five feet high, erect, ſimple, leafy, ſomewhat angular, ſtrongly furrowed, ſmooth, light green, often reddiſh. *Leaves* of a light bright green, not of the deep hue of *R. Acetoſa*, from two to four inches long, ſometimes more, oblong inclining to ovate, with two ſpreading, acute, entire lobes at the baſe, very variable in ſize. *Footſtalks* very long in the lower and radical leaves, and ſcarcely entirely wanting in the uppermoſt. *Cluſters* numerous, forming a large, terminal, compound, leafleſs *panicle* of innumerable, very ſmall, green *flowers*, male on one plant, female on another. *Calyx* of the latter reflexed, permanent. *Valves* thrice as large, pale brown, tinged with pink, membranous, without *grains*, finely reticulated, nearly orbicular, wavy, but not crenate. *Seed* pale brown, above half the length of the valves, its angles ſharp and greatly compreſſed. It muſt be obſerved that though Jacquin's figure, which is far from exquiſitely finiſhed, ſeems to indicate *grains* on the *valves*, his deſcription ſays there are none. We are not very doubtful of Boccone's ſynonym, as his figures are generally diminiſhed, and our plant is ſo variable in ſize.

42. R. *bipinnatus.* Cut-leaved Sorrel. Linn. Suppl. 211. Willd. n. 36.—Flowers dioecious. Leaves doubly pinnatifid.—Native of Morocco, in ſandy ground, according to a ſpecimen in the Linnæan herbarium, the only one we have ſeen, which is juſt about flowering, and ſeems entirely male. *Stem* aſcending, about a ſpan long, ſimple, leafy, angular, ſtriated, ſmooth. *Leaves* an inch or more in length, apparently very fleſhy, heart-ſhaped, deeply pinnatifid almoſt to the mid-rib; their ſegments deeply, irregularly and obtuſely ſubdivided, ſo that the whole leaf bears ſome reſemblance to various ſpecies of Pelargonium; ſee that article. *Footſtalks* about equal to the leaves, or longer. *Stipulas* large, membranous, pale, ovate, acute, ſheathing at the baſe. *Cluſters* compoſing a terminal panicle, with large ſhining *bracteas*, reſembling the *ſtipulas*. *Calyx* of three roundiſh, concave, membranous-edged leaves. We can ſcarcely diſcern even the rudiments of *petals*. *Stamens* ſix, with oblong, reddiſh, cloven *anthers*.

43. R. *hoſtilis.* Armed, or Prickly Dock. Loureir. Cochinch. 217.—Flowers dioecious. Leaves lanceolate, entire. Stem prickly. Valves naked.—Native of Cochinchina, where it is called *Cây dieò gai.* The *ſtem* is three feet high, erect, round, prickly. *Leaves* flat, ſpreading. *Flowers* ſpiked. *Valves* all without grains, entire, ſmooth, unarmed. *Seed* triangular. *Petals* three, greeniſh. *Loureiro.*

The author laſt named has a *R. criſpus*, found near rivers in Cochinchina, which he mentions as eatable. This is very unlikely to be our Linnæan *criſpus*, eſpecially as he ſays each *valve* bears three briſtles, nor was he at all acquainted with European plants, except from deſcription. Still we dare not, without ſpecimens, adopt the ſpecies in queſtion as a new one.

Rumex, in *Gardening*, contains plants of the herbaceous, perennial, and woody evergreen kinds, of which the ſpecies cultivated are, the common ſorrel (R. acetoſa); the French ſorrel (R. ſcutatus); the patience dock, or rhubarb (R. patientia); the bloody-veined dock, or bloodwort (R. ſanguineus); and the tree ſorrel (R. lunaria).

In the firſt ſpecies the whole herb is acid, with a degree of aſtringency not unpleaſant or unwholeſome. It is often cultivated as a culinary herb. And there is a variety of it with broad leaves, termed great mountain ſorrel.

The ſecond ſort, which is called round-leaved ſorrel, is a more grateful acid than the firſt kind, and of courſe preferred for kitchen uſe, in ſoups, &c.

Method of Culture.—The firſt and ſecond ſorts and varieties of theſe plants may be increaſed by ſeed and parting the roots, but more particularly the firſt, as the latter may be very readily increaſed by the roots. The ſeeds ſhould be ſown in a bed or border in the early ſpring, as March, raking them in evenly. When the plants come up, they ſhould be regularly thinned, and when of ſome growth, in the ſummer, be planted out in rows on a bed or border, about eight or nine inches apart in the common ſort, and, in the other a foot or more, watering them well; when they will be proper to cut the latter end of the ſame ſummer and in the autumn, continuing for ſeveral years; but as the ſeedling plants in the firſt kind moſtly produce larger leaves than the older plants, freſh ſupplies ſhould be raiſed annually, or every other year. And the parted roots may be planted out in the ſame ſeaſon, or in autumn, in rows a foot apart, giving them a good watering when they grow readily and

and furniſh leaves in the latter end of ſummer and in the autumn. The ſecond ſort is readily raiſed in this way. They afterwards only require to be kept clean, and to have the ſeed-ſtems cut down in the ſummer, as well as the rank leaves in the autumn, that more full ſupplies of freſh leaves may be afforded.

And the third and fourth ſorts may be raiſed alſo from ſeeds in the ſame way, and the former from offsets of the root planted out in the autumnal ſeaſon; when they grow very readily.

The laſt ſort is eaſily increaſed by cuttings of the young ſhoots in the ſpring and ſummer months, being planted in pots at the former ſeaſon, plunging them in a hot-bed; but in the latter they ſucceed without artificial heat, either in pots or the natural ground, being occaſionally ſhaded and watered; when they become well rooted by the autumn. The third and fourth ſorts afford variety in the clumps and borders, and the laſt among the green-houſe collections of plants.

Rumex, in the *Materia Medica*. The root of the R. aquaticus, or water-dock, has ſcarcely any ſmell; it has a ſtrong auſtere taſte, ſtrikes a black colour in a ſolution of ferrum vitriolatum, or ferri ſulphas, and yields its active matter both to water and to rectified ſpirit. All the lapatha were formerly officinal herbs. Their name is derived from λαπαζω, *evacuo*, and they are alluded to by Horace in the following lines:

"—— Si dura moralitur alvus,
Mitulus et viles pellent obſtacula conchæ
Et lapathi brevis herba." Sat. 4. l. 2. v. 27.

The water-dock has been eſteemed to be the moſt efficacious. The leaves, which manifeſt conſiderable acidity, are ſaid to poſſeſs a laxative quality, and have therefore been uſed to relieve coſtiveneſs; the roots are ſtrongly aſtringent, and have been much employed, both externally and internally, for the cure of ſcurvy, eſpecially when the gums are ſpongy, and frequent hemorrhages ſupervene. It is alſo recommended in various other cutaneous defœdations, and in viſceral obſtructions: and in order to give it additional importance, Muntingius has laboured to prove that this hydrolapathum is the "Herba Britannica" of the ancients; but many medical men ſtill think that this root does not peculiarly differ from other aſtringents, and are ſo ſceptical, as not to place any faith in the great virtues aſcribed to it by Muntingius and ſir John Hill; ſo that it is now ſcarcely ever employed. The powdered root is ſaid by Murray to be an excellent dentifrice. The leaves of the R. acetoſa, or common ſorrel, have an agreeable acid taſte, like that of oxalis acetoſella, or wood-ſorrel, which this plant reſembles in its medical properties; and as it is eaſily procured in great abundance, may be ſubſtituted for it. (See Oxalis.) Sorrel, taken in conſiderable quantity, or uſed variouſly prepared as food, will undoubtedly be found beneficial, where a refrigerant and antiſcorbutic regimen is required; and Linnæus informs us, that the Laplanders experience "ſerum acetoſatum" to be in this reſpect an uſeful and pleaſant diet. The acidulous taſte of ſorrel-leaves is ſaid to depend on the preſence of ſuperoxalate of potaſs, which they contain. The leaves are diuretic as well as refrigerant. Their expreſſed juice diluted with water, or a decoction of them in whey, affords an uſeful drink in caſes of inflammatory fever; and eating them in large quantities daily as a ſalad, may prove ſerviceable in ſome cutaneous affections. In France the plant is cultivated for the uſe of the table. Woodville. Thomſon.

RUMFORD, in *Geography*. See Romford.

Rumford, a town of America, in Cumberland county, Maine, on the N. bank of Androſcoggin river, about 80 miles N.W. of Portland. The townſhip is about eight miles ſquare, ſeven of which lie N. of Androſcoggin river, which meanders through it about twelve miles; about a mile from its E. line there is a large fall. Ellis's river runs through it on the weſt ſide.

Rumford. See Concord.

RUMI, in the *Materia Medica*, a name given by Avicenna and Serapio to maſtic of the finer kind. They diſtinguiſh this drug into two ſorts; the one called by this name *rumi*, which was white and pure; the other called *cupti*, which was foul and blackiſh; the former came from the iſland of Chios, the latter from ſome parts of Ægypt.

Rumi *Ramba*, in *Geography*, a plain near Quito, in Peru, full of large fragments of rocks, thrown thither from a volcano, formerly in the famous mountain of Pichincha.

RUMIGNY, a town of France, in the department of the Ardennes, and chief place of a canton, in the diſtrict of Rocroy; 12 miles S.W. of Rocroy. The place contains 779, and the canton 8944 inhabitants, on a territory of 230 kiliometres, in 27 communes.

RUMILLY, a town of France, in the department of Mont-Blanc, and chief place of a canton, in the diſtrict of Annecy; 7 miles W.S.W. of Annecy. The place contains 2757, and the canton 13,585 inhabitants, on a territory of 197½ kiliometres, in 26 communes.

RUMINANT, Ruminans, in *Natural Hiſtory*, an animal which chews over again what it has eat before: this is popularly called "chewing the cud."

Joah. Con. Peyer has an expreſs treatiſe "De Ruminantibus et Ruminatione," where he ſhews, that there are ſome animals which do really ruminate, ſuch as oxen, ſheep, deers, goats, camels, hares, and ſquirrels; whereas others only appear to ruminate, which he calls *ruminantia ſpuria;* of which number are moles, crickets, bees, beetles, crabs, mullets, and ſeveral other fiſhes.

This latter claſs, he adds, have the ſtomachs compoſed of muſcular fibres; by means of which the food is ground up and down, much as in real ruminants.

Ruminants, Mr. Ray obſerves, are all quadrupedal, hairy, and viviparous; ſome with hollow and perpetual horns, others with deciduous ones. See Quadrupeds.

The horned ruminants have all four ſtomachs appropriated to the office; *viz.* 1. The κοιλια μεγαλη of Ariſtotle, the *rumen*, *venter magnus*, or what we call the *paunch*, or *inward*, which receives the meat ſlightly chewed, retains it awhile, and then delivers it back again into the mouth, which is what we call the *cud*, to be re-chewed. 2. The κεκρυφαλος, or *reticulum*, which we call the *honeycomb*, from its internal coat being divided into cells like honeycombs. 3. The εχινος, which Mr. Ray thinks has been wrongly tranſlated *omaſus*, and which he chooſes to call the *echinus:* this being difficult to clear, our people throw it away, and call it the *manifold.* 4. The ενυστρον of Ariſtotle, by Gaza called the *abomaſus;* and, among us, the *maw.*

Again, all the horned ruminant animals want the dentes primores, or broad teeth in the upper jaw; and they afford that hard kind of fat called *ſuet*, *ſebum*, στεαρ, which is firmer and leſs liquefiable in them than the adeps of other animals. See *Anatomy of* Mammalia.

It is remarked by Mr. Feron, that the retrograde motion of the œſophagus in ruminating cattle, ſuch as cows, ſheep, goats, &c. renders them capable of bringing up the ſoftened graſs from their firſt ſtomach. But when theſe animals fill themſelves too full of clover, or of wet graſs, or of ſome other young vegetables, which are liable to run into fermention, tation, the ſtomach becomes diſtended with air, and death frequently enſues. See Cud and Hoven.

Great care is therefore to be taken with all theſe ſorts of animals when they are firſt turned into rich full graſſed paſtures, to ſee that they do not ſtay in them too long at a time, or fill themſelves too full of ſuch rich food. They are beſt and ſafeſt when only put into them for a ſhort period at any one time, on being firſt turned upon them. And the propereſt ſeaſon for them, as well as the graſs, is probably to conſume it when it is in the dry ſtate, as when eaten while very wet, there may be injurious conſequences in both ways.

RUMINATIO, in *Medicine*, which literally ſignifies *chewing the cud*, is applied by analogy to expreſs one of the ſymptoms of indigeſtion, nearly allied to *ructation*, when the ſtomach, by repeated ſpaſmodic efforts, throws up into the mouth, not only flatus and ſome of its ſecretions, but portions of the undigeſted food. Dr. Cullen defines *dyſpepſia*, or indigeſtion, by enumerating this among other ſymptoms by which it is, in different inſtances, characterized. "Anorexia, nauſea, vomitus, inflatio, ructus, *ruminatio*, &c." See his Synopſ. Noſolog. Method, Gen. 45. See Ructation, Indigestion, &c.

RUMINATION, in *Comparative Phyſiology*, a technical term equivalent to the common phraſe of "chewing the cud." It denotes the aſcent of the food from the paunch, or firſt ſtomach, into the mouth, and the ſecond maſtication which it there undergoes; a proceſs confined to thoſe mammalia which have complicated ſtomachs. When this ſecond maſtication has been accompliſhed, the food deſcends, not into the paunch, which receives it when it is firſt ſwallowed, but into the ſecond ſtomach; and thence ſucceſſively into the third and fourth. The mechaniſm, by which the animal has the power of conveying its food either into the paunch or the ſecond ſtomach at will, as well as the ſtructure of the ſtomach of ruminating animals altogether, is deſcribed in the article Mammalia. It is a ſingular example of voluntary power over the motions of an organ, which in other reſpects and in other animals are completely involuntary. "The influence of the will," ſays Blumenbach, "in the whole affair of rumination, is inconteſtible. It is not confined to any particular time, ſince the animal can delay it according to circumſtances, when the paunch is quite full. It has been expreſsly ſtated of ſome men, who have had the power of ruminating (inſtances of which are not very rare), that it was quite voluntary with them. I have known two men who have ruminated their vegetable food: both aſſured me that they had a real enjoyment in doing this, which has alſo been obſerved of others: and one of them had the power of doing it or leaving it alone, according to circumſtances." Comparative Anatomy, p. 138, note.

The final purpoſe of rumination, ſays the ſame author, as applicable to all the animals in which it takes place, and the chief utility of this wonderfully complicated function in the animal economy, are ſtill completely unknown: what has been already ſuggeſted on theſe points is quite unſatisfactory. Fabricius ab Aquapendente has ſufficiently refuted the old dream of Ariſtotle and Galen, that rumination ſupplied the place of inciſor teeth, the materials of which are applied in theſe animals to the formation of horns. Perrault and others ſuppoſed that it contributed to their ſecurity; as they eat much, and are timid, they ſuppoſed it removed the neceſſity of their remaining long employed in chewing in an open paſture. But the Indian buffalo ruminates, although it does not fly even from a lion, but rather attacks, and often vanquiſhes that animal. And the wild goat dwells in alpine countries, which are inacceſſible to beaſts of prey. Comparat. Anat. loc. cit.

RUMMAGE, probably derived from the Saxon *raum*, *room*, or *ſpace*, in the *Sea Language*, ſignifies to clear a ſhip's hold, or to remove goods or luggage from one place to another.

RUMMEL, in *Geography*, a river of Algiers, which paſſes by Conſtantina, and afterwards joins the Wed el Kibbeer, 18 miles N.W. of Conſtantina.

RUMMELSBURG, a town of Farther Pomerania, ſituated on the Wipper; 25 miles S. of Rugenwalde. N. lat. 53° 55′. E. long. 65° 53′.

RUMNEY. See Romney.

Rumney, or *Romney Marſh*, a tract of land in the county of Kent, (ſee Romney,) governed by certain ancient and equitable laws of ſewers, compoſed by Henry de Bathe, a venerable judge in the reign of king Henry III. who granted a charter to this diſtrict, impowering twenty-four men, thereunto choſen, to make diſtreſſes equally upon all thoſe which have lands and tenements in the ſaid marſh, to repair the walls and water-gates of the ſame, againſt the dangers of the ſea. The commiſſioners of ſewers, in other parts of England, may act according to the laws and cuſtoms of Rumney Marſh, or otherwiſe, at their own diſcretion; ſubject to the diſcretionary reviſion of the court of king's bench.

Rumney, or *Romney*, a townſhip of New Hampſhire, America, in Grafton county, on a north branch of Baker's river, about 7 or 8 miles N.W. of Plymouth, on the W. ſide of the Pemigewaſſet, incorporated in 1767, and containing 765 inhabitants.

RUMOUR, in *Law*. Spreading falſe rumours is criminal, and puniſhable at common law.

RUMP *of a Bird*. See Uropigium, and *Anatomy of* Birds.

RUMPHIA, in *Botany*, was inſcribed by Linnæus to the memory of George Everard Rumph, M.D. counſellor to the Dutch Eaſt India Company, whoſe remembrance muſt ever be dear to all ſtudents of tropical botany, for the ſake of his *Herbarium Amboinenſe*. This work, of ſeven volumes folio, was the fruit of his long reſidence, and great authority, in Amboyna, nor does it, as a ſtore of faithful practical information, fall ſhort of any performance of the kind. It has indeed ſome of the faults, or rather misfortunes, of a poſthumous publication; and the reader muſt always keep in mind that the figures, far inferior to thoſe of the *Hortus Malabaricus*, are generally not more than half the ſize of nature. The original drawings, ſtill in exiſtence, are ſaid to be very fine. The author was born at Hanau in 1637, and died in 1706. His ardour for natural ſcience roſe above the moſt formidable obſtacles, ſuch as the loſs of ſight, at forty-three years of age, and the deſtruction by fire of all his papers and collections, ſeven years afterwards. He publiſhed at Amſterdam, in 1706, a ſplendid and excellent work on ſhells in Dutch, and is ſaid to have left behind him, in manuſcript, a political hiſtory of Amboyna. Happy were it if his gentle and benevolent ſpirit tended, in any way, to meliorate the cruel and ſordid policy of his countrymen there, or any where elſe! He was a member of the Imperial Academy *Naturæ Curioſorum*, and well deſignated by that body, according to their cuſtomary mode, as the Indian Pliny.—Linn. Gen. Pl. 23. Schreb. 31. Willd. Sp. Pl. v. 1. 187. Mart. Mill. Dict. v. 4. Vahl. Enum. v. 2. 36. Juſſ. 370. Lamarck Illuſtr. t. 25.—Claſs and order, *Triandria Monogynia*. Nat. Ord. *Tricoccæ*, Linn. *Terebintaceæ*? Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, three-cleft, erect, flat. *Cor.* Petals three, oblong, obtuſe, equal, much exceeding the calyx. *Stam.* Filaments three, awl-ſhaped, the

the length of the corolla; anthers fmall. *Pift.* Germen fuperior, roundifh; ftyle awl-fhaped, the length of the ftamens; ftigma triangular. *Peric.* Drupa coriaceous, turbinate, with three furrows. *Seed.* Nut ovate, undivided, of three cells.

Eff. Ch. Calyx three-cleft. Petals three. Drupa coriaceous. Nut of three cells.

1. R. *amboinenfis.* Linn. Sp. Pl. 49. (Tsjem-tani; Rheede Hort. Malab. v. 4. 25. t. 11. Myxa pyriformis, officulo trifpermo; Raii Hift. v. 2. 1556.)—Native of wild ftony fandy places, in the hills of Parakaroo, and other parts of the country of Malabar, flowering in December, and bearing fruit in January, which remains long on the branches. This is a tree of vaft fize, with a thick *trunk*, and rough *bark*. *Leaves* evergreen, fcattered, ftalked, heart-fhaped, pointed, fharply crenate, with five radiating branched ribs, roughifh and hairy; dark green on the upper fide; paler beneath. *Flowers* white, in axillary clufters. They are reprefented with a hairy tubular *calyx*, and three feeming *bracteas* at the bafe; but the latter appear to be what Linnæus defcribes as the *calyx*. We have feen no fpecimen, nor do we know whence he formed his generic defcription, which certainly does not accord, in the laft-mentioned refpect, with Rheede's plate. The aromatic, acefcent, or fomewhat acrid, qualities attributed to the plant by this writer, juftify Juffieu's opinion of its natural affinities. The fpecific name, *amboinenfis*, is either incorrect, or muft have been founded on the authority of a fpecimen from Amboyna, feen perhaps by Linnæus, but of which no record remains.

RUMPNEY, in *Geography*. See Remney.

RUMSEY. See Romsey.

RUMZE, a river of Moravia, which runs into the Marfch, 15 miles S. of Olmutz.

RUN *of a Ship*, fo much of her hull as is always under water; growing thinner and lanker by degrees, from the floor-timber to the ftern-pofts.

This is alfo called the *fhip's way aftward.*

A fhip is faid to have a *good* run, when it is long, and the water paffes eafily to her rudder, her tuck not lying too low, which is of great importance to her failing. If the water do not come ftrongly to her rudder, by reafon of her being built too broad below, fhe cannot fteer well; and a fhip that cannot fteer well, cannot keep a good wind, nor will have any frefh way through the fea, but will always be falling to leeward.

And yet a fhip with a large and good run lofes much ftowage, becaufe it is made narrow below.

Run, in the *Manege.* To run a horfe is to put him to his utmoft fpeed. Some ufe the word *running* for any kind of gallop.

Run *Out*, in *Agriculture*, a provincial term applied to land that is exhaufted. It alfo fignifies to *fprout* as corn in a wet harveft; and likewife to *fcour*, as in the cafes of cattle.

It is a very bad and mifchievous practice, though one which is too much indulged in by farmers in many places, to fuffer lands to be quite run out, as they are very difficult, troublefome, and expenfive to bring into order again; and in a great many cafes, it is almoft impoffible ever to reftore them to the fame ftate of cultivation they were in before fuch injuries happened to them. As fuch ill confequences are, therefore, not unfrequently caufed in an intentional manner, it may be neceffary to provide againft them by the infertion of fuitable claufes in leafes.

Runs, a term ufed for the lines of planks on which the navigators wheel their barrows, when employed in the excavation of a canal. In fome inftances the fame term has been applied to inclined planes.

RUNACHUSAN, in *Geography*, a fmall ifland near the W. coaft of Scotland. N. lat. 58° 13′. W. long. 5° 4′.

RUNAN, a town of Pruffia, in Ermeland; 4 miles N.W. of Heilfberg.

RUNAWAY Bay, a bay on the N.W. coaft of the ifland of Antigua, between the fort on Corbizon's point N., and fort Hamilton S.—Alfo, a bay on the N. coaft of Jamaica, W. of Great Laughlands river and Mumby bay, and 9 or 10 miles E. of Rio Bueno. N. lat. 18° 30′. W. long. 77° 11′.

Runaway, *Cape*, a cape on the E. coaft of New Zealand; fo called by Cook in 1769, from the hafty retreat of the enemy, after having threatened hoftilities. S. lat. 37° 32′. W. long. 181° 48′.

RUNCARIA, in our *Old Writers*, fignifies land full of brambles and briars. (1 Inft. 5.) The word comes from the Latin *runca*, *a weed*.

RUNCATION, a term ufed in the *Ancient Hufbandry* to exprefs the clearing away the weeds from among the corn, and other fown plants.

They ufed, when the corn or other plants were an inch or two high, to draw a fort of rake or harrow over the ground indifcriminately over the corn and weeds, and when this was done, a perfon followed over all the field, and picked up all the weeds with the hand: the treading down the young corn, however, by this perfon's feet, and the injury done to it by the rake, were fo great, that the crop always fuffered greatly by it; and many of the Romans chofe to omit the ufe of the rake or harrow, as a thing that did as much injury to the corn as to the weeds, and contented themfelves with the fending a perfon to pick up the weeds without it.

This was a fort of firft hint to the horfehoeing hufbandry of the moderns, though fo injudicioufly managed, that it was of very little, if any ufe, in this its infancy. But had thefe farmers been inftructed to fow their corn in rows, and then to ufe the rake or harrow, as we do the hoe, only between thofe rows, they would then have had all the advantage of deftroying weeds by it, and of ftirring the earth, and no injury would have been done to the crop. See Husbandry.

RUNCHES, in *Agriculture*, a term applied to charlock when dry and withered.

RUNCINATUM, Folium, in *Botany*. See Leaf.

RUNCOL, in *Geography*, a town of Walachia; 15 miles N.W. of Tergofyl.

RUNCORN, a large townfhip, royalty, and parifh, in the weftern divifion of the hundred of Bucklow, county palatine of Chefter, England, is fituated on the S. bank of the river Merfey, at the diftance of about 14 miles N.E. from the city of Chefter. The royalty belongs to the earl of Cholmondeley, as annexed to the honour of Halton. Runcorn appears to have been anciently a town of confiderable confequence. Ethelfleda, the celebrated fifter of king Edward the Elder, built a caftle here, fome traces of which can ftill be difcovered on an eminence called the Caftle Rock, fituated about a quarter of a mile from the parifh church. This fortrefs muft have been important, as it commanded the paffage from the kingdom of Mercia to that of Northumberland. In the year 1133, a priory for regular canons of the Auguftine order was founded at Runcorn by William Fitz-Nigel, but they were fhortly afterwards removed to Norton. The church, which belonged to this monaftery, contains monuments in memory of of fir John Chefshyre, prime ferjeant to queen Anne and king George I. who died in 1738, and alfo of three baronets of the Brooke family. Thofe of fir Richard Brooke, who deceafed in 1781, and the late fir Richard, who died in 1795, were executed in marble by John Bacon, fculptor. Since the formation of the duke of Bridgewater's canal, which joins the Merfey clofe to Runcorn, this place has greatly increafed in population and wealth, and has been improved by the erection of many handfome buildings. For fome years paft it has likewife been a fafhionable refort for change of air and falt-water bathing.

The parifh of Runcorn is extenfive, and comprifes nineteen townfhips. According to the population returns of 1811, the parifh contained 1171 houfes, and 6317 inhabitants, of whom 2060 refided in the townfhip of Runcorn. Here are many fine quarries of free-ftone, large quantities of which are fent by water-carriage to Chefter, Liverpool, Manchefter, and various other places. Lyfons's Magna Britannia, vol. ii. Chefhire, 4to. Lond. 1810. Beauties of England, &c. vol. ii.

RUNDAL, a river of Norway, which runs into the fea, near Bergen.

RUNDENDORF, a town of Bavaria, in the bifhopric of Bamberg; 7 miles N.N.W. of Bamberg.

RUNDLES, or ROUNDLES, in *Heraldry*, the fame as balls or pellets.

RUNDLET, RONLET, or *Roundlet*, a fmall veffel, containing an uncertain quantity of any liquor, from three to twenty gallons.

RUNDULLA, in *Geography*, a town of Hindooftan, in Baglana; 10 miles E. of Naderbar.

RUNEHOLM. See RUUN.

RUNEKA, in *Hindoo Mythology*, is fabled as the mortal mother of Parafu Rama, an incarnation of Vifhnu. Her hufband was Jamadagni, one of the feven Rifhis, or patriarchal fages. Under thefe feveral names or words explanations will be refpectively found. On the death of Jamadagni, as related in that article, Runeka declared her intention of becoming Sati, that is *pure*, by the act of felf-immolation on her hufband's funeral pile. (See SATI.) The avaricious Raja, who had caufed her hufband's death, became thus charged with this double murder, and the vindictive Sati imprecated curfes on him and his tribe, enjoining their valorous fon Rama to avenge the death of his parents by the condign punifhment of the impious Raja and the military tribe of Kfhetria, (fee SECTS *of Hindoos*,) whofe meafure of iniquity and oppreffion was completed by this final atrocity.

The prayers or imprecations of a Sati are never inefficiently uttered; the great gods themfelves cannot liften to them unmoved. Vifhnu accordingly infpired Rama with a portion of his divinity, and fent him forth to combat the Raja; who, after twenty battles, was flain, the military race of Kfhetria annihilated, and his ufurped kingdoms relieved from oppreffion.

On the occafion of this felf-immolation of Runeka, it is related, that to ftrengthen the potency of her maledictions on the head of the murderous Raja, fhe, in addition to her own felf-facrifice, performed alfo the ceremony of Naramedha, or the facrifice of a man, thereby rendering her folicitations to the avenging deities abfolutely irrefiftible. And fo lafting is faid to be the effect of the wrath felt and tranfmitted by the vindictive Sati, and its attendant facrifice and incantations, (fee MANTRA and NARAMEDHA,) that nothing can avert its feverity, continued even to the prefent day, but a counteracting Naramedha; and that with the permiffion of Parafu Rama (who is confidered as ftill living in the Kokan or Concan): a man is accordingly facrificed to appeafe the wrath of Runeka Devi, in every generation, by the tribe called Karhara, a military fect, many of whom are fettled in the Kokan, Guzerat, and other weftern provinces of India.

Mr. Wilford, difcuffing fome of thefe topics in the third volume of the Afiatic Refearches, obferves, that although human victims, Naramedha, allowed by ancient authorities, are now prohibited under pain of the fevereft torments in the next world, the prohibition is faid to be difregarded by the Pamaras, or Pariar races, in different parts of India. But he cannot imagine that any Brahman would now officiate at fo horrid a ceremony, denounced as it is in the Brahma and Aditya Puranas, and in the Sri Bhagavat itfelf.

Notwithftanding, however, the general incredibility of the fact, refearches have fince brought to light that a tribe of Brahmans, called, from officiating for that tribe, Karhara Brahmans, do ftill actually countenance and practife the horrible ceremony in queftion. They bear, at all events, the odium of it, and are confequently fhunned by their holy brethren of more humane practices and tribes. They are themfelves very referved on the fubject; and deny the prefent practice, but admit of its former exiftence. On this curious point many particulars, for which we have not room, are collected in Moor's Treatife on Hindoo Infanticide; to which, p. 195, we refer thofe defirous of farther information. Inftances of recent facrifices, and the names of the fuppofed victims, are there given.

The name of this maleficent lady is fometimes written Renuci, and Renuka. In the eleventh volume of the Afiatic Refearches the following paffage occurs, defcriptive of her perfon and family. "In the white Ifland," which in paffing we will obferve Mr. Wilford endeavours to prove to be Albion, "lived Jamadagni, a great Muni (fee MUNI), who can at his will deftroy the world, who beftows rewards and inflicts punifhments, knows the paft and the future, and of whom the gods ftand in awe. His wife was Renuka; in her manners and gait fhe is like Reti, the mother of Kama. (See thofe articles.) The whole world gazed at her with aftonifhment: her eyes are more beautiful than thofe of the antelope of the foreft; her face is like the moon; fhe is a goddefs, incapable of decay, immediately born of the fupreme being. She is Ifwari, the fovereign queen (fee ISWARA); from her was born Rama, ever victorious," &c.

RUNGA, in *Geography*, a town of Hindooftan, in the circar of Cicacole; 25 miles S.W. of Cicacole.

RUNGIS, a town of France; 6 miles S. of Paris.

RUNGPOUR, a circar of Hindooftan, bounded on the N. by Coos Beyhar, on the E. by the Burhampooter, on the S. by Goragot, and on the W. by Dinagepour and Surroopour. The capital is Rungpour.

RUNGPOUR, a town of Bengal; 72 miles N.E. of Mauldah. N. lat. 24° 43′. E. long. 89° 23′.

RUNGS, in a *Ship*, the fame with the floor or ground-timbers, being the timbers which conftitute her floor, and are bolted to the keel, whofe ends are called *rung-heads;* and more properly floor-heads.

RUNG-*Heads* are made a little bending to direct the fweep or mold of the futtocks, and naval timbers; for here the lines, which make the compafs and bearing of a fhip, do begin.

RUNIC, a term applied to the language and letters of the ancient Goths, Danes, and other northern nations.

The word *rune*, according to Mallet, is derived from a word in the ancient Gothic language, fignifying *to cut:* but Wormius, with greater probability, derives *rune* from either *ryn*, *a furrow*, or *ren*, *a gutter* or *channel*. As thefe characters were firft cut in wood or ftone, the refemblance to a furrow, or channel, would eafily fuggeft the appellation. Others, however, derive the term from *ryne*, fignifying art, efpecially that of magic.

Some have been of opinion that Gulphilas, or Ulphilas, a Gothic bifhop, about the year 370, was the firft inventor of the Runic character: but Olaus Wormius fhews at large, that Ulphilas could only be the firft who taught it to foreigners; for that the Runæ, or characters themfelves, were older than he.

In reality, Ulphilas, according to other authors, was fo far even from teaching the character, that he invented an alphabet of his own, on purpofe to put the Runic characters, which had been made fubfervient to the fuperftitions of heathenifm, out of ufe. See GOTHIC *Character*.

Many learned writers have adopted the opinion, firft fuggefted by Dr. Hickes, that the Runic character was borrowed from the Roman, and they farther maintain, that it was not known in the North before the introduction of Chriftianity. If it were allowed, that the Runic characters are borrowed from the Roman alphabet, it by no means follows, that the Scandinavians had waited for the fecret till the introduction of Chriftianity among them: but it is juftly obferved by Wormius, that they are as eafily reducible to the Greek and Hebrew alphabets as to the Roman. An evident proof that the Runic were not derived from the Roman letters, refults not only from their form, which has fcarcely any refemblance to thefe, but from their number (being but 16), and their order and names, which have nothing in common with the Roman, Greek, or Gothic characters of Ulphilas. A comparative view of the Runic and Gothic in thefe refpects may be feen in the Englifh tranflation of Mallet's Northern Antiquities, vol. i. p. 370. M. Mallet has fufficiently fhewn, that all the old chronicles and poems of the North univerfally agree in affigning to the Runic characters a very remote antiquity, and in attributing the invention of them to Odin or Woden himfelf, whom their poets exprefsly call the inventor of the Runes. Befides, inftances occur of princes and pagan heroes, who made ufe of this character in an age long before Chriftianity had penetrated into the North.

In Blekingia, a province of Sweden, there is a road cut through a rock, on which are various Runic characters, faid to have been engraved there by king Harold Hyldetand, in honour of his father; and king Harold is faid to have afcended the throne about the beginning of the feventh century. It is, therefore, extremely probable that Odin introduced the Runic characters into the North, intending by the introduction of letters and writing to acquire refpect from the rude uncivilized inhabitants of Scandinavia; who would be ready enough to conceive that there was fomething divine or magical in them. Accordingly we find, that they were actually employed, in fpells and enchantments, for the pretended purpofe of working prodigies.

A few years before the birth of Chrift, as it has been faid, foon after Mithridates had been overthrown by Pompey, a nation of Afiatic Goths, who poffeffed that region of Afia which is now called Georgia, and is connected on the fouth with Perfia, alarmed at the progreffive encroachments of the Roman armies, retired in vaft multitudes under the conduct of their leader Odin, or Woden, into the northern parts of Europe, not fubject to the Roman government, and fettled in Denmark, Norway, Sweden, and other diftricts of the Scandinavian territory. As they brought with them many ufeful arts, particularly the knowledge of letters, which Odin is faid to have invented, they were hofpitably received by the natives, and by degrees acquired a fafe and peaceable eftablifhment in the new country, which feems to have adopted their language, laws, and religion. Odin is faid to have been ftyled a god by the Scandinavians; an appellation which the fuperior addrefs and fpecious abilities of this Afiatic chief eafily extorted from a more favage and uncivilized people.

This migration is confirmed by the concurrent teftimonies of various hiftorians: but there is no better evidence of it, than that confpicuous fimilarity fubfifting at this day between feveral cuftoms of the Georgians, as defcribed by Chardin, and thofe of certain cantons of Norway and Sweden, which have preferved their ancient manners in the pureft degree. Not that other ftriking implicit and internal proofs, which often carry more conviction than direct hiftorical affertions, are wanting to point out this migration. The ancient inhabitants of Denmark and Norway infcribed the exploits of their kings and heroes on rocks, in characters called Runic; and of this practice many marks are faid ftill to remain in thofe countries. This art or cuftom of writing on rocks is Afiatic. Modern travellers report, that there are Runic infcriptions now exifting in the deferts of Tartary. (See Voyage par Strahlemberg, &c. A Defcription of the northern and eaftern parts of Europe and Afia.) Schroder fays, from Olaus Rudbeckius, that Runes, or letters, were invented by Magog the Scythian, and communicated to Tuifco, the celebrated German chieftain, in the year of the world 1799. (Præf. ad Lexicon Latino-Scandic.) The *written mountains* of the Jews are an inftance that this fafhion was oriental. On the fubject of this migration, allowed by fome writers and contefted by others, fee the articles GOTHS and ODIN.

The Runic characters were diftinguifhed into various kinds. The *noxious*, or *bitter Runes* were employed to bring various evils on their enemies; the *favourable* averted misfortunes; the *victorious* produced conqueft to thofe who ufed them; the *medicinal* were infcribed on the leaves of trees for healing; others ferved to difpel melancholy thoughts, to prevent fhipwreck, as antidotes againft poifon, as prefervatives againft the refentment of their enemies, and in order to render a miftrefs favourable. Thefe various kinds differed only in the ceremonies obferved in writing them, in the materials on which they were written, in the place where they were expofed, in the manner in which the lines were drawn, whether in the form of a circle, a ferpent, or a triangle, &c.

The Runic characters were alfo employed for more rational purpofes: for writing epiftles and epitaphs, and for various kinds of infcriptions, which, the older they are, fo much the better are they engraven. They are rarely written from the right hand to the left; but it is not uncommon to meet with the line running from the top to the bottom, after the manner of the Chinefe and other Indian nations; or from the top to the bottom, and then turning round to the left, and fo up again to the place it begins at; or elfe from the left to the right, and fo back to the left again, which was the manner of the early Greeks. The greater part of the ancient monuments written in the Runic character, which are ftill preferved, confifts of infcriptions difperfed here and there in the fields, and cut out on large ftones or pieces of rock. They are alfo found in churches, and fometimes in other buildings.

The Saxons, who were fond of tracing the defcent of their princes from Odin, and who became poffeffors of England in the fixth century, imported into this country the old Runic language and letters. This appears from infcriptions on coins, ftones, and other monuments, and from fome of their MSS.

There are fome Runic medals in the clofets of the curious; and fome modern Danifh and Englifh medals, the infcriptions of which are Latin, and the character Runic.

There

There is extant a coin of king Offa with a Runic inscription, which shews, that this character had been used by the Saxons as well as their Scandinavian brethren.

There are also Runic inscriptions in this island; one in Cumberland, and another in Scotland. See Hickes' Thes. Ling. Sept.

But the conversion of the Saxons to Christianity, which happened before the seventh century, entirely banished the common use of those characters, which were esteemed unhallowed and necromantic; and with their ancient superstitions, which yet prevailed for some time in the popular belief, abolished in some measure their native and original vein of poetical fabling. They suddenly became a mild and polished people, addicted to the arts of peace and the exercise of devotion; and the poems they have left us are chiefly moral rhapsodies, scriptural histories, and religious invocations, intermixed even with frequent allusions to the old Scaldic fables and heroes. See SCALDS.

We may here observe, that the enchantments of the Runic poetry are very different from those in our romances of chivalry. The former chiefly deal in spells and charms, such as would preserve from poison, blunt the weapons of an enemy, procure victory, allay a tempest, cure bodily diseases, or call the dead from their tombs; in uttering a form of words, or inscribing Runic characters; whereas the magicians of romance are chiefly employed in forming and conducting a train of deceptions. In the incantations of the former there is an air of barbaric horror: the latter often present visions of pleasure and delight; and although not without their alarming terrors, sometimes lead us through flowery forests, and raise up palaces glittering with gold and precious stones. The Runic magic is more like that of Canidia, in Horace; the romantic resembles that of Armida, in Tasso. The operations of the one are frequently but mere tricks, in comparison of that sublime solemnity of necromantic machinery, which the other so awfully displays.

In the tenth and eleventh centuries the Runic gave way to the Roman character; till at length the missionaries succeeded in totally abolishing them, as tending to retain the people in their ancient superstitions. It is said that the Goths, when they became Christians, manifested a blind and indiscreet zeal in destroying several ancient monuments, and burning a great number of books, because they were written with those characters; and that about the year 1001, the Runic characters were quite laid aside in Sweden, and the Roman letters taken in their room, the Swedes being persuaded to adopt this measure by the pope, and by Sigfrid, a British bishop. In Spain they were forbidden in 1136 by Alphonso, king of Castille and Navarre, and condemned by the council of Toledo in 1115. They are, however, still retained among the mountaineers of one province in Sweden. Mallet's Northern Ant. vol. i. p. 359, &c.

It is supposed they were called Runic, as being mysterious and scientifical, like the Egyptian hieroglyphics. See Wormius de Literatura Runica; and Hickes's Thesaurus of the ancient Northern Languages.

In several parts of Sweden, stones may be met with, which were formerly set up as obelisks in memory of the dead; and these monuments are marked with the ancient northern letters called *Runor*, or the Runic characters. In some places the characters vary from the Runic, particularly in free-stones found in Helsingland, of which Mr. Celsius has given us a description, with an explanation. See Philos. Trans. N° 445. sect. 3.

From these Helsingland inscriptions an alphabet of sixteen letters may be derived, which is very singular. In other alphabets different sounds are generally denoted by different figures; but here the same character, according to the diversity of its place and altitude between two parallels, denotes different sounds.

But these characters, however different they may appear at the first sight from the Runic, may easily be derived from them; or, *vice versâ*, the Runic may be derived from the Helsingic, if these be supposed the most ancient. The subtraction of a perpendicular line in the first case, or its addition in the latter, brings the two characters to a near resemblance.

The inscription, which Mr. Celsius considers, was published in Mons. de la Motraye's Travels, but erroneously.

RUNIC *Staffs* were a kind of calendars or compendious almanacs used in the North, marked out by lines upon short pieces of board or smooth sticks; some of which bear the appearance of great antiquity. They were called, in the North, *rim-stocks* and *prim-staffs*; and exhibited, by different lines or marks, the fasts and festivals, the golden number, Dominical letter, epact, &c. Dr. Plot, in his History of Staffordshire, p. 418, &c. describes one of these instruments under the name of a *clog*, and illustrates the construction of it by a figure. He observes, that this kind of almanac is a remain of the Danish government, and that it was still in use amongst the meaner sort of people. Those which he met with in Staffordshire had only the prime and immoveable feasts upon them; whereas others of a more perfect kind, preserved in the cabinets of the curious, have likewise the Dominical letters. And of those imperfect ones there are two kinds; some public, of a larger size, which were commonly hung at one end of the mantle-tree of the chimney, for the use of the whole family, as Wormius informs us they disposed of them in Denmark; and others private, of a smaller size, which they carried in their pockets. This chronological instrument is sometimes, by an evident corruption, called *runstock*.

RUNJETZ, in *Geography*, a town of Bohemia, in the circle of Chrudim; nine miles N. of Chrudim.

RUNIUS, JOHN, in *Biography*, one of the most celebrated of the Swedish poets, was born at West Gothland in 1679. Having received the early parts of his education at Skara, he went, in 1700, to Upsal, and after completing his studies, was appointed by count Stromberg to be his secretary. He died at Stockholm of a consumption in 1713, in the 35th year of his age. He is said to have written Swedish poetry at the age of 18, which displayed great beauty, and afterwards produced a variety of pieces on different subjects, which added very greatly to his poetical fame. He wrote with so much care, and his versification is so smooth and pleasing to the ear, that he is accounted by the Swedes one of the most successful of their poets. "Some of his poems are said to be very excellent, but many of them bear evident marks of carelessness and haste, for he experienced the common lot of genius, having been doomed, throughout life, to struggle with all the ills of poverty; and his distresses would have pressed upon him much heavier, had he not been frequently relieved by count Stromberg." His poems, which he began to collect in his life-time, when he found that they were in general request, were published, after his decease, under the title of "Dudaim," Stockholm, 1714, in two parts; the first contains sacred poems, and the second epithalamia, epitaphs, and congratulatory odes. In 1733 both parts were reprinted, with the addition of a third, containing pieces on different subjects, among which were several poems written in Greek, French, and German. Gen. Biog.

RUNKEL, in *Geography*, a town of Germany, in the county of Wied-Runkel, situated on the Lahn, and consisting fifting of about 120 houfes. It has a citadel belonging to it, feated on a high hill, which was formerly the refidence of the counts. The fubfiftence of the inhabitants is derived from agriculture, gardening, and the breeding of cattle. In the year 1634, this town was plundered and reduced to afhes by the Croats; 14 miles E. of Naffau. N. lat. 50° 23′. E. long. 8° 7′.

RUNN, a lake of Sweden, in the province of Dalecarlia; four miles S. of Fahlun.

RUNNAGAUT, a town of Bengal; 15 miles S. of Kifhenagur.

RUNNEAH, a town of Hindooftan, in Candeifh; four miles N.E. of Peploud.

RUNNEL, in *Rural Economy*, a term fignifying a fort of rill.

Runnel is alfo ufed to fignify pollard wood.

RUNNER, in the *Sea Language*, a rope belonging to the garnet, and to the two bolt-tackles. It is reeved in a fingle block, feized to the end of a pennant, and has at one end a noofe to hitch into any thing, and at the other end a double block, into which is reeved the fall of the tackle, or the garnet; by which means it purchafes more than the tackle or garnet could allow.

To *overhale the runner* is to pull down the hooked end, and hitch it into the fling.

RUNNET. See Rennet.

Ariftotle will have the runnet to be the proper fubftance of the milk; but he is miftaken when he fays it is found in all animals which give milk, efpecially in all ruminants.

RUNNING, in *Antiquity*, made one of the exercifes performed in the *pentathlon*, (which fee,) or quinquertium. See Race and Stadium.

This exercife was in fo great efteem among the ancient Greeks, that fuch as prepared themfelves for it, thought it worth their while to burn, or parch their fpleen, becaufe it was believed to be a hindrance to them.

Indeed, all thofe exercifes that conduced to fit men for war, were more efpecially valued; and that fwiftnefs was efteemed fuch in an eminent degree, appears from Homer's giving his hero the epithet of ποδας ωκυς Αχιλλευς.

Running *of the Eyes*, in infants. See Infant.

Running-*Fights*, at fea. See Fights.

Running-*Fire*. See Fire.

Running *out a Warp*, in *Sea Language*, the act of carrying the end of a rope out from the fhip in a boat, and faftening it to fome diftant place, to remove the fhip towards the faid place, or keep her fteady while her anchors are lifted, &c.

Running-*Rigging* denotes all that part of a fhip's rigging which paffes through the blocks, to dilate, contract, or traverfe the fails. See Rigging.

Running *the Gauntlet*, in *Military Language*. See Gantlope.

Running *of Goods*, a clandeftine landing of goods, without paying the legal cuftoms or duties for the fame. See Smuggling.

Running-*Saddle*. See Saddle.

Running-*Thrufh*, or *Frufh*, in *Farriery*, denotes an impofthume, that fometimes gathers in a horfe's frog; or a fcabby and ulcerous difpofition which fometimes caufes it to fall off. When this difcharge is natural, the feet fhould be kept merely clean. When an impofthume appears, the fafeft courfe is to pare out the hard part of the frog, or that which appears rotten, and to wafh the bottom of the foot three times a day with old chamber-ley. But if a horfe has been neglected, and there be a ftrong flux to the part, it will be neceffary, in order to prevent its degenerating into a canker, to bathe the thrufh with the following lotion, laying over the ulcer a little tow dipped in the fame, and ufing the purges and diuretics recommended in the greafe. Take fpirit of wine and vinegar, of each two ounces; tincture of myrrh and aloes, one ounce; Ægyptiacum, half an ounce; and mix them together. See Bartlet.

Running, in *Rural Economy*, a provincial term fignifying rennet, or the coagulum made ufe of in cheefe-making.

Running *Bull*, in *Agriculture*, a term applied to the part of a harrow where the draught is attached in fome cafes. See Harrow.

RUNNO, in *Geography*, an ifland near the E. coaft of Sweden, in the Baltic. N. lat. 57° 51′. E. long. 16° 33′.

RUNNODE, a town of Hindooftan, in the Malwa country; 30 miles N.W. of Chanderee. N. lat. 25° 7′. E. long. 78° 15′.

RUNNYMEAD, or Runnemead, a tract of land on the fouth bank of the river Thames, in the parifh of Egham, and county of Surrey, England, is celebrated in hiftory for the ever memorable conference which occurred here between king John and his barons, in the year 1215. In that conference the articles of Magna Charta, or the Great Charter, as it is called, by way of eminence, were agreed upon; and on the 15th of June the fame was formally figned and fealed by the monarch, and a copy of it ordered to be depofited in the record office of each county. A fmall ifland in the Thames, adjoining the Mead, ftill retains the appellation of Magna Charta ifland, from a tradition that the charter was actually figned on that fpot. There is at prefent a houfe upon it, and a ferry for foot paffengers to Ankerwyke. It is faid that Runnemead was ufed, in Saxon times, for holding councils. If fo, obferves Mr. Bray in "The Hiftory and Antiquities of the County of Surrey," its name may have been derived from the Saxon word "Rune, fignifying council, the council mead." It contains about 160 acres of ground, tithe free, and is the property of ten perfons, who have the fole ufe of it from March to the 12th of Auguft, when it becomes common to all the parifhioners of Egham, who turn out upon it an indefinite number of cattle; but in the laft week of the fame month it is appropriated as a race courfe, in conjunction with fome adjoining inclofed lands, which are thrown open for the occafion. Near Runnymead are two meadows, called Long-mead and Yard-mead, to the fouthward of which the land rifes to a ridge of hills, one of which, called Cooper's hill, has been immortalized by the ftrains of the poet Denham. The Roman road from London to Silchefter paffed through Runnymead. The Hiftory and Antiquities of the County of Surrey, by the Rev. Owen Manning, continued by W. Bray, efq. F.S.A., of Shire, vol. iii. Lond. 1814, fol.

RUNO. See Ruun.

RUNOR. See Runic.

RUNRIG, in *Agriculture*, an ancient inconvenient diftribution of common field land, by which fmall portions or ridges of land were let to different individuals in a mixed manner.

The circumftances of land being diftributed in alternate ridges as the property or poffeffion of different tenants or holders, was unqueftionably a confequence of early farming townfhips. It is a fort of arrangement which muft have firft taken place on account of fome imperfect and confufed notion or intention of doing juftice in an equal manner to all the tenants or holders of land in fuch farming villages, by allotting to, or beftowing upon, every one of them the fame number of ridges near their houfes, and an equal number in remote fituations. And in order to render the abfurdity of fuch a mode of holding and occupying land ftill more prepofteroufly complete, if poffible, fuch ridges were, in many caſes, not unfrequently exchanged; ſo that one tenant poſſeſſed, in the ſucceeding year, the land which was held or occupied by his neighbour the preceding one.

It is remarked, that in many parts of the highlands of Scotland, the land under this diſtribution has been firſt ploughed, without leaving any boundaries, except the furrows between the ridges; then the field was divided, by putting ſmall branches of trees into the ground, in order to mark off every tenant's portion before the field was ſown. No man knew his own land until the ſeed was to be put into the ground; and it became almoſt impoſſible for him to have the ſame portion of land any two ſucceſſive years. This is a mode of diviſion, it is ſuppoſed, which is analogous to that which Cæſar has aſſerted to have prevailed among the ancient Gauls; which muſt abſolutely debar the very leaſt improvement.

This inconvenient and improper method of proceeding was greatly foſtered by the feudal notions of the times; in which he that could muſter the greateſt number of retainers, generally conſtituted to himſelf the greateſt eſtate. But in the preſent times nothing can be more abſurd than to ſee two or three, or perhaps four men, yoking their horſes together in one plough, and having their ridges alternately in the ſame field, with or without a bank of unploughed land between them, by way of boundary. Theſe diminutive poſſeſſions, it is ſaid, were carried to ſuch a length, that in ſome parts of Scotland, towards the northern extremity, the term a *horſe's foot*, the ſixteenth part of a plough-gate of land, is not yet wholly laid aſide. The land is ſtated to be like a piece of ſtriped cloth, with banks full of weeds and ridges of corn in conſtant ſucceſſion, from one end of a field to the other. Under ſuch management, all ſuch occupiers or poſſeſſors muſt have concurred in one opinion with regard to the time and manner of ploughing every field, the kind of grain to be ſown, the ſeaſon and weather fit for ſowing, and whether they and their horſes were to be employed or idle. So late as even thirty or forty years ago, this practice is ſtated to have prevailed, not only over the greater part of the county of Perth, but, with very few exceptions, over all other parts of Scotland. Since that period, however, it has been, it is ſaid, gradually going into diſuſe; and that the benefit of laying it aſide entirely is ſo apparent, that any remains of the runrig ſyſtem, which may ſtill be met with, muſt ſoon give way and diſappear, except, it is ſuppoſed, where the landlord is as much a Goth as his tenants.

When the various avocations, which theſe tenants muſt have, and the frequent jarring animoſities which muſt neceſſarily ariſe in a cloſe neighbourhood, where oppoſite intereſts are conſtantly interfering, are fully conſidered, it is ſuppoſed impoſſible to expect, that under ſuch a ſyſtem any ſpecies of improvement can be undertaken or carried on. In ſhort, townſhips and runrig are ſuppoſed ſuch obſtacles to improvement, and bolt the door ſo firmly againſt all good cultivation, that it cannot have the leaſt entrance; they are conſequently greatly deſtructive of all good management; and beſides, hold the people in the chains of idleneſs and poverty wherever they may be found to prevail. It is only by the proper ſeparation, diviſion, and incloſure of land into diſtinct portions, whether ſmall or large, for each individual tenant, occupier, or proprietor, that it can be cultivated and improved in the beſt manner, and to the greateſt advantage.

RUNSH, in *Huſbandry*, a term provincially applied to the troubleſome weed wild muſtard or charlock.

RUNSTYCKEN, or ORE, in *Commerce*, a money of account in Sweden, being the twelfth part of the ſkilling, and 48 ſkillings being = a rikſdaler. Alſo a copper coin, of 1 ore koppar and half runſtycken: the other copper coins are ſingle and double ſlants, at 1 and 2 ore ſilver, or 3 and 6 ore koppar: 96 double ſlants, 192 ſingle ſlants, or 576 runſtycken, are to paſs for 1 ſpecie rikſdaler; but in large payments, no perſon is obliged to take more copper coin than the value of half a rikſdaler. Un. Camb.

RUNT, the name uſed, with the diſtinction of places, for ſeveral ſpecies of pigeons. Theſe are the Leghorn, the Spaniſh, the Frieſland runt, &c. The *columba domeſtica Piſarum, Hiſpaniæ, et Friſiæ*, of Moore.

The Leghorn runt is a ſtately large pigeon, ſeven inches or better in the legs, cloſe-feathered, and faſt fleſhed, extremely broad-breaſted, and very ſhort in the back. He carries his tail, when he walks, ſomewhat turned up like a duck's; his neck is longer than any other pigeon's, and he carries it bending, like a gooſe or ſwan; he is gooſe-headed, and his eye lies hollow in his head, with a thin ſkin round it, like that of the Dutch tumbler; his beak is very ſhort for ſo large a bird, and has a ſmall wattle on it, and the upper chap falls a little over. It is a very valuable pigeon, but is tender, and requires care.

The Spaniſh runt is the longeſt bodied of all the pigeons; it is ſhort-legged and looſe-feathered, and does not walk ſo upright as the Leghorn runt. Theſe are of a great variety of colours, but are apt to have accidents in ſitting, from their ſitting too heavy, and often breaking their eggs.

The Frieſland runt is a large pigeon, and has all its feathers reverted, or looking as if placed the wrong way.

The Roman runt is a pigeon of the ſame general make with the common kind, but ſo large and heavy, that it can hardly fly.

The Smyrna runt is middle-ſized, and is feather-footed, and that to ſuch a degree ſometimes, as to look as if there were wings upon the feet; the feathers of theſe are ſometimes four or five inches long, and often pull the eggs and young out of the neſts.

The common runt is the common blue pigeon, kept for the table, and known to every body. Moore's Columb. p. 42. See PIGEON.

RUNT is alſo a name given to Canary-birds, when three years old. See CANARY-*Bird*.

RUNT, in *Rural Economy*, a name given to a ſmall kind of black cattle brought from Wales and Scotland.

But though this term be moſt uſually applied to the ſmall cattle of Wales and Scotland, it is not unfrequently employed in deſcribing the properties and qualities of the ſmaller, and mixed Engliſh breeds, eſpecially thoſe which have a ſtiff compact, runt-like appearance, and which, in their feeding and their habits, have conſiderable reſemblance to them. This ſort of cattle ſtock is often very ſuitable for grazing farmers, in diſtricts where the paſtures are of the inferior kinds, and for feeding out on the artificial graſs-paſtures, where a large ſtock is wanted which will ſoon become fit for the butcher.

RUPALA, in *Botany*, Willd. Sp. Pl. v. 2. 536. Mart. Mill. Dict. v. 4. See RHOPALA and ROUPALA.

RUPAS, in *Geography*, a town of Hindooſtan, in Bahar; 18 miles S. of Hajypour.

RUPEE, ROUPIE, or *Roupias*, in *Commerce*, a money of account, and alſo a coin in various parts of the Eaſt Indies. During the prevalence of the Mogul power in Hindooſtan, one principal coin, denominated the "ſicca rupee," was every where current: it was of a determinate weight, called the "ſicca," which ſerved as a ſtandard for other weights. The principal piece of gold was the "Mohur," which was of the ſame weight as the ſicca rupee; and both were intentionally minted without any alloy. The ſame denominations of money are ſtill current in India; but they differ from each other, and have deviated from their original purity.

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The Eaſt India Company have adhered to it as nearly as poſſible; but the monies of ſome of the native princes, which are of a high degree of fineneſs, are ſubject to frequent alterations; ſo that aſſayers and money-brokers, under the appellations of "ſhroffs, are appointed to ſet a value upon the different coins that are offered in payment.

The principal money of account in India is the "current rupee," to which real coins are reduced before they are entered into books of accounts. This reduction is performed by adding to the ſpecies a certain per-centage, called the "Batta," and varying according to the value of the coins, and alſo to the rate of exchange.

In Bengal, or Calcutta, accounts are kept in current rupees; each rupee being divided into 16 annas, and each anna into 12 pice. The Eaſt India Company, however, keep their accounts in ſicca rupees, annas, and pice, which bear a batta of 16 *per cent.* againſt current rupees, annas, and pice; and in their public and financial ſtatements, which are ſubmitted to parliament, each ſum of ſicca rupees is reduced to current rupees, by adding to it this batta; and the current rupee is then reckoned at 2*s.* ſterling. The Bengal coins, ſtruck at the Calcutta mint, are ſicca rupees, called alſo ſilver rupees, and gold mohurs, ſometimes called gold rupees; 16 of the former being, by regulation, to paſs for one of the latter. Thirty-two punns, or 2560 cowries, are generally reckoned for a current rupee; but the value of cowries fluctuates, nor are they conſidered as a legal tender above the value of 1 anna piece, without mutual conſent of parties. A lack of rupees is a ſum of 100,000, and a crore is 100 lacks, or 10,000,000 of rupees.

The ſicca rupee is to weigh 1 ſicca, correſponding to 179$\frac{2}{3}$ Engliſh grains, and to be 11 oz. 15 dwt. fine; thus it ſhould contain 175.927 grains of fine ſilver, and its value is 24$\frac{1}{2}$*d.* ſterling, or, more accurately, 24.566*d.* Theſe rupees were formerly called ſicca, only during the firſt year after their coinage, when the batta they bore on current rupees was 16 *per cent.*; the ſecond year this was reduced to 13; and the third and following years, the batta was 11 *per cent.* They were then called "ſonaut" or "ſunat" rupees. But by way of aboliſhing this diſtinction, all the rupees coined of late years by the Eaſt India Company have been dated, the 19th ſun, that is, the 19th year of the Mogul emperor's reign; and thus all the rupees of the above weight and fineneſs are conſidered of equal value, in whatever year they may have been coined.

According to theſe regulations, the current rupee is worth 21.177*d.*, valuing ſilver according to the mint price in England; but the market price in India is generally much higher, making this rupee worth 2*s.* nearly, and the ſicca rupee about 2*s.* 6*d.* In the Company's books, 243 current rupees are valued at 100 dollars.

In the upper provinces of Bengal, there is another rupee, ſtruck at the Ferruckabad mint, which weighs 173 grains, and contains 165.215 grains of pure ſilver; and therefore its ſterling value is 23*d.* nearly.

The ſilver coins at Madras or Fort St. George are "Arcot" rupees. Each of theſe weighs 176.4 grains, and contains 166.477 grains of fine ſilver; and therefore its ſterling value is 23$\frac{1}{4}$*d.* It is divided into 12 annas and 192 pice, like the other rupees.

At Bombay accounts are kept in rupees; each rupee being divided into four quarters, and each quarter into 100 reas. The rupee is alſo divided into 16 annas. An urdee is two reas; a doreca, 6 reas; a dooganey, or ſingle pice, 4 reas; a fuddea, or double pice, 8 reas. A paunchea is 5 rupees, and a gold mohur, 15 rupees. The annas and reas are only imaginary monies.

The coins of Bombay are the mohur, or gold rupee; the ſilver rupee and its half; alſo the double and ſingle pice, the urdee, and doreca, which are copper coins, with a mixture of tin or lead. The old Bombay rupee was the ſame as that formerly coined at Surat under the Mogul: it weighed 178.314 Engliſh grains, and contained 1.24 *per cent.* of alloy. It was agreed that both ſhould circulate at an equal value, and the coin be kept to its exact ſtandard of weight and fineneſs. At length, in 1800, the Company found it expedient to order the Surat rupee, which had been debaſed by an augmentation of alloy, to be ſtruck at Bombay; and ſince that period, the rupees of both places have been kept at an equal value, weighing 179 Engliſh grains, and containing 164.74 grains of fine ſilver, which anſwer to 11 oz. 1 dwt. fine; and thus they are worth 23*d.* ſterling.

In the Company's financial accouuts, which are ſubmitted to parliament, the Bombay rupee is reckoned at 2*s.* 3*d.*, and then it bears a batta of 16 *per cent.* againſt current rupees, though in the tables the batta is ſtated at 10 *per cent.* It was ſettled in 1800 that the mohur ſhould be of the ſame weight and fineneſs as the ſilver rupee, and that it ſhould paſs for 15 ſuch rupees.

At Anjengo, on the Malabar coaſt, a ſilver rupee is worth, 7 old fanams, or 6 new ones, called gallon fanams: the fanam is 12 pice, or 16 vis; and a pice 4 budgerooks: all theſe are real coins. In the Company's accounts, an Anjengo fanam is reckoned to be worth $\frac{4}{5}$ths of a Calicut fanam, or $\frac{1}{5}$th of a Surat rupee, which gives its intrinſic value about 4$\frac{3}{4}$*d.* ſterling. At Calicut, 5 fanams are commonly reckoned for one rupee. The fanam is a ſmall gold coin, with a conſiderable alloy of ſilver and copper, and the tar ($\frac{1}{16}$th of the fanam) is a ſmall ſilver coin. The Calicut fanams have been found, by aſſays made at Bombay, to contain 52$\frac{1}{2}$ parts of gold, 29 of ſilver, and 17$\frac{1}{2}$ of copper. They are worth 6*d.* ſterling. At Cambay, on the Malabar coaſt, accounts are kept in rupees of 48 pezas. The rupee is worth about 2*s.* ſterling. A Venetian ſequin paſſes here for 5 rupees; a Perſian abaſſi for 1$\frac{1}{12}$ rupee; and a Perſian mamoodi for 24 pezas. At Cochin, accounts are kept in rupees of 16 annas. Theſe are reckoned of equal value to the Surat rupees. Accounts are alſo kept in fanams, 20 of which are generally reckoned for a rupee.

At Mangalore, accounts are generally kept in ſultanny pagodas, rupees, and annas; the pagoda being 4 rupees, and the rupee 16 annas. At Maſulipatam, accounts are kept in pagodas, rupees, and annas. The pagoda is 3$\frac{1}{2}$ ſilver rupees, and the rupee 16 annas. The coins are gold rupees, weighing 171$\frac{1}{3}$ Engliſh grains, about 23$\frac{3}{4}$ carats fine, and worth 1*l.* 10*s.* ſterling; pagodas of nearly the value of the ſtar pagoda of Madras; and ſilver rupees, 24$\frac{1}{4}$ of which weigh a ſeer, or 4293 Engliſh grains, and the fineneſs of theſe rupees is 11 oz. 12$\frac{1}{2}$ dwt. The value is, therefore, 23$\frac{1}{2}$*d.* ſterling.

The coins of the Myſore country are gold mohurs, paſſing for 4 pagodas; ſultany pagodas, and other pagodas, all paſſing for 13 fanams; and alſo ſultany fanams and cantery fanams, two ſmall gold coins of baſe alloy. Alſo ſultany rupees, and rajah rupees, 26 of which paſs for 7 ſultany pagodas; copper dudus, called by the Engliſh dubs: 260 dudus are the market price for a ſultany pagoda. The ſhroffs, in exchanging copper for gold or ſilver, pay at the rate of 234 dudus for a pagoda; but in changing gold and ſilver for copper, they receive 240; whilſt the price fixed by government is 182 dudus *per* pagoda. The ſultany rupee weighs 177 grains, and is 11 oz. 5$\frac{1}{2}$ dwt. fine; and is therefore worth 23$\frac{1}{4}$*d.* ſterling nearly.

At Pondicherry, accounts are kept in pagodas of 24 fanams, and the fanam is ſubdivided into 60 caſh. The coins are gold pagodas, and ſilver rupees and fanams, mentioned under Madras rupee; alſo copper caſhes, and dudus, a copper coin, 20 of which are reckoned to a fanam. Gold and ſilver are weighed by the ſeer, pagoda, rupee, and fanam. A ſeer weighs $24\frac{1}{8}$ rupees, $81\frac{1}{4}$ pagodas, or $731\frac{1}{4}$ fanams. A rupee weight equals 30 fanams, or 480 nellos; a pagoda weight, 9 fanams, or 144 nellos. Thus 3 rupees are equal in weight to 10 pagodas.

At Scindy, the coins current are ſilver rupees of 16 annas, or 48 copper pice. At Surat, accounts are kept in rupees of 16 annas, or 64 pice. The coins are mohurs or gold rupees, and ſilver rupees, with halves and quarters. A gold rupee paſſes for 15 ſilver rupees. Here are alſo pezas or pice, of copper or lead, 64 of which are reckoned to one ſilver rupee. See the coins under Bombay, *ſupra*.

At Tranquebar, accounts are kept in rixdollars of 12 fanams, and alſo in rupees of 8 fanams; and the fanam is divided into 80 caſh. The coins are ſilver rupees, double and ſingle fanams, and copper dudus or caſh. Rupees are here coined under ſuch regulations, that 1302 of them are worth 600 old Spaniſh dollars, weighing 43 lb. 7 oz. 2 dwt. troy. The value of the Tranquebar rupee is therefore $24\frac{1}{8}$ *d.* ſterling.

The following Table ſhews the Aſſay and Value of Rupees.

	Aſſay.			Weight.		Contents in pure Silver.	Value in Sterling.	
		oz.	dwt.	dwt.	gr.	grains.	s.	d.
Rupee of Mohammed Shah - - - - - -	B.	0	$6\frac{1}{2}$	7	$9\frac{1}{4}$	168.7	1	$11\frac{1}{2}$
Rupee of Ahmed Shah - - - - - - -	B.	0	12	7	$9\frac{1}{4}$	172.8	2	$0\frac{1}{4}$
Rupee of Allum Ghir (1759) - - - - -	B.	0	13	7	$11\frac{1}{2}$	176	2	$0\frac{1}{2}$
Rupee of Shah Allum (1772) - - - - -	B.	0	14	7	10	175.1	2	$0\frac{1}{2}$
Rupee of the ſame (Benares 1774) - - -	B.	0	8	7	$6\frac{3}{4}$	167.5	1	$11\frac{1}{4}$
Rupee of the ſame (1779) - - - - - -	B.	0	$14\frac{1}{2}$	7	$11\frac{1}{2}$	177.4	2	$0\frac{3}{4}$
Rupee, Sicca, coined by the Eaſt India Company at Calcutta, and dated the 19th year of the emperor's reign - - - - - - - - - -	B.	0	13	7	$11\frac{1}{2}$	175.8	2	$0\frac{1}{2}$
Rupee, Arcot (1759) - - - - - - -	B.	0	7	7	$9\frac{1}{4}$	170	1	$11\frac{3}{4}$
Rupee, Arcot (1782) - - - - - - -	B.	0	8	7	6	166.8	1	$11\frac{1}{4}$
Rupee, Arcot (1788) - - - - - - -	B.	0	8	7	$9\frac{1}{4}$	169.8	1	$11\frac{3}{4}$
Rupee, Arcot, of the lateſt coinages - - -	B.	0	$4\frac{1}{2}$	7	$8\frac{1}{2}$	166.5	1	$11\frac{1}{4}$
Rupee, Bombay, old - - - - - - -	B.	0	13	7	$10\frac{1}{3}$	174.6	2	$0\frac{1}{2}$
Rupee, Bombay, new, or Surat - - - - -	W.	0	1	7	11	164.8	1	11
Rupee, Lucknow - - - - - - - -	B.	0	$8\frac{3}{4}$	7	$5\frac{1}{4}$	166.5	1	$11\frac{1}{4}$
Rupee, Sultanny - - - - - - - -	B.	0	$3\frac{1}{2}$	7	9	166.2	1	$11\frac{1}{4}$
Rupee, Madepoor or Nowſee - - - - -	W.	0	5	7	$5\frac{3}{4}$	158.2	1	10
Rupee, Madras Rajapoor - - - - - -	B.	0	4	7	7	164.8	1	11
Rupee, Jeypoor - - - - - - - -	B.	0	12	7	7	170.6	1	$11\frac{3}{4}$
Rupee, Furruckabad Sicca - - - - - -	B.	0	$7\frac{1}{3}$	7	5	165.2	1	11
Fanam, Cannanore - - - - - - - -	W.	0	$1\frac{1}{4}$	1	$11\frac{3}{4}$	32.9	0	$4\frac{1}{2}$
Fanam, Bombay, old - - - - - - -	B.	0	13	1	$11\frac{3}{4}$	35	0	$4\frac{3}{4}$
Fanam, Pondicherry - - - - - - -	B.	0	$5\frac{1}{2}$	1	$0\frac{1}{2}$	22.8	0	$3\frac{1}{4}$
Fanam, Pondicherry, double - - - - - -	W.	0	3	1	$18\frac{3}{4}$	39	0	$5\frac{1}{2}$
Rupee, Chanderry - - - - - - - -	W.	0	$0\frac{3}{4}$	7	5	159.5	1	$10\frac{1}{4}$
Rupee, Oukery - - - - - - - -	W.	1	$0\frac{1}{2}$	7	7	146.9	1	$8\frac{1}{2}$
Rupee, Shree Sicca of Poona - - - - -	W.	0	$1\frac{1}{2}$	7	$4\frac{1}{2}$	158.5	1	10
Rupee, Halee Sicca - - - - - - -	B.	0	$12\frac{1}{2}$	7	$7\frac{1}{4}$	171.2	2	0
Rupee, Ougein - - - - - - - -	B.	0	5	7	$6\frac{1}{4}$	166.8	1	$11\frac{1}{4}$
Rupee, Maiſore or new Holkar - - - - -	B.	0	7	7	5	165.1	1	11
Rupee, Indore Holkar - - - - - - -	B.	0	$4\frac{1}{4}$	7	5	164	1	$10\frac{3}{4}$
Rupee, Chinſouree - - - - - - - -	B.	0	2	7	$4\frac{3}{4}$	159.7	1	$10\frac{1}{4}$
Rupee, Broach, old - - - - - - -	W.	0	$0\frac{1}{2}$	7	10	170.8	1	$11\frac{3}{4}$
Rupee, Broach, new - - - - - - -	W.	0	10	7	10	157.3	1	10
Rupee, Brodera, old - - - - - - -	W.	0	$4\frac{1}{2}$	7	$10\frac{1}{2}$	162.7	1	$10\frac{3}{4}$
Rupee, Brodera, new - - - - - - -	W.	0	$10\frac{1}{4}$	7	$10\frac{1}{2}$	157.3	1	10
Rupee, Ana Sai, coined at Caira - - - -	W.	0	$10\frac{3}{4}$	7	$8\frac{1}{4}$	155.1	1	$9\frac{3}{4}$
Rupee, Ana Sai, coined at Pitlad - - - -	W.	0	$17\frac{1}{2}$	7	$9\frac{1}{4}$	151	1	9
Rupee, Amedabad Sicca - - - - - -	W.	0	$7\frac{1}{2}$	7	10	160	1	$10\frac{1}{4}$
Rupee, Mungull Sai - - - - - - -	W.	0	$10\frac{1}{4}$	7	$10\frac{1}{2}$	157.2	1	10
Rupee, Mumo Sai - - - - - - - -	W.	0	$8\frac{3}{4}$	7	$9\frac{3}{4}$	157.6	1	10
Rupee, Seca Sai (coined in Futty Sing's time) - -	W.	0	$9\frac{1}{2}$	7	$7\frac{3}{4}$	155.6	1	$9\frac{3}{4}$
Rupee, Cambay - - - - - - - -	W.	0	$18\frac{1}{2}$	7	10	151	1	9
Rupee, Perſian (1745) - - - - - -	B.	0	13	7	$9\frac{1}{4}$	175.4	2	$0\frac{1}{2}$
Rupee, Perſian (1789) - - - - - - -	B.	0	$12\frac{1}{2}$	7	10	175.3	2	$0\frac{1}{2}$
Larin - - - - - - - - - - -	B.	0	$10\frac{1}{2}$	3	$2\frac{1}{2}$	72.1	0	10
Buſſora Crux - - - - - - - - -	W.	0	$0\frac{3}{4}$	11	16	118.1	1	$4\frac{1}{2}$

The inscriptions on the silver coins of the East Indies are as follow:

The sicca rupee has the legends nearly the same as on the mohur, and may be thus translated: "Struck in the seven climates (date of the Hegira), by the shadow of God's favour, Shah Allum king, disciple in the faith of Mahomet;" and on the other side, "Struck at (name of the place), in the 19th year of the august and glorious reign of the emperor," &c. Some rupees do not bear the date of the Hegira, but only that of the emperor's reign; and all the rupees struck in Bengal of late years, at the Company's mint, have been dated the 19th year of his reign, as above.

The Arcot rupee has on one side, "Blessed coin of the conquering king" (the name); on the other side, "Struck at Arcot in the year —— of the reign," and the date of the Hegira. But it may be observed, that in these and many other rupees, except such as are coined by the East India Company, the legends are often illegible, owing to the edge being clipt or worn, or to the piece being too small to receive the impression.

The rupee of the Dutch East India Company has on one side, "Coin of the company of Holland," and the date of the Christian era; on the other side, "In the great island of Java."

The sultany rupee of Tippoo bears the same impressions and legends nearly as Tippoo's mohur.

The rupee of Persia, or piece of 10 mamoodies, has various legends. Some bear the sovereign's name, as "Sultan Shahrokh;" and on the other side, "May God prolong his reign, coined at" (the name of the place and date of the Hegira). On other rupees, the king of Persia styles himself "The servant of the monarch," that is, of the Iman Riza, the head of their religion, whom the Persians consider as the real sovereign of their empire; and the coins are often struck in the name of the Iman Riza, with this legend, "By the divine decree, the coin of happy omen has been struck in the name of Ally Riza, son of Musa;" and on the other side, "There is no God but God, Mahomet is the apostle of God, Ally is the favourite of God, struck at ——," with the date of the Hegira.

The silver fanam of Pondicherry bears on one side several flower de luces; and on the other, various flowers, dots, and lines, without any inscription.

The larin is a silver wire about half an inch in length, doubled up, and flattened on one side to receive the impressions of some characters. It was first made in Arabia, and has become scarce, but is still used as money of account.

The mohur, or gold rupee, (coined under the reign of the emperor Shah Allum, which began in 1770,) has on one side, "He who is the shadow of God's favour, the protector of the religion of Mahomet, the emperor Shah Allum, coins money for the seven climates," with the date of the Hegira; on the other side, "Struck at —— the year —— from the happy accession." Some mohurs have only, on one side, "Coin of the emperor Shah Allum," with the date of the Hegira; and on the other, the year of the reign. The coins struck by the East India Company bear the name of the Mogul emperor; and those minted of late years are dated the 19th year of the emperor's reign, and the number 19 is visible on some part of the piece.

The mohur of Tippoo has on one side, "The faith of Mahomet, the most excellent in this world, is supported by the splendour of the victories of Hyder. Hyder! exalted in equity; struck at Seringapatam, the year pre-eminent in prosperity," with the date of the Hegira. On the other side, "He alone is the equitable sultan; the epoch of the accession was a year of happy omen," with the date of the reign. Some of Tippoo's coins are dated according to an Indian era, which is divided into cycles of 60 years each; of which cycles 81 are supposed to be now elapsed.

The faruki, or quarter mohur of Tippoo, has on one side, "Mahomet, he is the only and right sultan," with the date; and on the other side, "Faruki, struck at Pattan" (Seringapatam), with the date of Tippoo's reign, and a Persian H, the initial of Hyder.

The zodiacal rupees are pieces of twelve different impressions, representing the twelve signs of the zodiac. They were coined between the years 1616 and 1624 of the Christian era, by Jehangeer, and have been long out of circulation. They are, however, much sought after, and highly valued as objects of curiosity. Each sign, or figure, is surrounded by rays representing the sun; and on the reverse is the following inscription: "This ornamented coin in Agra found its face (received its impression) in the year —— from the sovereign Jehangeer, son of king Akber."

The zodiacal rupees are exceptions to the Mahometan law, which forbids the representation or embossment of figures; but it is said that Jehangeer had little respect for his religion; and it is further stated by some writers, that his favourite queen, Nur Mahal, had obtained permission to reign for one day, (others say for one year,) and that she caused these coins to be struck, to perpetuate the memory of her short reign. This account, however, cannot be quite correct, as the dates of these rupees are different.

We shall here add, that, in the business of exchange, London draws on Bengal in current rupees at 2*s.* more or less, or in sicca rupees at 16 *per cent.* above current; also on Madras in pagodas at 7*s.* 6*d.* more or less; and on Bombay in rupees at 2*s.* 2*d.* more or less.

Such bills are mostly at 60 or 90 days sight: but bills from those places on London are generally drawn at 6, 9, or 12 months sight; in which case, the sicca rupee is valued at 2*s.* 6*d.*, the pagoda at 8*s.*, and the Bombay rupee at 2*s.* 4*d.* sterling, more or less.

The bank of Bengal has been incorporated by a charter for seven years, granted under the governor-general in council, by virtue of the authority vested in him by the act of the 47th of George III. sec. 2. cap. 28.

The capital of the bank is 5,000,000 sicca rupees, that is, 50 lacks. It is divided into 500 equal shares, 100 of which belong to the government, and the other 400 to individuals.

The business of the bank chiefly consists in issuing notes, keeping cash for others, discounting bills, and granting loans at short periods, for the accommodation of merchants, and the general convenience of the public.

The notes of this bank are issued at sums not less than 10 sicca rupees, and not exceeding 10,000: they are paid off in specie when presented, and are therefore accepted as cash in all transactions, although they have not been declared a legal tender, except in payments to be made to government at their general treasury, and other offices of the presidency; and likewise at the provincial treasuries, but under certain conditions and limitations.

The interest of money in India fluctuates from 8 to 12 *per cent. per annum*, and it has been even higher; but the bank, which engages not to charge above 12, has already lowered the rate of interest, and has in many other respects rendered essential service to trade and commerce. We are indebted for the materials of this article to the excellent work of Dr. Kelly, entitled the "Universal Cambist."

RUPEE, *Gold*. See MOHUR.

RUPELA, in *Geography*, a town of European Turkey, in the Morea; 12 miles S.W. of Corinth.

RUPELLENSIS SAL, *Rochelle Salt*, in *Chemiſtry*, a name given to a peculiar ſalt, invented by M. Seignette, apothecary, at Rochelle, and extolled as a very valuable medicine.

The preparation of it was kept a great ſecret, till Meſſrs. Boulduc and Geoffroy diſcovered and publiſhed its compoſition.

To prepare this ſalt, cryſtals of marine alkali are to be diſſolved in hot water, and into this liquor powdered cream of tartar is to be thrown. When the effervеſcence ceaſes, more cream of tartar is to be added, till the liquor is ſaturated; it is then to be filtered and evaporated; and very fine and large cryſtals may be obtained by cold, each of which is the half of a polygonous priſm cut in the direction of its axis.

The cryſtallization of this ſalt, according to M. Baumé, as well as of the vegetable ſalt, is much more eaſy and more beautiful, when the liquor, in which it is made, contains an exceſs of alkali, which does not prevent the ſalt from being exactly neutral, after it has been well drained.

The ſalt of Seignette has a ſaline taſte, moderately ſtrong, and diſagreeable. It retains much water in its cryſtallization, is ſoluble in a leſs quantity of hot water than of cold water, and becomes farinaceous in a dry air.

This ſalt is uſed only in medicine; being a good purgative, when taken from an ounce to an ounce and a half. It is diſſolved in pure water, or in ptiſans and mineral waters, to render them purgative. It is alſo given in ſmall doſes of one or two drachms, as an alterative, aperitive, and corrector of other purgatives. But, upon the whole, it does not differ much from ordinary ſoluble tartar. This is now known under the name of "tartrate of potaſs and ſoda," &c. &c. See SODA.

RUPELMONDE, in *Geography*, a town of France, in the department of the Two Nethes, at the union of the Ruppel and the Scheldt; 8 miles S.S.W. of Antwerp.

RUPENDA, a country of Africa, W. of Mocaranga.

RUPERSBACH, a town of Bavaria, in the principality of Aichſtadt; 3 miles N.W. of Aichſtadt.

RUPERSDORF, a town of Bohemia, in the circle of Konigingratz; 4 miles N.N.W. of Branau.

RUPERT, *Prince*, in *Biography*, third ſon of Frederic, elector palatine of the Rhine, and Elizabeth, daughter of James I., and he was, conſequently, nephew to king Charles I., was born in the year 1619. His education, like that of moſt German princes, eſpecially the younger brothers, qualified him for arms, and he was ſoon diſcovered to be extremely well fitted in reſpect to natural abilities, and acquired accompliſhments for a great commander. In his thirteenth year he accompanied the prince of Orange to the ſiege of Rhinberg, and ſo greatly diſtinguiſhed himſelf, that at the age of eighteen he was entruſted with the command of a regiment of cavalry. He was taken priſoner in the following year by the Imperialiſts, who detained him a conſiderable time. Having obtained his liberty, upon the ruin of the houſe-palatine in Germany, he came to England with his brother Maurice in 1642, and offered his ſervices to their relation Charles I., between whom and the parliament, war had juſt commenced. Through the whole war he behaved with great intrepidity; and on many occaſions his exertions were attended with very extraordinary ſucceſs. Almoſt at the outſet of the buſineſs he was placed at the head of a body of horſe, with which he immediately routed a part of lord Eſſex's cavalry, and eſtabliſhed his character for ſpirit and enterpriſe. At the ſubſequent fight at Edge-Hill he commanded the right wing of the royaliſts, with which he drove out of the field the parliament horſe; but, by an incautious purſuit, the king's infantry were left expoſed, and ſuffered ſeverely, ſo that the reſult was a drawn battle. In the next he proceeded into the weſt to join the Corniſh royaliſts: and afterwards he undertook the ſiege of Briſtol, which city he carried by aſſault. He was preſent at the battle of Newbery, where he broke the enemy's horſe; but was repulſed in his charge on their foot. The king, on account of his great ſervices, advanced him to the dignity of a peer of England, by the title of earl of Holderneſſe, and duke of Cumberland. In 1644 he relieved Newark, beſieged by the parliamentarians; after which, having collected a conſiderable force, he marched againſt the earl of Mancheſter, then inveſting York, and made a junction with the marquis of Newcaſtle. Contrary to the advice of that nobleman, he engaged the parliament army in a pitched battle at Marſton-Moor, and placed himſelf in the right wing. He was there oppoſed by Cromwell, and in the conflict prince Rupert's cavalry was put to flight. The final iſſue was a defeat of the royaliſts, which was, in fact, the commencement of the misfortunes that thenceforth attended the king's arms. In this action the courage of prince Rupert was ſignally diſplayed; but his precipitation, and want of attention to the marquis of Newcaſtle, were very much cenſured; he, however, redeemed his character by ſome ſpirited ſervices which he performed between this and the battle of Naſeby, in which he took a moſt diſtinguiſhed part. He commanded in the right wing; and by the impetuoſity of his charge he defeated the parliament's left, under the command of Ireton; but committing his uſual fault of purſuing inconſiderately, the battle was loſt before he could return to reſtore order. After this event, he withdrew towards the weſt, and threw himſelf into the city of Briſtol. That important place, thus garriſoned, was expected to make a vigorous defence; but the prince ſeems to have loſt himſelf on this occaſion, and ſurrendered the city to Fairfax before a cloſe attack was made. The king was ſo indignant at his conduct, that he recalled all his commiſſions, informing him he could thenceforward diſpenſe with his ſervices.

When a part of the Engliſh navy, in 1648, went over to Charles II., it was placed under the command of prince Rupert, who attempted, in vain, the relief of ſome maritime towns and fortreſſes, attacked by the republicans. He then carried on a predatory war, by which the Engliſh trade in the weſtern ſeas was ſo much annoyed, that admiral Blake was ſent with a ſquadron in purſuit of him. He took ſhelter in Kinſale, whence he eſcaped to Portugal, and was protected from his purſuer. He, however, loſt a great part of his fleet on the coaſt of Spain, and with the remainder ſailed to the Weſt India iſlands, where, for ſome time, he ſupported himſelf by making prizes of Spaniſh and Engliſh ſhips. His brother, prince Maurice, who commanded a ſeparate ſquadron, being ſhipwrecked among the iſlands, Rupert ſailed to France, where he diſpoſed of his prizes and ſhips, and joined Charles at the French court. Between this period and the reſtoration he occupied himſelf with thoſe ſtudies which afterwards rendered him celebrated in the annals of ſcience, and to which we ſhall have occaſion to refer at the concluſion of this article.

On the king's reſtoration, prince Rupert was invited into England, where the king, who had a ſincere affection for him, gave him various offices worthy of his high birth. In 1666 the king entruſted him, in conjunction with the earl of Albemarle, to command the fleet, and he ſoon manifeſted all

all the great qualities that could be defired in an admiral; for, by his happy return to the fleet, he wrelted from the Dutch the only victory they had the appearance of gaining, and, afterwards, on the 24th of June, beat them effectually, purfued them to their own coaft, blocked up their harbours, and made them fully fenfible of the fuperiority of Englifh courage when not oppreffed by numbers. In the autumn of the fame year, having the fole command of the fleet, and learning that the Dutch were endeavouring to join a French fquadron of forty fail under the duke of Beaufort, he followed them fo clofely into the Boulogne road, that, to avoid a battle, they hauled fo near the fhore, as in all probability they muft either have been funk or burnt, if a fudden ftorm had not forced the prince to return to St. Helen's bay.

On the prince's return home he was kindly received by the king, and grew into high efteem with the nation. The Dutch war was again renewed in 1673, the French being at this time in alliance with the Englifh. Prince Rupert was appointed admiral of the Englifh fleet, having under him fir Edward Spragge, and the earl of Offory. Two indecifive actions enfued in May and June, and prince Rupert, whofe bravery could not be doubted, was fufpected, probably without reafon, of being difinclined to the favourite political fchemes of affifting the French to ruin the Dutch, and of augmenting the royal auhority at home. On his part he complained that he was ill fupplied with neceffary articles by the admiralty, which was under the controul of the duke of York. To prove the fact, he, without particular orders, returned home, immediately after the battle of the 5th of June, and had addrefs enough to perfuade the king to come and examine the ftate of the fleet with his own eyes. This put the matter beyond all cavil and difpute, and obtained the neceffary fupplies without any delay, and as he had fhewn his fpirit by appealing to the fenfes of his majefty, fo he gave as fignal a proof of his activity and enterprife, by carrying the whole fleet through the Narrow feas on the 19th of July, and appearing on the Dutch coaft, almoft as foon as they had received certain intelligence of his returning to his own. In the following Auguft, however, an engagement took place off the Texel, in which the two maritime rivals difplayed all the obftinate valour that had rendered their former contefts fo memorable in naval hiftory, and of which a full and moft interefting account will be found in Campbell's Lives of the Admirals, vol. ii. ed. 1813. Prince Rupert was perfonally oppofed to De Ruyter, and by the greateft exertions he difengaged his fquadron from numerous affailants, and came to the relief of that of fir Edward Spragge, which had loft its brave commander. (See Spragge.) The French kept aloof, and both fides claimed the victory. This was the clofe of prince Rupert's warlike fervices.

On his return from the command, the king expreffed fome coolnefs, which was owing, not more to the arts of his highnefs's enemies, than to the quicknefs of his letter, in which he gave an account of this laft fight, the contents of which a contemporary hiftorian gives in the following words. "In the midft of fo many intrigues of oppofition here at home, fo many delays of his commiffion, fo few powers contained in it, fuch fcanty number of feamen, fo little affurance of divers chief commanders, fuch failure of provifions; fuch want of ammunition, and all other neceffaries, fuch deceit of navy officers, fuch non-obfervance of orders at fea, amongft his own Englifh, and fo many manifeft defections of the French, not to be ftaggered in his refolution, nor to be put out of all patience and prudence in action, nor to abate of his affection and zeal for the honour and fervice of his majefty, the fafe-guard and intereft of religion and the kingdom; in a feafon when fo many Popifh projectors played a game under board, and above too; will be an everlafting argument of his highneffes's valour and renown, and muft needs be a ftrong obligation upon the king, the parliament, and the people of England, who are now left to judge, whether it was not a wonderful good providence of God, or one of the moft memorable pieces of fervice ever done at fea, to furmount all thofe difficulties, and even envy itfelf; and, after all, to bring home the fleet royal of England, without the lofs of one man of war, to her own fhore in fafety, in defpite of all enemies that defigned otherwife by fea and land."

But the king's difpleafure was not lafting, and he was foon replaced in his favour. After this, prince Rupert led a quiet and, in a great meafure, a retired life, moftly at Windfor caftle, of which he was governor, and fpent a great part of his time in the profecution of chemical and philofophical experiments, as well as the practice of mechanic arts, for which he was very famous. He is mentioned by foreign authors with applaufe for his fkill in painting, and celebrated by one of the moft judicious of our own, for his invention of mezzo-tinto prints, fince rifen, from their foftnefs and beauty, into fo high efteem. He likewife delighted in making locks for fire-arms, and was the inventor of a compofition called, from him, Prince's metal. He communicated to the Royal Society his improvements upon gunpowder, by refining the feveral ingredients, and making it more carefully; which, as appears upon feveral trials reported to that learned body, augmented its force, in comparifon of ordinary powder, in the proportion of ten to one, an invention which, though too expenfive for common occafions, deferves to be remembered, becaufe, in particular cafes, it may be of fingular utility. He alfo acquainted them with an engine he had contrived for raifing water, and fent them an inftrument, of which he made ufe, to caft any platform into perfpective, and for which they deputed a felect committee of their members to return him their thanks. He was the inventor of a gun for difcharging feveral bullets with the utmoft fpeed, facility, and fafety, which was generally and juftly admired. The Royal Society received likewife from his highnefs the intimation of a certain method of blowing up rocks in mines, and other fubterraneous places. The very ingenious and indefatigable Dr. Hooke has preferved another invention of his for making hail-fhot of all fizes. He devifed a particular kind of fcrew, by the means of which, obfervations taken by a quadrant at fea were fecured from receiving any alteration by the unfteadinefs of the obferver's hand, or through the motion of the fhip. It was faid that he had alfo, among other fecrets, one that was very curious, and, if preferved, might be very beneficial, which was that of melting or running black lead, like a metal, into a mould, and reducing it back again into its original form.

As to his public character in the laft ten years of his life, it was that of a patriot, which was owing to the innate honefty of his temper, and not to his having any liking to intrigues. He gave indefatigable attention to whatever appeared to him conducive to the public good. He was a great promoter of the trade to Africa, and a principal protector of the Royal African Company; as a proof of which, before the firft Dutch war in this reign, he offered his majefty to fail with a fquadron to the coaft of Guinea, in order to vindicate the honour of the crown, affert the juft rights of the company, and redrefs the injuries done to the nation; but the king, unwilling to hazard his perfon at fuch a diftance, and in fo fickly a climate, though he received the motion kindly, would not confent to it, but contented himfelf

felf with taking an officer of his recommendation (captain Holmes), under whom the fquadron was fent. He was an active member of the council of trade. It was owing to his folicitations, after being at great expence, not only in the inquiry into the value, but in fending fhips thither, that the Hudfon's Bay Company was erected, of which he was the firft governor appointed by the charter. In memory of him, a confiderable opening on the eaft fide of that bay, in Terra de Labrador, is called Rupert's river. In general, his highnefs was a great friend to feamen, and to all learned, ingenious, and public-fpirited perfons, and affifted them with his purfe, as well as afforded them his countenance. He was concerned in the patent for annealed cannon, in a glafs-houfe, and other undertakings for acquiring or improving manufactures, for which fome have cenfured him, as giving encouragement to projectors. But furely this cenfure is very ill placed, fince, without fuch patrons, induftry and ingenuity would want fupport, and many ufeful inventions, many valuable difcoveries, barely emerge, and then fink again into oblivion. But ftrict juftice has been done to his highnefs's many virtues, and amiable qualities, by abler and more impartial judges, efpecially in that excellent character of him by the elegant pen of bifhop Sprat. In refpect to his private life, he was fo juft, fo beneficent, fo courteous, that his memory remained dear to all who knew him. This, obferves Campbell, I fay of my own knowledge; having often heard old people in Berkfhire fpeak in raptures of prince Rupert.

He died at his houfe in Spring-Gardens, on the 29th of November 1682, in his grand climacteric, leaving behind him a natural fon, ufually called Dudley Rupert, by a daughter of Henry Bard vifcount Bellemont, though ftyled in his father's laft will and teftament Dudley Bard. He received the firft tincture of letters at Eton fchool, where the gentlenefs of his temper, and the modefty and amiablenefs of his behaviour, procured him univerfal efteem. His genius, however, inclining rather to arms than ftudy, he was placed under the care of that celebrated mathematician fir Jonas Moore at the Tower. Here he continued till the demife of that prince, when he made a tour into Germany to take poffeffion of a confiderable fortune which had been bequeathed to him. He was very kindly received by the Palatine family, to whom he had the honour of being fo nearly allied. In 1686 he made a campaign in Hungary, and diftinguifhed himfelf at the fiege of Buda, where he had the misfortune to lofe his life, in the month of July or Auguft, in a defperate attempt made by fome Englifh gentlemen upon the fortifications of that city, in the 20th year of his age, and, though fo young, he had fignalized his courage in fuch an extraordinary manner, that his death was exceedingly regretted. Hume. Campbell's Lives of the Admirals.

Rupert, in *Geography*, the north-wefternmoft townfhip of Bennington county, in the ftate of Vermont, America, containing 1630 inhabitants; 20 miles N. of Bennington.

Rupert's *Bay*, a bay on the N.W. coaft of the ifland of Dominica, which is deep, capacious, and fandy, and affords good fhelter from the winds. It is the principal bay of the ifland, and on it is erected the town of Portfmouth. N. lat. 15° 40′. W. long. 61° 18′.

Rupert's *Fort*, lies at the bottom of Hudfon's bay, in North America, fituated on a river of the fame name, on the E. fide of James's bay, between Slade river N., and Nordway river S. N. lat. 51° 50′. W. long. 80° 5′.—Alfo, a fort on the W. coaft of the ifland of Barbadoes; 1 mile N. of Speight's town.

Rupert's *Head*, a cape on the W. coaft of the ifland of Dominica. N. lat. 15° 41′. W. long. 61° 19′.

Rupert's *Ifland*, the moft wefterly of four iflands in the ftraits of Magellan, forming the S. fide of Royal Reach; 3 miles S. of Paffage Point.

Rupert's *River*, a river of North America, which runs from lake Miftafin into James's bay, Hudfon's bay. N. lat. 51° 28′. W. long. 78° 56′.

Rupert's *Drops*, *lacrymæ Batavicæ*, a fort of glafs drops with long and flender tails, which burft to pieces on the breaking off thofe tails in any part, faid to have been invented by prince Rupert, and therefore called after his name.

The hiftory of thefe drops is this: they were firft brought into England by prince Rupert out of Germany, and fhewn to king Charles II. who communicated them to the Royal Society at Grefham College; and a committee, appointed on this occafion by the fociety, gave the following account of them. They muft be made of green glafs well refined, for till the metal, as the glafs-men call it, is perfectly refined, they never fucceed if made of it; but always crack and break foon after they are dropped into the water.

The beft way of making them is to take up fome of the metal out of the pot upon the end of an iron rod, and immediately let it drop into cold water, and there lie till it is cold. If the metal be too hot when it is dropped into the water, the bufinefs does not fucceed, but the drop frofts and cracks all over, and falls to pieces in the water, and every one that does not crack in the water, but lies in it whole till it is quite cool, is fure to be good. There is great nicety in the hitting a due degree of heat in the metal, and the workmen who beft know their bufinefs cannot promife before hand which fhall fucceed, but often two fail for one that hits right. Some of them froft over the furface without falling to pieces, and others break into pieces before the red heat is quite over, and that with a fmall noife; others break foon after the red heat is over and make a great noife, and fome neither break nor crack till they feem to be quite cold; and others hold together while they are in the water, but fly to pieces with a fmart noife when they are taken out of it; fome do this on the inftant, others an hour or two after, and others will keep feveral days, nay weeks, and at laft fall to pieces without being touched.

Thefe drops, thus formed, are fo hard, that they will bear fmart blows of a hammer, on the rounded end, without breaking; and yet if you grind the furface, or break off the tip of the tail, they will fhatter, with a loud report, into powder; and in an exhaufted receiver, with greater impetuofity than in the open air, and into a finer powder, exhibiting light, when the experiment is made in the dark. But if the drops are ground with powder of emery and oil, or annealed by the fire, they will efcape breaking.

This furprifing phenomenon is fuppofed to arife from hence; that while the glafs is in fufion, or in a melted ftate, the particles of it are in a ftate of repulfion; but being dropped into cold water, it fo condenfes the particles in the external parts of their fuperficies, that they are thereby reduced within the power of each other's attraction, and by that means they form a fort of hard cafe, which keeps confined the before-mentioned particles in their repulfive ftate; but when this outer cafe is broke by the breaking off the tail of the drop, the faid confined particles have then liberty to exert their force, which they do by burfting the body of the drop, and reducing it to a very peculiar form of powder. See a paper on the phenomena and explication of thefe glafs-drops, by Dr. Le Cat, in the Philof. Tranf. vol. xlvi. p. 175, &c. See *Annealing of* Glass.

RUPERTS.

RUPERTSDORF, Hohen, in *Geography*, a town of Auftria; five miles S.W. of Ziſterſdorf.

RUPICAPRA, in *Zoology*, a fpecies of antilope. See Chamois. See alfo Ovis *Ammon*.

RUPICHSTERADT, in *Geography*, a town of the duchy of Berg; four miles N.E. of Blankenberg.

RUPINIA, in *Botany*, from *rupes*, a rock, alluding to its place of growth, is a name given in the Supplement of Linnæus to what Forfter had called *Aitonia*, after the celebrated curator of Kew garden; there being another *Aitonia* in that fame work. Mr. Dickfon difcovered, by examining original fpecimens, that Forfter's plant is no other than *Marchantia hemifphærica*, without fructification; the fuppofed *anthers* being nothing but the hairs of the leaf!

RUPITANI, a name given to the Donatifts. See Campitæ.

RUPOLY, in *Geography*, a town of Bengal; 22 miles W. of Purneah.

RUPPAN, a town of Bohemia, in the circle of Pilfen; 17 miles S. of Pilfen.

RUPPE, a town of France, in the department of the Vofges; eight miles N. of Neufchateau.

RUPPEL, a river of France, formed by the union of the Senne, the Demer, and the Dyle, which joins the Scheldt at Rupelmonde.

RUPPERTSGRUN, a town of Saxony, in the Vogtland; fix miles N. of Plauen.

RUPPIA, in *Botany*, was named by Linnæus, in memory of Henry Bernard Ruppius, native of Gieffen, a ftudent of phyfic, who foon gave up that and every other purfuit for botany. Haller characterizes him as "of fhort robuft ftature, with the eyes of a lynx, unwearied limbs, a penetrating genius, and moft tenacious memory." He travelled through various parts of Germany, living with the mountain cottagers, difdaining every indulgence, except the ftudy of plants. He feems to have died at an early age. The firft edition of the *Flora Jenenfis*, compiled from his papers, and arranged after the fyftem of Rivinus, which he much approved, was publifhed in 1718, by J. H. Schutte. Another came forth in 1726; and a third, under the care of Haller, with beautiful plates, in 1745. Each makes an octavo volume.—Linn. Gen. 68. Schreb. 92. Willd. Sp. Pl. v. 1. 717. Mart. Mill. Dict. v. 4. Ait. Hort. Hew. v. 1. 281. Purfh 121. Sm. Fl. Brit. 198. Prodr. Fl. Græc. Sibth. v. 1. 109. Juff. 19. Lamarck Illuftr. t. 90. Gærtn. t. 84. (Buccaferrea; Mich. Gen. 72. t. 35.)—Clafs and order, *Tetrandria Tetragynia*. Nat Ord. *Inundatæ*, Linn. *Naiades*; Juff.

Gen. Ch. *Cal.* Perianth none. *Cor.* none. *Stam.* Filaments none; anthers four, feffile, equal, roundifh, of two roundifh valves, burfting tranfverfely. *Pift.* Germens four or five, nearly ovate, crowded clofe together; ftyles none; ftigmas obtufe. *Peric.* none. *Seeds* four or five, ovate, oblique, each elevated on a long flender ftalk, and terminated by the permanent, flat, orbicular ftigma.

Eff. Ch. Calyx none. Corolla none. Seeds four, on long footftalks.

1. R. *maritima*. Sea Ruppia. Linn. Sp. Pl. 184. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 136. Lightf. Scot. 124. t. 8. f. 1. (Potamogiton maritimum, gramineis longioribus foliis, fructu ferè umbellato; Raii Syn. 134. t. 6. f. 1. Fucus ferulaceus; Ger. Em. 1573. Buccaferrea maritima, foliis acutiffimis; Mich. Gen. 72; as well as fol. minùs acutis; ibid. t. 35.)—Native of falt-water ditches, in moft parts of Britain, flowering in July, and ripening feed in Auguft. Dr. Sibthorp obferved it in Cyprus, as well as on the claffic fhore of Argos. Mr. Purfh fays it occurs about the mouths of moft rivers in America. The habit of the plant agrees with Potamogeton; fee that article. The *root* is probably annual. *Stems* capillary, very much branched, clothed with alternate, linear, more or lefs pointed *leaves*, which embrace the ftem with a membranous united *ftipula*. *Flower-ftalks* axillary, folitary, fimple, variable in length, according to the depth of the water in which the herb grows, and often fpiral, accommodating itfelf to any alteration, that the *flowers*, which ftand two together at the top, one a little above the other, may not be fpoiled by immerfion. The plant is moft diftinguifhable when in *fruit*, by means of the fingularly ftalked, and as it were umbellate, *feeds*. Dillenius, in his edition of Ray's *Synopfis*, greatly errs in reporting that the *flowers*, or *ftamens*, grow remote from the *fruit*, and that the latter appears firft.

Labillardiere, in his account of the plants of New Holland, v. 2. 116. t. 264, defcribes a *Ruppia antarctica*, whofe genus he merely conjectured, having feen nothing of the fructification. This is referred, perhaps more properly, though likewife from the habit only, by Mr. Brown, to Decandolle's genus *Caulinia*; fee Br. Prodr. Nov. Holl. v. 1. 339.

RUPPIN, New, in *Geography*, a town of the Middle Mark of Brandenburg, the capital of a county or circle of the fame name, containing two Lutheran churches, and 800 burghers. It is fituated on a large lake, formed by the river Rhine, and has confiderable manufactures of cloth. "Old Ruppin" is fituated on the fame lake, oppofite to New Ruppin; 30 miles N.N.W. of Berlin. N. lat. 52° 55′. E. long. 12° 55′.

RUPPOLI, a mountain of Etruria; 10 miles S.W. of Florence.

RUPRECHTSHOFEN, a town of Auftria; 12 miles S.E. of Ips.

RUPSTA, a town of Sweden, in Eaft Gothland; fix miles W. of Linkioping.

RUPTORIUM, in *Surgery*, a cauftic applied with a view of opening an abfcefs.

RUPTURE. See Hernia.

Rupture-*Wort*, in *Botany*. See Herniaria.

Although there be no foundation for the virtues afcribed to this plant, and implied in its name in the curing of ruptures; yet there is another cafe in which German phyficians ftrongly recommend it. It is in the diforder of the eyes which is brought on by reading or writing by candle-light, or by examining nice objects, or very fine work. This diftemperature feems to be properly a diminution of fight, without any apparent caufe, or vifible alteration in the eye, and is probably owing to a vifcid matter obftructing the optic nerves, and preventing a fupply of their proper fluid. The herniaria, being a gentle and mild attenuant, is fuppofed to be adapted for the relief of this diforder. Gruhlman De Novo Caliginis Remedio.

The author gives many inftances of the fuccefs of this remedy, and mentions two methods of giving it; the one in powder, and the other in tincture: the former way is preferred, and the method is to gather the herb in its prime, and powder it after it has been dried in the fhade; then to fprinkle the quantity of a fcruple of this powder on the bread and butter ufed for breakfaft. If this is not liked, the tincture is to be made with fpirit of wine, as ftrong as the plant will make it, and forty drops are to be taken every morning and evening in any liquor.

The diftemperature this is propofed to cure is very common, yet this is almoft the only thing, as it has been faid, that has been prefcribed by way of remedy, and deferves to

be

be fairly tried. But no modern practice seems to warrant the above-mentioned author's recommendation of it.

RUPUTTY, in *Geography*, a town of Hindoostan, in Bahar; 12 miles E. of Chuprah. N. lat. 25° 44'. E. long. 85° 11'.

RURAL, or RUSTIC, formed of *rus*, *ruris*, *country*, something that relates to the country.

RURAL *Dean*, in the *Ancient Church*. See DEAN.

RURAL *Economy*, a term which comprehends the amelioration and improvement of the landed and different other property, habits, and customs of a country, in whatever way or by whatever means of a rural nature they may be capable of being accomplished, as, whether in the laying out, inclosing, and cultivating the ground, or in the management of the different practices, operations, and processes which have a relation to it, or to its produce, the regulation of the various kinds of labour which attends them, as well as that of the sale of the different articles of provisions which are raised from it in the several fairs and markets, and the provision of a variety of substances which are necessary for use as fuel, as well as for many other purposes of the rural kind. In these views, the bettering of the condition of different sorts of land, by the particular modes and practices of husbandry which have been lately discovered, are of very great importance, as well as the improved management in feeding animals, dairying, and making a great number of other articles, and the working of different sorts of quarries and pits for the raising of materials which are useful in various rural intentions, besides those of being consumed as fuel.

There are many other kinds of works, establishments, and constructions which are partly of this nature, and which contribute in no small degree to the general improvement and advantage of a country, such as those of roads, so far as the state, form, and convenience of them are beneficial in this way; the construction of convenient railways for the more ready conveyance of weighty articles of slate, coal, and other kinds of produce; the formation of canals, and the widening and altering of rivers, for the benefit of water-carriage for different bulky matters; and the raising of embankments against the sea, or large rivers, for the better cultivation, protection, and acquisition of land. To which may be added, the establishing of fisheries of different kinds, and improving the management of them, as well as some other undertakings.

The rural habits and practices of a country, which are necessarily either different at different times, in consequence of the changes which are always taking place in the circumstances and conditions of it, or fixed by the hilly and mountainous nature of its surface, are constantly slow in their progress towards the state of amelioration and perfection; on which account, they and the industry of the rural population of a nation ought to be looked upon and considered in respect to what they were formerly at different periods of time, what they are now, and what there is the probability of their becoming by the progress of man in the state of society.

In the infant state of a country, while its riches and resources chiefly consist in the number of herds and flocks which it can support, the attention and exertion of the people are, for the most part, with much propriety, directed to the rearing, feeding, protection, and management of these sorts of live-stock. Afterwards, when the tillage system becomes, in some measure, to be connected and incorporated with the pastoral state, there is a division of their cares and labours, between the cultivation of the soil for the raising of grain, and the attendance on their cattle, stocks, and sheep flocks. And ultimately, when the benefits and numerous advantages of commerce begin to be known and appretiated, no small part of them leave the cattle and the tillage plan for that of trade, and the manufacturing of different kinds of articles for its use and benefit.

The history of all nations, as well as that of the same nation at different periods of time, furnishes numerous instances in proof of these progressive stages of change in their rural state. It is therefore a great absurdity, as well as error, to stigmatize and reprobate the customs and practices of a people or country, in any one of such stages or changes of their rural means, by the comparison of those of another, as the object of their industry and application is widely different at the different times, and consequently the test by which they ought to be judged of, must be equally different. Thus, the condemnation and reprehension of particular modes, practices, and habits of the rural kind, from preconceived notions peculiar to the situation and way of life in which the persons have been themselves placed, are highly preposterous and foolish, as any one is well employed in pursuing an useful and laudable occupation or undertaking with industry and perseverance, whatever the nature of it may be, whether it be that of tending and managing herds and flocks, or that of conducting some other business, practice, or process, each contributing to the convenience of the community, however different their engagements may be, or the rank which they hold in society.

The practice and custom of attending herds and flocks, which prevailed in a certain stage of society in all countries, was more quickly departed from in cases where the land was suitable for the purposes of tillage than in other instances; but most so on the sea-coasts and the banks of navigable rivers.

Improvements of this nature are always highly deserving the attention and encouragement of the public, on account of the general influence which they have in promoting and bettering the state and condition of society; as they may be said to embrace the introduction of whatever is useful and advantageous, as well as, in some measure, what is ornamental, into a country. These beneficial changes and alterations are accomplished in a great variety of different ways, and by a number of different methods, but principally by the discovery of new means, the cultivation of what has been formerly overlooked or neglected, and by having recourse to superior and more enlightened modes of management in the whole. In this manner a vast increase of produce of different kinds, as well as of national wealth, may be brought forth, and at the same time much ornamental effect and convenience be produced.

RURAL *Architecture*, the nature of any sort of country building, but principally those of the farm or agricultural kind. See FARM.

RURAL *Artificers*, all those persons who are employed in the making of any sort of tool, implement, or machinery, for the purpose of agriculture, husbandry, or any other rural art or business. The excellencies or defects of these sorts of workmen depend upon their ingenuity and knowledge of the nature of mechanism in general, or their deficiency in both these respects.

Wherever the construction of machinery has made any considerable progress, there is most commonly a portion of the same spirit diffusing itself among the rural artificers of the same neighbourhood; but where this has not happened, the contrary is always the case. It is, however, of vast importance to the farmer and landed interest in general to be in possession of, or capable of procuring, ingenious and intelligent workmen of this description, as the progress

and

and advancement of the art of farming greatly depends upon it.

The writer of the Agricultural Report of the County of Middlesex has remarked, that not only the common wheelwrights and smiths of that diſtrict have no ideas of machinery, or the capacity of executing any thing from drawings or ſpecifications; but that the generality of the farmer's labourers are equally ſtupid, and unwilling to execute their work in any way to which they are not accuſtomed. Hence, it is contended, the difficulty of introducing any thing new in the implements or practice of huſbandry is almoſt inſurmountable. Even the moſt trifling alteration, or deviation from the old ſyſtem or plan, is reſiſted, it is ſaid, both by the artificers and labourers; and every poſſible obſtruction thrown in the way of the farmers, to prevent what they deem an innovation on the eſtabliſhed cuſtom of the place, or part of the county where it may take place. The ſame is the caſe in regard to all the more complex kinds of machinery, as it is aſſerted that it is abſolutely impoſſible to get a plough, a threſhing-mill or machine, a winnowing machine, or indeed any other ſimilar ſort of implement of huſbandry, conſtructed on a good principle by the artificers of this county; and that it is not much leſs difficult to induce the labourers to make uſe of them, when they are brought from any other place at a diſtance. Thus the farmer is reduced to the neceſſity of treading in the ſteps of his forefathers, though the practice may be at war with his own better judgment and inclination; and many uſeful alterations and improvements in the art of cultivation retarded and kept back.

But though there may be ſome expert, ingenious, and ſenſible mechanics in a diſtrict, who are capable, and fully competent to execute orders for all kinds of implements and machinery, which may be uſeful or neceſſary to the different purpoſes of agriculture and huſbandry, their exertions and labours are often more conſiderably leſſened in utility and value than might be ſuppoſed, on account of the unavoidable wear and tear which they undergo, neceſſarily ſubjecting them to frequent repairs, which are utterly impoſſible to be got done in any ſkilful manner by the common country artificers; and the great inconvenience, expence, and loſs of time, which muſt be ſuſtained by ſending them for ſuch purpoſes to the original conſtructors of them, who are not unfrequently at a great diſtance. This is another great drawback on improvements in the practice of farming.

Mere theoretical cultivators, who have not experienced theſe difficulties and inconveniencies, and are ſo frequently condemning the whole body of farmers as obſtinately reſiſting every attempt at improvement in the art, often diſplay their own want of knowledge and ſuperficialneſs on the ſubject, by beſtowing that degree of reprobation and cenſure on the farmer, which ought to have been applied to his labourers and rural artificers.

The proper encouragement of good and expert rural artificers is conſequently a matter which tends greatly towards promoting and bettering the ſtate and condition of agriculture, in various eſſential points, as well as to augment and render its conveniencies much more numerous and beneficial.

Rural *Buildings* and *Seats*, in *Gardening*. See Retreat and Seat.

Rural *Gates*, in *Ornamental Gardening*, are ſuch as are employed for ornamenting the entrances to country reſidences, or other ſimilar purpoſes. They ſhould have a form and conſtruction, ſo as in ſome meaſure to harmonize and accord with the nature and ſtyle of the reſidence to which they are to belong; the ſame general principles being, in ſome degree, applicable here as in the caſe of rural lodges. It is indeed ſuggeſted, that they both preſent ample ſcope for invention, which has been productive of two great evils: the firſt of which is, that too many deſigns of this nature have been given to the public; and the latter, that the proprietors and other perſons have adopted, copied, and executed them, without any regard to the nature of the ſituation, or the character of the manſion or reſidence to which they are to be affixed. It is believed that no perſon will require proofs of this, who has ſeen any thing of the country. In regard to what relates to economy and utility in gates for common purpoſes, it may be ſeen under the head Gate.

Rural *Lodges*, are ſuch adorned ſmall buildings as are neceſſary for the entrances, or other parts of the approaches or drives of country reſidences. Thoſe for the former, according to the opinion of Mr. Loudon, ſhould be deſigned and conſtructed in a character and on principles ſomewhat analogous to that of the reſidence to which they belong; while thoſe of the latter, or for the drives, ſhould ſeldom be more than improved rural cottages, unleſs the nature of the ſituation ſhould ſuggeſt ſome peculiarity of form, or deſcription of them. It is ſuppoſed, that the notion of appropriating a country, by ſtamping all ſuch buildings, as well as ſome others, with ſomething which may denote the continuation of the proprietor's eſtate, is only calculated to gratify the vanity and oſtentation of ſuch perſons. The truly great, it is conceived, need nothing to make them appear ſo; and in the country, they will ever be more aſſiduous to render themſelves agreeable to their neighbours, than to ſhew the unſociable diſpoſition of monopolizing territory. In regard to their grounds, it is ſuggeſted that they will be ready with Marlborough, Argyle, Howard, and other noble proprietors of grand reſidences, to ſay with the marquis of Ermeonville, "This, the farm, only is ſhut up; the three others, the wood, the foreſt, and the meadow, are open to every body; and I only wiſh that they ſhould think themſelves as much at home as if they belonged to them." On the whole, thoſe ſorts of buildings ſhould always partake ſomewhat of the nature of the ſituations, and the ſtyles of building in the reſidences to which they are to be attached. See *Country* Residence.

RUREMONDE, or Roermond, in *Geography*, a town of France, and principal place of a diſtrict, in the department of the Lower Meuſe, late of Upper Guelderland, in the Auſtrian Netherlands, ſituated at the conflux of the Roer and Meuſe. It derives its name from that of the former river and the term *Mondt*, ſignifying mouth, both expreſſing its ſituation at the Mouth of the Roer. It was encompaſſed with walls and ſix gates by Otho, ſurnamed the Cripple, 14th count of Guelderland. In 1290 it obtained from Rodolphus the privilege of coining money; and in 1562 it was created into a biſhopric by pope Paul IV., under the archbiſhopric of Malines. The cathedral is the only pariſh church. Its magiſtracy is compoſed of nine echevins and two ſecretaries. In 1665 an accidental fire deſtroyed almoſt all the houſes, convents, and the biſhop's palaces. It has been often taken and retaken by the Dutch and Spaniards, in their civil wars; 30 miles N. of Aix-la-Chapelle. The town contains 3788, and the canton 14,621 inhabitants, on a territory of 222½ kiliometres, in 20 communes. N. lat. 51° 12′. E. long. 5° 50′.

RUREY, a town of France, in the department of the Doubs; 4 miles E. of Quingey.

RURROW, a town of Hindooſtan, in Dooab; 30 miles E. of Etaya.

RUS, a mountain of Arabia, in Yemen; 8 miles S. of Sana.

RUSAZUS, in *Ancient Geography*, a town of Africa, on the coast of Mauritania Cæsariensis, between Rusubirsis and Vabar, according to Ptolemy. Pliny gives to this town the appellation of Colonia Augusta; and in the Itinerary of Antoninus it is named Rusazis Municipium, and placed between Iomnium Municipium and Saldis Colonia.

RUSBACH, in *Geography*, a river of Austria, which runs into the Danube, 2 miles above Hainburg.

RUSBACH, *Hohen*, a town of Austria; 9 miles N. of Korn Neuburg.

RUSCEK, a town of European Turkey, in Bulgaria, on the Danube; in which are 20 mosques, 3 churches, and a Jews' synagogue. It is defended by a castle, with a garrison; 50 miles E. of Nicopoli. N. lat. 53° 52'. E. long. 25° 15'.

RUSCINO, in *Ancient Geography*, a town of Gallia Narbonnensis, the capital of the people called Consuarani. It was in this town that the people of the country assembled, to deliberate on the passage demanded by Hannibal, according to Livy, lib. xxi. cap. 24. It was a Roman colony, according to Mela; and Pliny says, that it enjoyed the jus Latinum. It was ruined by the Normans, and its name is preserved in Roussillon. In the Itinerary of Antonine, this town was marked on the route from Narbonne to Castulo, between Combusta and Ad Centuriones.—Also, a river of Gallia Narbonnensis, according to Strabo, who says that it had its source in the Pyrenées, and watered a town of the same name. Ptolemy calls it Ruscio, and places its mouth between those of the Illiberis and Atages.

RUSCINONA, a port of Africa, whither, according to Dr. Shaw, the Carthaginian fleet retired, the night before it engaged with Scipio near Utica. This name is said to be of Phœnician origin; the first part of it, *Rus* or *Ras*, denoting cape; and the latter, *annona*, expressing the great quantity of corn and provisions that were shipped off from this place. These circumstances lead Shaw to conclude, that Ruscinona is the present "Porto Farina," on the coast of Tunis, called by the inhabitants, from an ancient saltwork near it, "Gar-el-Mailah," *i. e.* the cave of salt. This port, especially the Cothon, or inward part of it, is safe in all accidents of weather, and opens into a large navigable pond, formed by the Majerdah or ancient *Bagrada*, which at present discharges itself through it, in its way to the sea. The town belonging to this port was formerly very considerable.

RUSCIUD, in *Geography*, a river of Persia, which runs into the Persian gulf, 48 miles W. of Ormus.

RUSCUNIÆ COLONIA, *Temendfuse*, in *Ancient Geography*, a promontory and colony of the eastern part of Mauritania Cæsariensis, according to Ptolemy, Pliny, Mela, and the Itinerary of Antonine. Antonine places it 15 miles E. of Icosium. The ruins are still visible.

RUSCURIUM, RUSUCCORÆ of Ptolemy, and the *Rusuccuro* of the Peutingerian Tables, now *Dellys*, formerly an ancient city, but at present a small town, of Africa, on the coast of Algiers, situated partly at the foot and partly upon the declivity of a high mountain. In a wall, just over the harbour, is a small niche, with an image, in the attitude of a Madonna; but the features and drapery, says Dr. Shaw, are defaced.

RUSCUS, in *Botany*, an ancient name, whose derivation has been given up by most authors, as hopeless. De Theis justly observes, that it was originally *Bruscus*, and this leads him to the Celtic name of the plant in question, *Beuskelen*, equivalent to Box-holly, which is certainly the best explanation that has ever fallen in our way.—Linn. Gen. 534. Schreb. 709. Willd. Sp. Pl. v. 4. 874. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 420. Sm. Fl. Brit. 1073. Juss. 42. Lamarck Illustr. t. 835. Gærtn. t. 16.—Class and order, *Dioecia Triandria*. (*D. Syngenesia*, Linn. *D. Monadelphia*, Willd.) Nat. Ord. *Sarmentaceæ*, Linn. *Asparagi*, Juss.

Gen. Ch. Male, *Cal.* Perianth of six ovate-oblong, rather spreading, convex leaves, reflexed at the sides. *Cor.* Petals none, except three alternate leaves of the calyx be taken for such. Nectary central, ovate or cylindrical, the size of the calyx, hollow, erect, coloured, perforated at the summit. *Stam.* Filaments none; anthers three, spreading, seated on the extremity of the nectary, connected at the base. *Pist.* obsolete.

Female, *Cal.* as in the male. *Cor.* Petals as in the male. Nectary the same. *Pist.* Germen superior, oblong-ovate, concealed within the nectary; style cylindrical, the length of the nectary; stigma obtuse, projecting out of the orifice. *Peric.* Berry globose, of three cells. *Seeds* two in each cell, globose.

Obs. There is one species, *R. racemosus*, with united flowers, whose calyx is globose, with six segments at the mouth only. It is seldom that in this genus and its allies, *Smilax*, *Tamus*, *Convallaria*, &c., the seeds all come to maturity. One of them commonly suffocates the rest.

Ess. Ch. Male, Calyx of six leaves. Petals none. Nectary ovate, tubular, bearing the stamens on its margin within.

Female, Calyx and Nectary like the male. Stamens none. Style one. Berry superior, of three cells, seeds originally two in each cell.

The species of this genus are not in general truly shrubby, but biennial evergreens, with perennial roots. Their young shoots resemble asparagus.

The substance of the herbage is peculiarly hard and rigid. The green colour either dark and opaque, or bright and polished. Flowers in most instances borne by the leaves.

1. R. *aculeatus*. Prickly Butcher's-broom. Linn. Sp. Pl. 1474. Willd. n. 1. Ait. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 560. Woodv. Med. Bot. suppl. t. 237. Mill. Illustr. t. 96. (Ruscus; Ger. Em. 907. Matth. Valgr. v. 2. 555. Camer. Epit. 935.)

β. R. laxus; Sm. Tr. of Linn. Soc. v. 3. 334. (R. flexuosus; Mill. Dict. ed. 8. n. 6.)

Leaves sharply pointed, flowering on the upper side, without a leaflet.—Native of bushy woody places, throughout the middle and southern countries of Europe, especially on a gravelly or barren soil, flowering early in spring. Not uncommon in England. The variety β was observed at Stoke, near Gosport, by Mr. G. Caley, growing plentifully. This is an old inhabitant of Chelsea garden, and we have no hesitation in adopting professor Martyn's opinion, as to Miller's synonym. The *root* of this species is branched, and rather creeping. *Plant* truly herbaceous, though so firm and rigid. After living one year without flowering, and remaining in leaf all the winter, it dies down to the root, after ripening fruit, in the following autumn. Every part is devoid of pubescence. *Stems* about two feet high, round, striated, branched, rather spreading. *Leaves* alternate, spreading every way, not quite sessile, twisted, hard, ovate, entire, tipped with a sharp thorn, and bearing a solitary pale *flower* about the middle of their upper side. *Nectary* purplish. *Berry* scarlet, the size of a black currant, with a ſweet pulp, encloſing one or two large, ſhining, globular, horny or ſemitranſparent *ſeeds.* The above-mentioned variety has longer, more lax, *branches,* and elliptical *leaves,* tapering at each end; but there are many intermediate ſtates, which connect it with the common kind. Mr. Woodward has rightly obſerved, that the *flower* has a real ſtalk, immerſed in the *leaf,* under the cuticle. We would remark, that the ſtrict union of the leaves and the branches, in this genus, is like that of Moſſes, and Ferns, which laſt they reſemble further in mode of infloreſcence, and exceed them in firmneſs of texture.

2. R. *Hypophyllum.* Broad-leaved Butcher's-broom. Linn. Sp. Pl. 1474. Willd. n. 2. Ait. n. 2. (Laurus alexandrina et Chamædaphne; Column. Ecphr. 164. t. 165. f. 1.)

β. R. latifolius, fructu in medio foliorum extra pendente; Till. Piſ. 149. Dill. Elth. 333. t. 251. f. 323.

Leaves flowering on the under ſide, without a leaflet.—Native of rather hilly ſituations in Italy. Dr. Sibthorp gathered it alſo on mount Athos, in ſhady woods, and took it for the Χαμαιδαφνη of Dioſcorides, of which we conceive there can be no doubt. The *roots* are much like thoſe of the foregoing, but the *plant* is not branched, and the *leaves* are much larger, more elliptical, with an acute, but not ſpinous, point. Each *leaf* bears, from the middle of its under ſide, a pair of ſtalked pendulous *flowers,* whoſe ſegments and *nectary* are of a more ſlender form than in the *aculeatus.* Their *ſtalks* are accompanied at the baſe by a ſmall ſcaly *bractea,* but not by any acceſſory leaf, as in the following. The *berries* are red.

3. R. *Hypogloſſum.* Double-leaved Butcher's-broom. Linn. Sp. Pl. 1474. Willd. n. 3. Ait. n. 3. Sm. Fl. Græc. Sibth. t. 955, unpubliſhed. (Hippogloſſum Dioſcoridis, et Lauro-Taxa Plinii; Column. Ecphr. 166. Hypogloſſon; ibid. t. 165. Δαφνη αλεξανδρεια, Dioſc. *Sibth.*)—Leaves flowering on the upper ſide, under a leaflet.—Native of Hungary, Italy, mount Athos, and the borders of the Black ſea, in buſhy, rather hilly ſituations. Gerarde appears to have cultivated it in 1596. The plant is kept in ſome curious gardens, where it bloſſoms imperfectly early in ſpring, but we have never ſeen the berries, which in Dr. Sibthorp's figure make a beautiful appearance, being of a deep rich ſcarlet, the ſize of black currants. The habit of this ſpecies is like the laſt, but the *leaves,* though variable in breadth, are commonly narrower, and particularly diſtinguiſhed by the ſmall leaf on their diſk, from beneath which proceeds a ſolitary, ſtalked, pale-green *flower,* with a ſlender, purpliſh, curved, furrowed *nectary.* The *ſtems* are ſimple, ſcarcely a foot high, not quite erect.

4. R. *androgynus.* Climbing Butcher's-broom. Linn. Sp. Pl. 1474. Willd. n. 4. Ait. n. 4. (R. latifolius, è foliorum ſinu florifer et baccifer; Dill. Elth. 332. t. 250.)—Stem twining, branched. Leaves flowering at the edge.—Native of the Canary iſlands, and long cultivated in England, where it proves a hardy green-houſe plant, flowering moſt part of the ſummer. We have never ſeen this ſpecies in ſuch perfection as in the celebrated garden of the late Dr. Fothergill at Upton, where, under the foſtering care of his worthy ſucceſſors, ſeveral relics of his collection ſtill remain. The *Ruſcus,* trained up the inſide of the old green-houſe, to the height of many feet, makes a very elegant appearance with its broad, ovate, drooping *leaves,* of a rich ſhining green, from one of whoſe margins proceeds a copious tuft of cream-coloured *flowers,* male and female on the ſame plant. The *berries* are deſcribed by Dillenius nearly the ſize of the laſt, yellowiſh, and uſually ſolitary, one ripe *ſeed* in each.

5. R. *racemoſus.* Alexandrian Laurel, or Cluſtered Butcher's-broom. Linn. Sp. Pl. 1474. Willd. n. 5. (Laurus alexandrina anguſtifolia ramoſa; Moriſ. ſect. 13. t. 5. f. 4. L. alexandrina, fructu è ſummitate caulium prodeunte; Herm. Lugd. Bat. 679. t. 681.)—Stem erect, branched. Cluſter terminal. Flowers united.—Native of Portugal, according to Mr. Aiton. Linnæus was unacquainted with its origin, and Willdenow by miſtake, it ſeems, mentions the iſlands of the Archipelago, as Dr. Sibthorp did not obſerve the plant any where in his tour, though he could not poſſibly have over-looked it at any ſeaſon of the year. Nothing is more common in ſhrubberies, and ruſtic gardens. The *ſtems* are buſhy, from two to four feet high. *Leaves* ſeſſile, lanceolate, twiſted, of a bright and poliſhed green. *Flowers* in terminal cluſters, pale buff or cream-coloured, the *ſtamens* and *piſtils* complete in each flower, but they afford no great quantity of *fruit;* except occaſionally, in retired country ſituations, where the herb grows luxuriantly. The *berries* are orange-coloured.

6. R. *reticulatus.* Reticulated Butcher's-broom. Thunb. Prodr. 13. Willd. n. 6.—"Stem climbing. Leaves ovate, many-ribbed, reticulated. Flowers ſolitary, ſtalked."—Native of the Cape of Good Hope.

7. R. *volubilis.* Twining Butcher's-broom. Thunb. Prodr. 13. Willd. n. 7.—"Stem twining. Leaves ovate-oblong, many-ribbed."—From the ſame country. We know nothing of this or the laſt, but from Thunberg's ſhort definitions.

Miller has a *R. trifoliatus,* from Zante and the Greek iſlands, which profeſſor Martyn juſtly prefers to *Hypophyllum.* The ſame author deſcribes another ſpecies, under the name of *R. fruteſcens,* gathered by Houſtoun near Carthagena. This we conceive to be a *Jacquinia;* probably the *ruſcifolia* of Linnæus.

Ruscus, in *Gardening,* contains plants of the ſhrubby and under-ſhrubby evergreen kind, of which the ſpecies cultivated are, the prickly-butcher's-broom (R. aculeatus); the broad-leaved butcher's-broom (R. hypophyllum); the double-leaved butcher's-broom (R. hypogloſſum); the Alexandrian laurel (R. racemoſus); and the climbing butcher's-broom (R. androgynus).

Method of Culture.—Theſe plants are capable of being readily increaſed by the roots, which ſend up numerous ſtalks or ſuckers, which may be taken up in autumn, winter, or ſpring in open weather, and divided into many ſeparate ſets, each forming a proper plant, though they need not be divided very ſmall unleſs where a great increaſe is required, planting the largeſt at once where they are to remain, and the ſmalleſt in nurſery rows, &c., when each plant ſoon increaſes by offsets, and aſſumes a buſhy growth. They are alſo capable of being raiſed from ſeeds, but they often remain in the ground till the ſecond ſpring. The ſeeds of the hardy ſort ſhould be ſown in any bed or border an inch deep, and the tender kind in pots, placed under ſhelter in cold weather; and when the plants are a year old, pricking them out in March, the hardy ſorts in nurſery-beds for two or three years, and the tender ſorts in pots.

All the different hardy ſorts are proper for being placed out near the verges of ſhrubberies, or any cloſe plantations, as they thrive under the drip of trees, and remain green the year round. But the laſt tender ſort requires the ſhelter of a green-houſe in winter, where it affords variety among other potted plants of that kind.

RUSE, in *Geography,* a town of European Turkey, in Romania; 60 miles N.E. of Adrianople.

RUSECK, a town of Bohemia, in the circle of Koniggratz; two miles N. of Koniggratz.

RUSEI, a town of Walachia, in the Kodmana; 45 miles W. of Bucharest. N. lat. 44° 21′. E. long. 24° 47′.

RUSGUNIA, in *Ancient Geography*, *Rustonium* of Ptolemy, *Ruthisia* of Mela, and *Rusconia* of Pliny and others, a cape near Algiers, on the coast of Africa, now Temendfuse, or Metasus, with a tabled land, as the mariners call a flat hillock that rises up in the middle of it. The Turks have here a small castle for the security of the adjacent roads, once the chief station of their navy, where are still the traces of an ancient Cothon, with several heaps of ruins of the same extent with those of Tefessad, and which have no less contributed to the fortification of Algiers.

RUSH, Benjamin, in *Biography*, an eminent physician, and professor of the institutes and practice of medicine in the university of Pennsylvania, was born near Bristol, in the state of Pennsylvania, on the 5th of January, 1745. His ancestors belonged to the society of Quakers, and were of the number of those who followed the celebrated William Penn to Pennsylvania, in the year 1683: his grandfather, James Rush, resided on his estate near Philadelphia, and died in the year 1727: his son, who was the father of the subject of these memoirs, inherited both his farm and his trade, which was that of a gun-smith. He died while Benjamin was yet young. His widow, a most excellent woman, upon whom the education of young Rush thus necessarily devolved, placed him, at an early age, under the direction of the late Rev. Samuel Finley, at West Nottingham, in Chester county, Pennsylvania, by whom he was taught the rudiments of classical knowledge. Dr. Finley, afterwards better known as the president of Princeton college, New Jersey, was an able scholar and faithful teacher, and, being also related to Mrs. Rush, may be supposed to have paid great attention to the improvement of his young pupil. But whatever may have been the assiduity with which his education was directed by his preceptor, he possessed an ardent desire for knowledge, and was most unwearied in the pursuit of it.

From the academy of Dr. Finley he was removed to the college of Princeton, where he finished his classical education, and was admitted to the degree of A. B. in 1760, when he had not yet completed his sixteenth year. He was now left to choose a profession, and in the choice which he made, he doubtless was actuated by conscientious motives. He seems to have fully known his own character, and to have formed a proper estimate of his talents, and by applying them to the science and practice of medicine, to have been desirous of doing all possible good to the family of mankind. That he was directed by these motives, may be inferred from his own opinion of the utility of medicine. "So great," says he, "are the blessings which mankind derive from it, that if every other argument failed to prove the administration of a providence in human affairs, the profession of medicine would be fully sufficient for that purpose."

He accordingly, soon after leaving college, placed himself under the care of the late Dr. John Redman, of Philadelphia, a gentleman who had deservedly obtained an extensive share of professional business, and who was justly considered an excellent practitioner. With Dr. Redman young Rush continued some time, zealously engaged in the acquisition of the several branches of medicine. At that day, however, no institution for the purpose of medical instruction was established in Philadelphia, and his thirst for knowledge being rather excited than gratified with what he had learned from his preceptor, he formed the resolution of going abroad in order to avail himself of those advantages which were not within his reach in his native country. The university of Edinburgh, at that time, was at the zenith of its reputation, and justly boasted of its able professors, among whom were the elder Munro, the elder Gregory, Dr. Cullen, and Dr. Black. Thither Rush repaired, and was graduated M.D. in 1768, after having performed the usual collegiate duties with much honour, and published his inaugural dissertation "De Concoctione Ciborum in Ventriculo." In this performance he candidly acknowledged himself indebted, for many of the opinions which he advanced, to his distinguished teacher Dr. Cullen.

About the period of Dr. Rush's return to his native country, the first attempt was made in Philadelphia for the organization of a medical school. Lectures on anatomy and surgery had indeed been delivered in that city, in 1763 and 1764, to a small class of pupils, by the late Dr. William Shippen, who, two years before, had returned from Europe, where he had completed his education under the direction of the celebrated Dr. William Hunter; and, in 1765, Dr. John Morgan, also, gave instruction on the institutes of medicine and the practice of physic. Three years after this, the venerable Dr. Kuhn, who had been a pupil of the illustrious Linnæus, and had preceded Dr. Rush in his medical honours at Edinburgh only one year, was made the professor of botany and the materia medica. To this list of teachers, Dr. Rush himself was added as professor of chemistry, immediately upon his arrival from England in 1769. Such was the first organization of the medical college of Philadelphia.

That Dr. Rush had, in an eminent degree, the qualifications of a teacher, and discharged with exemplary fidelity the important duties belonging to the elevated station to which he was chosen, the popularity attending his lectures, the yearly increase in the number of his hearers, and the unexampled growth of the college with which he was connected, bear ample testimony. Shortly after this period, he was elected a fellow, and also one of the curators of the American Philosophical Society.

While Dr. Rush was thus engaged in the active pursuits of his profession, the dispute of the then American colonies with Great Britain arose. Considering the claims of the British government unjust, he entered with warmth into the defence of the rights of his countrymen. His talents were already well known, and the fullest confidence was placed in his integrity and patriotism. The crisis demanded his services; and in the year 1776 he was chosen a member of congress for the state of Pennsylvania, and, on the 4th of July, with eight other delegates from that state, he signed the instrument of independence. Upon the 11th day of April, 1777, he was appointed surgeon-general of the military hospital in the middle department. His colleague in the medical school, Dr. Shippen, on the same day was appointed director-general of all the military hospitals for the armies of the United States, and Dr. J. Jones was made physician-general of the hospital in the middle department. The office of surgeon-general was not long held by Dr. Rush, for upon the 1st of July, 1777, he was created physician-general of the hospital, in the middle department, in the room of Dr. Jones.

On the 6th of February ensuing, Dr. Rush resigned the station of physician-general, and Dr. William Brown was appointed in his place.

Doctor Rush, however, still continued to take an active part in the politics of the state to which he belonged. The original government of Pennsylvania is known to have been perfectly unique in its form, and the constant source of incalculable mischief. The house of representatives, chosen annually by the people, and on which there was no check, was the sole legislative power; and each succeeding assembly often made it their business to undo all that their predecessors had done. This kind of government was justly reprobated by Dr. Rush, and the necessity and wisdom of a reformation in it were too apparent not to be attempted. Dr. Rush, and many other distinguished abettors of the cause, had soon after the satisfaction of seeing a new form of government established in Pennsylvania, by a general convention of the people.

Soon after, he formed the resolution of retiring from political life, and of devoting the remainder of his days, with increased ardour, to his profession. He was still further induced to this resolution, from the consideration of the state of medicine in his native country at that time, which, it is scarcely necessary to remark, was in a very low condition. Happy for medical science and the interests of humanity, that he so early formed such a resolution, and that he was so steady, uniform, and indefatigable in the accomplishment of it!

During the long and brilliant career of Dr. Rush's life, from this time to its termination, he may be considered as exclusively occupied in duties pertaining to his profession, and not unlike another Howard, in "surveying the mansions of sorrow and pain," and in mitigating and removing the distresses of all within his power. His biography, therefore, like that of most other scientific men, consists chiefly in a history of his professional labours. How numerous and important his services, as an author, have been, will be readily seen from a brief detail of his writings, which we shall attempt to give, as nearly as practicable, in chronological order.

The first fruits of his professional labours, as an author, was an account of the effects of the Stramonium, or thorn apple; this appeared in the year 1770, and was published in the Transactions of the American Philosophical Society, vol. i. The same year he addressed a letter, on the usefulness of Wort in ill-conditioned ulcers, to his friend Dr. Huck, of London, which was published in the Medical Observations and Inquiries of London, vol. iv. In 1774 he read, before the Philosophical Society, his interesting Inquiry into the Natural History of Medicine among the Indians of North America, which formed the subject of an anniversary oration. He this year again addressed another letter to Dr. Huck, containing some remarks on Bilious fevers, which was printed in the London Medical Observations and Inquiries, vol. v. To this succeeded his Account of the Influence of the Military and Political Events of the American Revolution upon the Human Body, and Observations upon the Diseases of the Military Hospitals of the United States, which his situation in the army eminently qualified him to make. In 1785 he offered to the Philosophical Society of Philadelphia an Inquiry into the Cause of the Increase of Bilious and Intermitting Fevers in Pennsylvania, published in their Transactions, vol. ii.; and soon after, in quick succession, appeared Observations on Tetanus, an Inquiry into the Influence of Physical Causes upon the Moral Faculty, Remarks on the Effects of Ardent Spirits upon the Body and Mind, and his Inquiry into the Causes and Cure of the Pulmonary Consumption. About this time, also, appeared his paper entitled Information to Europeans disposed to migrate to the United States, in a letter to a friend in Great Britain; a subject which had already occupied the attention of Dr. Franklin, but which Dr. Rush considered still further deserving notice, on account of the important changes which the United States had lately undergone. To this paper followed his Observations on the Population of Pennsylvania, Observations on Tobacco, and his Essay on the Study of the Latin and Greek Languages, which was first published in the American Museum of Philadelphia. This last-mentioned paper, which has been the fertile topic of much animadversion, was, with several other essays of Dr. Rush, and his Eulogiums on Dr. Cullen and the illustrious Rittenhouse, the former delivered in 1790, the latter in 1796, embodied in an octavo volume, entitled Essays, Literary, Moral, and Philosophical, and published in 1798.

In 1791, the medical colleges of Philadelphia, which, on account of certain legislative proceedings, had existed as two distinct establishments since the year 1788, became united under the name of the University of Pennsylvania; and Dr. Rush was appointed to the chair of the professorship of the institutes of medicine and clinical practice. He now gave to the public his Lectures upon the Cause of Animal Life. The same year he presented the Philosophical Society his Account of the Sugar Maple Tree of the United States, which was published in their Transactions, vol. iii.; and in 1792, Observations, intended to favour a supposition that the Black Colour of the Negro is derived from Leprosy; published in their Transactions, vol. iv.

The year 1793 is memorable in the medical annals of the United States, on account of the great mortality occasioned by the yellow fever, which prevailed in the city of Philadelphia; and the history of that epidemic, which was published by Dr. Rush in 1794, cannot be too highly valued, both for his minute and accurate description of the disease, and the many important facts he has recorded in relation to it. It was comprised in one volume octavo, and has undergone several editions, and been extensively circulated in the Spanish and in the French languages. About this period, also, he offered to the medical world his observations on the Symptoms and Cure of Dropsy in general, and on Hydrocephalus Internus; an Account of the Influenza, as it appeared in Philadelphia in 1789, 1790, and 1791; and Observations on the State of the Body and Mind in Old Age. In 1797 came out his Observations on the Nature and Cure of Gout, and on Hydrophobia; an Inquiry into the Cause and Cure of the Cholera Infantum; Observations on Cynanche Trachealis, &c.

It is proper to state, as connected with the literary labours of Dr. Rush, that in 1788, many of his medical papers were collected together, and that he offered them to the public under the title of Medical Inquiries and Observations, vol. i. These he, from time to time, continued, embracing most of the writings above enumerated, besides observations on the climate of Pennsylvania, and some others, until a fifth volume was completed in 1798. In 1801 he added to his character as a writer, by the publication of six Introductory Lectures to a course of Lectures upon the Institutes and Practice of Medicine, delivered in the University of Pennsylvania. In 1804 a new and corrected edition of his Medical Inquiries, &c. was printed in four volumes, octavo. In 1806 he also published a second edition of his Essays. In 1809, such was the demand for the Medical Inquiries and Observations, he again revised and enlarged the work throughout, and enriched the medical profession with a third edition. In this edition he continued his several histories of the yellow fever, as it prevailed in Philadelphia from 1793 to 1809. It also contained a Defence of Blood-letting, as a Remedy for certain Diseases; a view of the comparative state of Medicine in Philadelphia between the years 1760 and 1766, and the year 1809; an Inquiry into the various sources of the usual forms of Sum-

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mer and Autumnal Difeafes in the United States, and the means of preventing them; and the recantation of his opinion of the Contagious nature of the Yellow Fever.

He now formed the idea of felecting fome of the beft practical works for republication in America, and in order to render them more ufeful, of adding to them fuch notes as might the better adapt them to the difeafes of his own country. His editions of Sydenham and of Cleghorn were publifhed in 1809, and in 1810 appeared thofe of Pringle and Hillary. In 1811 appeared a volume of Introductory Lectures, containing thofe he had formerly publifhed, with ten others delivered at different years before his clafs, and alfo two upon the pleafures of the fenfes and of the mind. His work upon the Difeafes of the Mind, which had long and ardently been looked for, was next added to his writings. It appeared towards the clofe of 1812, in one volume octavo. The laft effort of his pen was a letter on Hydrophobia, containing additional reafons in fupport of the theory he had formerly advanced, as to the feat of the difeafe being chiefly in the blood-veffels. It was addreffed to Dr. Hofack, and written not many days before his fatal illnefs.

While thus affiduoufly engaged in enriching medical fcience with the valuable fruits of his long and extenfive experience, and in the active difcharge of the practical duties of his profeffion, he was, on the evening of the 13th of April, feized with fymptoms of general febrile irritation, which were foon accompanied with confiderable pain in his cheft. His conftitution was naturally delicate, and he had acquired, from previous illnefs, a predifpofition to an affection of his lungs. He loft a moderate quantity of blood, by which he felt himfelf confiderably relieved. But his ftrength was not fufficient to overcome the feverity of his complaint; the beneficial effects refulting from the moft fkilful treatment were but of temporary duration. His difeafe rapidly affumed a typhus character, attended with great ftupor, and a difinclination to converfation. In other refpects, however, he retained his faculties, and the perfect confcioufnefs of his approaching diffolution. On Monday evening enfuing, after a fhort illnefs of five days, and in the 69th year of his age, he ended his truly valuable and exemplary life. His death was the fubject of univerfal lamentation, and he was followed to the grave by thoufands, who affembled to bear teftimony to his excellence.

In January, 1776, he married Mifs Julia Stockton, daughter of the Hon. Judge Stockton, of New Jerfey, a lady of an excellent underftanding, and whofe amiable difpofition and cultivated mind eminently qualified her as the companion of Dr. Rufh. Thirteen children were the fruits of their marriage, nine of whom ftill furvive. Two of thefe are chofen to offices of high refpectability in the general government of the United States.

It were no eafy tafk to do adequate juftice to the great talents, the ufeful labours, and the exemplary character of Dr. Rufh. From the preceding fketch, it is prefumed, fome idea may be formed of his inceffant devotednefs to the improvement of that profeffion of which he was fo bright an ornament. His merits, as a practitioner, are too well known to need particular notice; he was fully aware of the great refponfibility attached to the medical character, and uniformly evinced the deepeft folicitude for the recovery of his patient. His kindnefs and liberality in imparting aid to thofe from whom no remuneration was ever to be expected were unbounded, and arofe from the generous impulfe of his nature, the cordial concern he felt in whatever affected the interefts of his fellow creatures. His mind was of a fuperior order: to a perception naturally ready and acute, he united a difcriminating judgment, a retentive memory, which was greatly improved by habits of clofe attention, a brilliant imagination, and a highly cultivated tafte. He poffeffed a comprehenfive underftanding; his knowledge was varied and profound, and he eminently excelled in the feveral departments of his profeffion. In his affiduity and perfeverance in the acquifition of knowledge he had no fuperior, and few equals. Accuftomed to conftant and regular exercife, his intellectual powers acquired additional vigour from employment. Notwithftanding the great fatigue he had to undergo in the difcharge of the practical duties of a laborious profeffion, and the conftant interruptions to which he was expofed, when engaged in his purfuits as an author, he never for a moment abated of his ardour in the caufe of fcience. His habits of punctuality to every kind of bufinefs in which he was employed, added to a judicious arrangement of time for his multifarious occupations, fecured to him fufficient leifure for the publication of thofe works which have given fuch celebrity to his name.

His writings claim our attention, both on account of their extent and their variety. Inftead of being a mere collator of the opinions of others, he was conftantly making difcoveries and improvements of his own, and from the refults of his individual experience and obfervation, added more facts to the fcience of medicine, than all who had preceded him in his native country. His defcription of difeafes, for minutenefs and accuracy of detail, cannot be exceeded, and may fafely be regarded as models of their kind. His volume on the difeafes of the mind, as far as it exhibits the infinitely varied forms which thofe difeafes exhibit, is a ftorehoufe of inftruction. Had his labours been limited to thefe fubjects alone, his character would defervedly have been cherifhed by future ages. His reputation, however, will permanently depend upon his feveral hiftories of the epidemics of the United States, which have rendered his name familiar wherever medical fcience is cultivated, and will hereafter caufe to be infcribed upon the fame imperifhable column that bears teftimony to the merits of Sydenham and Boerhaave, the illuftrious name of Benjamin Rufh. The refpect and confideration which his publications procured for him among his contemporaries, were fuch, that the higheft honours were accumulated upon him in different parts of Europe, as well as in his own country, and he was admitted a member of many of the moft diftinguifhed literary and philofophical affociations.

There are other qualities which ftill more entitled Dr. Rufh to our refpect and efteem. In private life, his difpofition and deportment were in the higheft degree exemplary. Admired and courted for his intellectual endowments, he riveted to him the affections of all who enjoyed the pleafure of an intimate acquaintance. The affability of his manners, the amiablenefs of his temper, and the benevolence of his character, were ever confpicuous. He was ardent in his friendfhips and forgiving in his refentments, and yet entertaining a due regard for himfelf and a high fenfe of honour, he poffeffed a manly independence of fpirit which difdained every thing mean and fervile. He had an extraordinary command of language, and always imparted his thoughts in a peculiarly impreffive and eloquent manner. Thofe who had the happinefs to experience the delights of his converfation, will long recollect, with pleafure, his unaffuming modefty, and the rich ftores of knowledge he poured forth on the moft inftructive topics. Even when his opinions were folicited, they were given, not as the dictates or admonitions of a fuperior, but as the kind advice of a friend and equal. He never evinced any of that haughtinefs and affectation of importance, which fometimes attaches to

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men of eminence, and which fo materially leffens the pleafures and comforts of focial life.

He was a believer in Chriftianity from an examination of its principles and the deepeft conviction. The purity of its doctrines, and the excellence of its precepts, were a frequent topic of his converfation; its practical influence upon his conduct through life he often acknowledged, and cherifhed with a fervent hope the animating profpects it affords. His writings, in numerous places, bear teftimony to his Chriftian virtues; and in a manufcript letter, written a fhort time previous to his fatal illnefs, and now before the writer of this imperfect fketch, he candidly declares that he had "acquired and received nothing from the world which he fo highly prized as the religious principles he received from his parents." It is peculiarly gratifying to obferve a man fo diftinguifhed in a profeffion in which, by the illiberal, religious fcepticifm is fuppofed to abound, directing his talents to the maintenance of genuine piety, and the enforcing of Chriftian virtue. To inculcate thofe principles which flow from the fource of all truth and purity, and to impart them as a legacy to his children, was an object dear to his heart, and which he never failed to promote by conftant exhortation and the powerful influence of his own example.

There is one particular circumftance in the character of Dr. Rufh, which we cannot permit to be paffed over without obfervation; we allude to the union, fo eminently confpicuous in him, of the eminent practitioner, and the able and voluminous writer. But our limits will not allow us to enlarge. The materials of the above biographical article have been extracted from the American Medical and Philofophical Regifter, conducted by Dr. Hofack and Dr. Francis, of New York; July, 1813.

Rush, in *Botany*. See Juncus.

Rufhes always indicate a deepifh rich foil, and they thrive moft in land that is too wet and cold for moft other plants. It has been obferved that plants of the rufh kind may be eafily removed by preventing the ftagnation of moifture near the furface by judicious under or furface draining, and the application of fubftances of the faline or calcareous kinds, as afhes, lime, drift from the roads, and other fimilar materials. Thefe are beft made ufe of in a dry feafon in either the autumn or fpring, but the latter is probably the beft; as thefe abforbent materials will thereby be made ufe of at the time fuch plants begin to fhoot and eftablifh themfelves, and when there will be the leaft danger of their operation being leffened or prevented by too great a degree of moifture. It has been ftated by Mr. Kent, that in naturally coarfe meadows, or fuch as become fo in confequence of rufhes growing upon them before they have been rendered fufficiently dry by draining, it forms a great improvement to apply a thin coat of fand evenly over the furface of them in the proportion of from twenty to thirty common loads. By this means the fward is rendered much finer, and a much better fort of herbage brought up, white clover being predominant in moft cafes. And there is ftill another method, that, in particular fituations, may be more eafy and convenient, and which has been found to quickly deftroy plants of this coarfe kind by bringing up thofe of a finer defcription. It is a mode that may, at firft, feem fingular to thofe who have not feen its fudden and aftonifhing effects. It is that of conducting water over the furface of fuch ground; but in this intention it fhould not be fuffered to have the leaft degree of ftagnation, but be conveyed off with as much expedition as poffible, by fuitable drains being made. Frequent cutting over while in their young growth has alfo been found ufeful in deftroying them.

Another method of deftroying rufhes is to fork them up clean by the roots in July, and after having let them lie a fortnight or three weeks to dry, lay them in heaps and burn them gently, and the afhes which thefe afford will be tolerable manure for the land; but, in order to prevent their growing again, and to make the pafture good, the land fhould be drained, otherwife there will be no deftroying them entirely; but after it is well drained, if the roots are annually drawn up, and the ground kept duly rolled, they may be fubdued. Miller.

Rush, *Flowering*, or *Water Gladiole.* See Butomus.

Rush, *Leffer Flowering.* See Scheuchzeria.

Rush, *Round, Black-headed, Marfh*, or *Bog.* See Schoenus.

Rush, *Sweet.* See Acorus.

Rush-*Grafs.* See Scirpus.

Rushes, *Petrified.* What is ufually called by this name is a kind of foffile coral. But we have in England, alfo, another not uncommon fubftance, frequently called by the fame name: this is an incruftation of fparry matter, in the form of a ftony cruft on the outfides of real rufhes; though, in this cafe, it is no real petrifaction, but only a covering of this ftone-like matter.

Incruftations and petrifactions are ufually confounded together, and the generality of people do not attend to the diftinction, which is, that in a real petrifaction, the ftony matter penetrates the very fubftance of the body, as is the cafe in the petrified wood of Ireland, and other places; whereas, in thefe incruftations the fubftance itfelf remains unaltered within, and its outer part alone is covered with the ftony fubftance; this is the cafe with what is called the petrified mofs at Scarborough, and in other parts of England, and this is the cafe in regard to what we call fometimes petrified rufhes.

Rush, in *Rural Economy*, a term fignifying a tuft, clufter, or a knot of plants of the corn or grafs kind.

Rushes is alfo a term provincially applied to the wire rufh.

Rush, in *Geography*, a fifhing-town of the county of Dublin, Ireland, well fituated for carrying on bufinefs to advantage. The ling cured here, of which much is exported, is celebrated for its fuperior flavour. It is fituated on a point of land projecting into the Irifh fea; $13\frac{1}{2}$ miles N. by E. from Dublin.

Rush, *The*, a fand-bank near the E. coaft of Ireland, and county of Wexford, about four miles long, and hardly one broad; a little to the fouth of Glafscarrick Point.

RUSHA, a fmall ifland near the W. coaft of Scotland. N. lat. 58°. W. long. 2° 20'.

RUSHIN, or Castle Rushin. See Castle-town.

RUSHWORTH, John, in *Biography*, was born in or about the year 1607, fomewhere in the county of Northumberland. Of the early part of his education we have no account. He was fome time a ftudent in the univerfity of Oxford, after which he entered himfelf at Lincoln's Inn, and was called to the bar. He was, however, more attached to politics than to the purfuits of the profeffion, and was almoft perpetually an attendant on the parliament, ftar-chamber, and other courts, taking notes, in fhort-hand, of the proceedings at thofe places. In the troubles of that period he attached himfelf to the parliamentarian and prefbyterian parties, and in 1640 he was admitted an affiftant clerk of the houfe of commons. He foon gained the confidence of the houfe, and, during the king's refidence at York, was employed to convey to him its addreffes and meffages, on which occafions he is faid, even at that period, to have rode from London to that city in 24 hours. For thefe fervices he was recommended by the houfe to a place in the excife. In 1643 he took the covenant, and fir Thomas Fairfax, to whom he was nearly related, being made general of the parliamentary forces, appointed Mr. Rufhworth to be his fecretary. In this fituation he was very zealous and active in performing his duties, public and private. In 1649 he attended Fairfax to Oxford, where he was created M.A. as a member of Queen's college. When Fairfax refigned his commiffion, Rufhworth took up his refidence in London, and was nominated in 1652, by the houfe of commons, one of the commiffioners to reform abufes in the common law. At this time he was engaged in the compilation of his "Hiftorical Collections," of which the firft part appeared in 1659, dedicated to Richard Cromwell, at that time Protector. He was at this period member of parliament for Berwick-upon-Tweed. In 1660 he was appointed one of the clerks of the new council of ftate. After the Reftoration, he endeavoured to ingratiate himfelf with Charles II. by prefenting to him feveral books of the privy-council during the former reign, which he had preferved from deftruction, for which, however, he probably received no higher reward than that of thanks. In 1667, fir Orlando Bridgeman, keeper of the great feal, made him his fecretary, when he was again elected reprefentative for Berwick in the parliament of 1678-9, and the fubfequent one held at Oxford. After the diffolution of the latter, having always been carelefs of his private affairs, he fell into neceffitous circumftances, and lived in great obfcurity in Weftminfter, affiduoufly employed in his Collections, of which he publifhed the fecond part in 1680. He was at length arrefted for debt, and committed to the king's bench prifon, where he fpent, in great wretchednefs, the laft fix years of his life. He died in 1690, at the age of 83. He had feveral daughters, one of whom was married to fir Francis Vane. The "Hiftorical Collections" of this author include private paffages of ftate, weighty matters of law, remarkable proceedings in parliament, &c. and they commence in the reign of king James, in the year 1618, and were brought down to 1740. The third and fourth parts, printed from his MSS., extend to the death of Charles I. in 1648-9. The whole was reprinted uniformly in 7 volumes, folio, in 1721. Of his Collections, the writer in the Biographia Britannica fays, all that have written on the Puritan or Prefbyterian fide have highly extolled, nay almoft idolized them; fuch as Coke, Rapin, Oldmixon, &c. Others, on the contrary, who were favourers of king Charles I. and his caufe, condemn them as extremely partial, and have difcredited them as much as poffible. But the perfon who profeffedly fet himfelf to oppofe them was John Nalfon, L.L.D., who publifhed, by command of king Charles II., "An Impartial Collection of the great Affairs of the State, from the Beginning of the Scotch Rebellion in the Year 1639, to the Murder of King Charles I." &c. Dr. Nalfon did not continue his hiftory lower than January 1641-2. He brings four capital accufations againft Rufhworth, *viz.* that he does not inform us whence he had his materials, and therefore that his facts do not ftand upon fufficient authority;—that he prints falfe and erroneous copies of fome papers;—that, under the colour of epitomizing others, he has not only obfcured, but, in many places, corrupted and difguifed the fenfe;—and that he has recorded little but what relates to the juftification of thofe whom he favours, and their proceedings, omitting what might ferve to manifeft the king's innocence. In a compilation of fuch extent, it is no wonder there fhould be errors, and the writers of the "Parliamentary Hiftory" have taken pains to frame a long lift of his miftakes, which is copied in a note to the article RUSHWORTH, in the Biog. Brit.; they, however, attribute them rather to the negligence and ignorance of tranfcribers, than to wilful mifreprefentation. It can, however, fcarcely be expected that a man, writing as he did, fhould be free from partialities, or that his perfonal attachments fhould not enter into his work. Befides, it is certain that the firft part of his work was fubmitted to the revifion of Oliver Cromwell, who being too much occupied to examine it himfelf, put it into the hands of Whitelock, under whom it underwent various alterations. Neverthelefs, Mr. Rufhworth profeffes great impartiality and faithfulnefs, affuming that he muft be in poffeffion of a fufficient degree of knowledge and information for all the objects he had in view; and he, moreover, gives himfelf as an inftance, that it is poffible for a man to be of a *party* and not *partial*. The value of the "Hiftorical Collections" arifes from their having preferved together feveral detached pieces, which otherwife would have been loft, and from being the fulleft compilation during the period of which they treat. Biog. Brit.

RUSHY LAND, in *Agriculture*, that which is much infefted and troubled with the growth of rufhes upon it. Lands of this nature and quality prevail in many places to very confiderable extents, which, when properly reclaimed and managed, conftitute extremely good meadows and paftures. They are alfo, in fome cafes, capable of being broken up and converted to the purpofe of tillage, with great advantage.

In many inftances of this nature, very great benefit has been derived from a thick covering of chalk rubbifh, or the rubbifh of lime-ftone and free-ftone quarries, applied in a confiderably reduced or powdery ftate, after the land had been fufficiently freed from ftagnant water by means of pipe or other kinds of under draining, as fuch heavy materials foon fink in the ground, and by confolidating it are the caufe of bringing up another fort of better plants of the grafs kind. When fuch rufhy lands have once acquired a certain ftate and degree of firmnefs by thefe or any other means, they may be further benefited and improved by rolling, and clofe feeding down with fheep ftock, which fhould be confined on particular portions of them, in great numbers, in order to infure the fulleft effect and advantage.

It is better likewife, where they are capable of it, to let thefe forts of lands remain for fome years in the ftate of pafture, than to bring them directly under the mowing fyftem; as, in that way, they are conftantly advancing to a more folid and finer ftate of herbage, whereas under the contrary practice, they are invariably getting more open, loofe, and coarfe in their produce. See RUSH.

RUSIBIS PORTUS, in *Ancient Geography*, a port of Africa, in Mauritania Tingitana, between the mouth of the river Cofa and that of Afama, according to Ptolemy. It is called *Rutubis Portus* by Pliny.

RUSICADA, SGIGATA, a town of Africa, according to Mela and Ptolemy. It was fituated towards the middle of the gulf of Numidia, about 30 miles E. of Collops Magnus. In the Itinerary of Antonine, this town is placed in Mauritania Cæfarienfis, upon the route from Carthage to Leninx, between Chuli Municipium and Paratianæ. Here are fome remains of antiquity. Its cifterns ferve as a corn magazine.

RUSICIBAR, a town of Africa, in Mauritania Cæfarienfis, between Ruftonium and Medunga, according to Ptolemy. Antonine calls it Rufubbicari, and in the Peutingerian Tables it is Rufibricari Matidiæ.

RUSIN, in *Geography*, a town of Bohemia, in the circle of Schlan; 4 miles N.W. of Prague.

RUSK, AL, a town of Curdiftan; 18 miles S.E. of Amadieh.

RUSKO, a town of Sweden, in the government of Abo; 6 miles N.W. of Abo.

RUSKOBAGAN, the Indian name of Parker's iſland in Kennebeck river.

RUSKY, or Ruskybridge, a ſmall poſt-town of Ireland, in the county of Leitrim, where there is a bridge over the Shannon. It is 67 miles N. by W. from Dublin, and 7 from Longford.

RUSLAM River, a river of Upper Canada, which runs into lake St. Clair, between Point aux Roches and Belle river; it is navigable by a loaded boat ſix miles upwards. The land on its banks is very good, and at the diſtance of a few miles in aſcending it there is an Indian ſettlement.

RUSMA, in *Natural Hiſtory*, the name given by the Eaſtern nations to the ſubſtance called by the ancient Greeks *ſory*, and uſed as a depilatory.

The Turks call this ſubſtance *ruſma*, and the Arabians *nouret*. It is not, as ſome have imagined, a mineral ſubſtance found ready for uſe, as a depilatory, in the bowels of the earth; but it requires a preparation and an alloy to give it that property. Bellon, who firſt deſcribed (at Cuta, in Galatia,) "the ſource of a mineral which they call *ruſma*," adds, that this mineral alone cannot be uſed "till it has been beaten into a very fine powder, putting half as much quick-lime as ruſma, which is then diluted in a veſſel with water." Thus, the ruſma of Bellon is not of itſelf a depilatory; but it contains ſome cauſtic matter, which being mixed with lime, gives it that property. This preſumption is confirmed by M. Velmont de Bomare, who, having received from Conſtantinople ſome ſmall pieces of mineral ruſma, perceived, that on throwing it upon hot coals, there immediately exhaled from it a vapour, which gives reaſon for ſuſpecting that it is a "colchitis" mineralized by ſulphur and arſenic. This mixture is the true ruſma of the Turks, and the nouret of the Arabs. There are different names of the ſame ſubſtance, or rather of the ſame compoſition. It is, in fact, with arſenic or orpiment, mixed with quick-lime, that the drug for taking off the hair is prepared in the Egyptian baths. The proportion is ſeven parts of lime to three of orpiment. It is neceſſary for the perſon who deſires to uſe it, to keep in a very warm place, ſuch as the hot baths of the Eaſt, in which a profuſe ſweat exudes from all parts of the body. The mixture is diluted with water, and lightly rubbed on the parts from which the hair is to be taken off. After a few moments, it will be ſeen if the hair be looſened; it can then be plucked out without pain, and the ſkin is afterwards waſhed with hot water. Care muſt be taken, however, that this liniment does not remain on too long, becauſe it would burn the ſkin. This does not prevent the hair from growing again, and at the end of ſome time the operation muſt be repeated.

Mr. Boyle tells us, he made a fine powder of equal parts of ruſma and quick-lime, and letting them ſoak a little time in water, they became a ſoft paſte, which he ſpread on the part he would free from hair; and after letting this paſte lie on about three minutes, he wiped it off with a wet cloth, and found the hair taken away by the roots without any inconvenience to the part.

RUSOER, in *Geography*. See Risoer.

RUSOOLPOUR, a town of Hindooſtan, in Allahabad; 35 miles N. of Gazypour.

RUSPACH, a town of Auſtria; five miles S. of Sonneberg.

RUSPÆ, Shé-ah, in *Ancient Geography*, a town of Africa, on the gulf of Numidia, according to Ptolemy, ſituated between Achola and Brachodes Exterma; ſix miles S. of Achola. Some ruins ſtill remain.

RUSPEN, in *Geography*. See Roszwein.

RUSPINA, Sahaleel, in *Ancient Geography*, a town of Africa, on the gulf of Numidia, between Leptis Minor and Adrumettium, according to Ptolemy. It was ſituated on the declivity of an eminence about a mile from the ſea, S.E. of Adrumettium. It is known by ſome ancient remains.

RUSPONO, in *Commerce*, a gold coin of Tuſcany, which is a piece of 3 ſequins, weighing 8 denari 21 grani, Florence weight, and paſſing for 40 lire or 60 paoli. In gold and ſilver weight, the pound contains 12 ounces; the ounce, 24 denari or 576 grani. This pound weighs 11 oz. 2 deniers 8 grains, French poids de Marc, or 5241 Engliſh grains; ſo that 100lbs. of this weight anſwer to 91lbs. Engliſh troy weight. The aſſay and value of the ruſpono are as follow: compared, as to fineneſs, with the Engliſh ſtandard of 22 carats, and as to value with the mint price of gold in England, *i. e.* 3*l.* 17*s.* 10½*d. per* oz. ſtandard, *viz.*

	Aſſay.	Weight.	Contents in pure Gold.	Value in Sterling.
	car. gr.	oz. dwt. gr.	grains.	*L. s. d.*
Ruſpono - -	B. 1 3¾	0 6 17¼	160.8	1 8 5½
Zecchino, or ſequin	B. 1 3¾	0 2 5¾	53.6	0 9 5¾
Ruſpono of Etruria	B. 1 3⅞	0 6 17¼	161.6	1 8 6

The impreſſions on the ruſpono are a lily, with the name and title of the reigning prince, thus: FERDINANDUS III. D. G. A. A. M. D. ETR. that is, *Dei Gratia Archidux Auſtriæ, Magnus Dux Etruriæ*, (Ferdinand III. by the grace of God, archduke of Auſtria, grand duke of Tuſcany); reverſe, a figure repreſenting St. John the Baptiſt; legend, S. JOANNES BAPTISTA. Some pieces, coined about the year 1738, bear the head of the reigning prince; legend, FRANCISCUS III. D. G. LOTH. BAR. ET M. ET. D. REX HIER. (Francis III. by the grace of God, duke of Lorraine and Bar, grand duke of Tuſcany, king of Jeruſalem); reverſe, arms of the prince; legend, IN TE DOMINE SPERAVI, (in thee, O Lord, have I hoped).

The new ruſpono of the kingdom of Etruria bears the ſame impreſſions as above; legend in thoſe coined in 1803, LUDOVICUS I. D. G. HISP. INF. REX ETRURIÆ, (Louis I. by the grace of God, infant of Spain, king of Etruria); and in thoſe ſtruck in 1804, CAROLUS I. D. C. REX ET M. ALOYSIA R. RECTRIX, (Charles I. by the grace of God, king of Etruria, and Maria Louiſa queen regent).

The ſequin of Tuſcany has the ſame impreſſion as the ruſpono.

RUSS, in *Geography*, a town of Pruſſian Lithuania, and principal place of a diſtrict, ſituated at the mouth of the river Ruſſe; 20 miles N.W. of Tilſit.—Alſo, a ſmall iſland in the Eaſt Indian ſea, near the W. coaſt of Naſſau. S. lat. 2° 53′. E. long. 99° 48′.

RUSSE, a river of Pruſſia, one of the branches of the Memmel, which runs into the Curiſch Haff.

RUSSELE'E, a town of Aſiatic Turkey, in the province of Diarbekir; 58 miles S. of Moſul.

RUSSELIA, in *Botany*, received that name from Jacquin, in honour of Dr. Alexander Ruſſel, for many years phyſician to the Engliſh factory at Aleppo, and author of a "Natural Hiſtory" of that place, publiſhed in 1756; which was ſubſequently re-edited by his brother, the late worthy Dr. Patrick Ruſſell, ſo well known by his works on the Plague, and on Indian Serpents. (See Russell.) This original *Ruſſelia* was neglected by Linnæus; but in the *Supplementum*, printed in in 1781, his son gave that appellation to another genus, now established under the name of VAHLIA, as will hereafter be shewn when we come to that article. The younger Linnæus appears to have puzzled himself between the words *Russelia* and *Roussea*; for the latter was what his father had intended; see ROUSSEA. The result of all this confusion is, that Jacquin's *Russelia* is now finally restored to its due rank.—Jacq. Amer. 178. Schreb. 419. Willd. Sp. Pl. v. 3. 344. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. Epit. 373. Juss. 118. Lamarck Illustr. t. 539.—Class and order, *Didynamia Angiospermia*. Nat. Ord. *Personatæ*, Linn. *Scrophulariæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five deep, ovate, concave, acute, taper-pointed, erect, small, permanent segments. *Cor.* of one petal, ringent; tube cylindrical, somewhat compressed, erect, several times longer than the calyx, hairy at the lower side internally; limb two-lipped; the upper lip roundish, flat, cloven, spreading, reflexed at the summit; lower rather the longest, in three deep, oblong, obtuse, flat, widely spreading segments. *Stam.* Filaments four, thread-shaped, erect, rather shorter than the tube, two of them longest; anthers ovate. *Pist.* Germen superior, ovate; style thread-shaped, erect, the length of the shorter stamens; stigma globose, undivided. *Peric.* Capsule roundish, beaked with the permanent base of the style, of two cells and two valves, about as long as the calyx. *Seeds* numerous, minute.

Eff. Ch. Calyx in five deep taper-pointed segments. Upper lip of the corolla emarginate; lower in three deep segments; tube much longer than the calyx, hairy within. Stigma globose. Capsule of two cells, and two valves, with many small seeds.

1. R. *sarmentosa*. Trailing Russelia. Jacq. Amer. 178. t. 113. Willd. n. 1.—Leaves ovate, nearly sessile. Stalks axillary, three-flowered. Gathered by Jacquin in woods and bushy places about the Havannah. The *stem* is shrubby, with numerous long, weak, square, smooth, leafy *branches*, supporting themselves against the neighbouring bushes, and pendulous at the ends. *Leaves* opposite, on very short stalks, ovate, acute, serrated; rather hairy on the margin and upper surface; smooth at the back. *Flowers* about an inch long, inodorous, of a fine red, growing two or three together on axillary stalks, not so long as the leaves. The partitions of the *capsule*, being formed of the inflexed valves, probably separate from the central column as the fruit ripens, and led Jacquin to describe the *capsule* as of one cell. The same thing is observable in *Verbascum*.

2. R. *rotundifolia*. Round-leaved Russelia. Cavan. Ic. v. 5. 9. t. 415.—Leaves sessile, heart-shaped, roundish. Clusters many-flowered, axillary and terminal, in pairs. Gathered by Louis Née, near Acapulco, flowering and seeding in February, March, and April. The *stem* is erect, shrubby, four feet high, with obscurely quadrangular, downy *branches*. *Leaves* about two inches in diameter, almost orbicular, though somewhat pointed, reticulated with veins, downy, especially when young, broadly serrated. *Flowers* scarlet, smaller than the preceding, in twin *clusters*, with small *bracteas* under each pair of partial stalks. Central column of the *capsule* hairy. *Seeds* minute, black. *Cavan.*

3. R. *multiflora*. Many-flowered Russelia. Sims in Curt. Mag. t. 1528.—Leaves ovate, pointed, stalked. Cluster terminal, whorled, compound; the stalks cymose. Found by Mr. Cowan, in the mountainous tract of South America, between Vera Cruz and Mexico. Mr. Lambert raised the plant from seed, and it flowered in his stove at Boyton in the autumn of 1812. The *stems* and *branches* are weak and trailing, as in the first species; but the *leaves* are larger, and the *flowers* much more numerous, composing dense whorled *clusters* at the ends of each branch. *Corolla* scarlet, about the size of *R. sarmentosa*, but the points of the *calyx* are longer.

RUSSELL, *Lord* WILLIAM, in *Biography*, a distinguished patriot and martyr to the cause of liberty, was the third son of William, the first duke of Bedford, by a daughter of the earl of Somerset. He was born about the year 1641, and was brought up in those principles of liberty of which his father was an assertor, and which are congenial to the spirit of the English constitution. Being in the fervour of youth at the time of the restoration of Charles II. he joined in the gaieties of the court; till his marriage in 1667, with Rachel, second daughter and co-heiress of the earl of Southampton, reclaimed him from any irregularities into which he had fallen, and from this time he bore a most unblemished character. In four parliaments he represented the county of Bedford, highly esteemed for his patriotism and independent spirit. He was looked up to as one of the heads of the Whig party.

"A political intrigue of this period," says one of his lordship's biographers, "has brought an imputation on his memory, from which different methods have been taken to clear it. Charles II., one of the most profligate of public characters, had been exasperated against the court of France, by the withdrawing, on account of the marriage of the duke of York's daughter to the prince of Orange, that pension which he had hitherto been mean enough to receive, and he appeared desirous of joining the continental confederacy against Lewis XIV. A French war being always popular in England, the parliament voted a large supply of men and money for the purpose. The patriots, however, knowing that Charles was not to be trusted, and being at the same time full of alarms respecting popery and arbitrary power, were very unwilling to give him the disposal of an army, which might as probably be employed against the liberties of the country, as against France. In this point, therefore, their wishes coincided with those of Lewis, in raising an opposition to the measures of the English court: and by means of a M. de Rouvigny, who was a relation of lady Russell, they intrigued with Barillon, the French ambassador in England. From that minister's private dispatches, sir John Dalrymple copied, and published in his 'Memoirs of Great Britain,' his negotiations on this head, and also a list of members of parliament whom he had actually bribed." Lord W. Russell is not charged with being one of the number bribed; he and lord Hollis, it is asserted, positively refused to accept of money. There seems, however, little reason to doubt that he took a part in the intrigue. His intentions, no doubt, were perfectly upright: he was zealously inclined to defend the Protestant interest, which he saw was in imminent danger, and he hoped, by the course which was now taken, the blow might be warded off. To his good intentions, therefore, his biographers must appeal for the justification of a step confessedly of a suspicious nature, and not consistent with correct policy.

In the year 1679, the king found it expedient to ingratiate himself with the Whigs, by the appointment of a new privy council, of which lord Shaftesbury was president, and lord William Russell was a member. They soon found that they did not enjoy the king's confidence, who engaged in some important measures without their concurrence, among which was the recall of the duke of York; several of them resigned, and lord Russell among the number. His sense of the danger to the Protestant religion from a Catholic successor, induced him to take a moſt deciſive part in the attempt for the excluſion of the duke of York. He went publicly to Weſtminſter-hall, and at the court of king's bench preſented the duke as a recuſant: this was in June 1680, and in the following November, he carried up the Excluſion-bill to the houſe of lords, at the head of 200 members of the houſe of commons. The lead which he took in this matter, as it was highly diſpleaſing to the court, ſo it carried a great influence with the public, he being a perſon of high reputation for integrity, a man of very great fortune, and wholly deſtitute of private ambition. The king diſſolved the parliament, and ſeemed determined to govern without one. Arbitrary principles were openly avowed by the friends of the king, and the cauſe of liberty, civil and religious, was brought into the greateſt hazard.

This ſtate of affairs inſpired deſperate councils into ſome of the Whig leaders, and a conſpiracy was formed for an inſurrection, conducted by a council, conſiſting of the duke of Monmouth, lords Ruſſell, Eſſex, and Howard, Algernon Sydney, and Hampden, who were to act in concert with the duke of Argyle, and the Scotch malcontents. Among theſe leaders different deſigns prevailed; but it is admitted, that the ſubject of this article had no other views than to procure the excluſion of the duke of York from the throne, and a redreſs of grievances. While theſe ſchemes were agitating, a minor plot was laid by ſome inferior conſpirators, which conſiſted of a plan for aſſaſſinating the king on his return from Newmarket, at a farm called the Rye-houſe, and which has given name to this plot. Although it is known that this conſpiracy was entirely apart from the ſcheme of an inſurrection, yet two of the perſons engaged in the Rye-houſe plot had acceſs to ſome of the leaders in the other plan, and the detection of the one plot, led to the diſcovery of the other, and orders were inſtantly iſſued for the apprehenſion of thoſe engaged in it. Lord William Ruſſell was in conſequence committed to the Tower, and after ſome of the Rye-houſe conſpirators had been condemned and executed, and the nation was fully impreſſed with horror of a plot ſuppoſed to be connected throughout with a deſign of aſſaſſination, he was brought to trial in July 1683. A jury of zealous royaliſts was packed for the purpoſe of convicting the priſoner: in the indictment, the noble lord was charged with the treaſonable purpoſe of killing the king, which was made an inference from his being engaged in a plan of inſurrection. "On the whole," ſays Hume, "having deſcribed the nature of the evidence produced on the trial, it was undoubtedly proved, that the inſurrection had been deliberated on by the priſoner, and fully reſolved; the ſurpriſal of the guards deliberated on, but not fully reſolved, and that an aſſaſſination had not been once mentioned or imagined by him. So far the matter of fact ſeems certain: but ſtill, with regard to the law, there remained a difficulty, and that an important one. The Engliſh laws of treaſon, both in the manner of defining that crime, and in the proof required, are the mildeſt and moſt indulgent, and conſequently the moſt equitable, that are any where to be found. The two chief ſpecies of treaſon contained in the ſtatute of Edw. III. are the compaſſing and intending of the king's death, and the actually laying of war againſt him; and by the law of Mary, the crime muſt be proved by the concurring teſtimony of two witneſſes, to ſome overt act, tending to theſe purpoſes. But the lawyers, partly deſirous of paying court to the ſovereign, partly convinced of ill conſequences which might attend ſuch narrow limitations, had introduced a greater latitude, both in the proof and definition of the crime. It was not required that the two witneſſes ſhould teſtify the ſame preciſe overt act. It was ſufficient that they both teſtified ſome overt act of the ſame treaſon; and though this evaſion may ſeem a ſubtilty, it had long prevailed in the courts of judicature, and had at laſt been ſolemnly fixed by parliament at the trial of lord Strafford. The lawyers had uſed the ſame freedom with the law of Edward III. They had obſerved, that, by that ſtatute, if a man ſhould enter into a conſpiracy for a rebellion, ſhould even fix a correſpondence with foreign powers for that purpoſe, ſhould provide arms and money, yet, if he were detected, and no rebellion enſued, he could not be tried for treaſon. To prevent this inconvenience, which it had been better to remedy by a new law, they had commonly laid their indictment for intending the death of the king, and produced the intention of rebellion as a proof of that other intention. But though this form of indictment and trial was very frequent, and many perſons had been convicted and executed upon it, it was unqueſtionably irregular, and plainly confounded, by a ſophiſm, two ſpecies of treaſon, which the ſtatute not only had diſtinguiſhed, but meant accurately to diſtinguiſh. What made this refinement more exceptionable was, that a law had paſſed ſoon after the Reſtoration; in which the conſulting or the intending of a rebellion was, during Charles's life-time, declared treaſon, and it was required, that the proſecution ſhould be commenced within ſix months after the crime was committed. Lord Ruſſell's crime fell within the ſtatute of Charles II., but the facts ſworn to by two witneſſes, were beyond the ſix months required by law, and to the other facts there was only a ſingle witneſs, and he an accomplice. Lord Ruſſell perceived this irregularity, and deſired to have the point argued by counſel. The chief juſtice told him, that could not be granted, unleſs he previouſly confeſſed the facts charged upon him." The artificial confounding of two ſpecies of treaſon, though a practice ſupported by many precedents, is the chief, but not the only, hardſhip of which the noble lord had to complain on his trial. His defence was feeble, contenting himſelf with proteſting that he never had entertained any deſign againſt the life of the king. The jury, after a very ſhort deliberation, found the priſoner guilty. Such a victim was too deſirable to the court, and too agreeable to the vindictive feelings of the duke of York, for him to expect the royal mercy; and though his father, whoſe only ſon he now was, offered a large ſum, a hundred thouſand pounds, to the ducheſs of Portſmouth, for his life; and his excellent wife, the daughter of a moſt diſtinguiſhed royaliſt, implored forgiveneſs in the moſt pathetic manner, his doom was irrevocable, and he obtained the remiſſion only of the moſt ignominious part of the ſentence. After his ſentence, he was attended by Tillotſon and Burnet, who, though afterwards favourers of the revolution, now urged upon the noble victim an acquieſcence in the doctrine of non-reſiſtance. This point, however, he was too firm and honeſt to concede, though a declaration to that purpoſe offered the only chance of a pardon. It was not quite creditable to the nobleneſs of his nature, that he ſhould condeſcend, even to ſave his life, to write a petitionary and rather humiliating letter to the duke of York, promiſing to forbear all future oppoſition to him, ſhould his life be ſpared. He alſo wrote a letter to the king, which was not to be delivered to him till after his death; this, though ſubmiſſive, was not at all abject. It is almoſt certain he muſt have taken theſe ſteps in compliance with the ſolicitations of his friends, rather than from the deſire of ſaving his own life; for he refuſed the generous offer of lord Cavendiſh to favour his eſcape, by changing clothes with him in prifon; and he alfo declined the duke of Monmouth's propofal of furrendering himfelf, fhould lord William Ruffell think it might contribute to his fafety. "It will be no advantage to me," he faid, "to have my friends die with me." Conjugal affection was the feeling that clung clofeft to his heart; and when he had taken his laft farewel of his wife, he faid, "The bitternefs of death is now over." He fuffered the fentence of his judges with refignation and compofure. Some of his expreffions imply much good humour in this laft extremity. The day before his execution he was feized with a bleeding at the nofe: "I fhall not now let blood to divert this diftemper," faid he to Burnet, who was prefent; "that will be done to-morrow." A little before the fheriffs conducted him to his carriage, that was to convey him to the fcaffold, he wound up his watch, "Now I have done," faid he, "with time, and henceforth muft think folely of eternity."

The execution was performed July 21ft, not on Tower-hill, the common place of execution for men of high rank, but in Lincoln's-Inn-Fields, in order that the citizens might be humbled by the fpectacle of their once triumphant leader, carried in his coach through the city; a device which, like moft others of the kind, produced an effect contrary to what was intended. The multitude imagined they beheld virtue and liberty fitting by his fide. As he was the moft popular among his own party, fo was he the leaft obnoxious to the oppofite faction; and his melancholy fate united every heart, fenfible of humanity, in a tender compaffion for him. Without the leaft change of countenance, he laid his head on the block, and at two ftrokes it was fevered from his body. He was, at the time of his death, only 42 years of age. To his character for probity, fincerity, and private worth, even the enemies to his public principles bear teftimony. Of his underftanding, bifhop Burnet fays "that he was flow, and of little difcourfe, and had a true judgment, when he confidered things at his own leifure." At Wooburn Abbey is preferved, in gold letters, the fpeech of lord Ruffell to the fheriffs, together with the paper delivered by his lordfhip to them at the place of execution.

Mr. Calamy, in fpeaking of lord Ruffell, fays, "that an age would not repair the lofs to the nation, and whofe name fhould never be mentioned by Englifhmen without fingular refpect." He paffed through and left this world, with as great and general a reputation as any one of the age, and his memory will be had in grateful and everlafting remembrance. Honour and friendfhip attended lord Ruffell beyond the grave. Lord Cavendifh married his eldeft fon to one of the daughters of his deceafed, his *murdered* friend; for fo the deed was defcribed in the act of 1688-9, for reverfing the attainder. The houfe of commons, at the fame time, appointed a committee to examine who were the advifers and promoters of the *murder* of lord Ruffell. In May 1694 his father, the earl of Bedford, was created marquis of Taviftock and duke of Bedford; and the reafons for beftowing thefe honours upon him are in part as follow: "That this was not the leaft, that he was the father to lord Ruffell, the ornament of his age, whofe great merits it was not enough to tranfmit by hiftory to pofterity, but they (the king and queen) were willing to record them in their royal patent, to remain in the family as a monument confecrated to his confummate virtue, whofe name could never be forgotten, fo long as men preferved any efteem for fanctity of manners, greatnefs of mind, and a love to their country, conftant even to death. Therefore, to folace his excellent father for fo great a lofs, to celebrate the memory of fo noble a fon, and to excite his worthy grandfon, the heir of fuch mighty hopes, more cheerfully to emulate and follow the example of his illuftrious father, they entailed this high dignity upon the earl and his pofterity."

Russel, *Lady* Rachel, the worthy wife of the fubject of the foregoing article, diftinguifhed herfelf equally by the affectionate zeal with which fhe ferved her hufband, and by the magnanimity with which fhe bore her lofs, and the reverence fhe cherifhed for his memory. Upon his trial, fhe accompanied him into court; and when he was refufed a counfel, and permitted only to employ an amanuenfis, fhe ftood forth as that affiftant, exciting the fympathy and admiration of all the fpectators. After his death, fhe wrote an affecting letter to the king, afferting that the paper delivered by him to the fheriffs was of his own compofition, and not dictated by any other perfon, as had been fufpected. She was the faithful guardian of her hufband's fame. A few days after the defeat and death of the duke of Monmouth, with whom lord Ruffell had an intimate connection, fhe made ufe of the opportunity for declaring her conviction that his grace's late attempt was a new project, and not at all depending on any former defign, if there was any real one, which, fhe faid, fhe was fatisfied, was no more than her lord admitted, *viz.* talk; and it is poffible that converfation might have proceeded fo far as to confider, if a remedy for fuppofed evils might be fought, how it could be formed. "He had," continues her ladyfhip, "fo juft a foul, fo firm, fo good, that he could not warp from fuch principles that were fo, unlefs mifguided by his underftanding, and that his own and not another's: for I dare fay, as far as he could difcern, he never went into any thing confiderable upon the mere fubmiffion to any one's particular judgment." Lady Ruffell alfo, in the fame affectionate regard to her lord's memory, after the revolution, made ufe of her intereft in favour of his chaplain, Mr. Samuel Johnfon, and was inftrumental in procuring him a penfion. As fhe had promifed her lord to take care of her own life, for the fake of his children, fhe was religioufly mindful in keeping her promife, and continued his widow to the end of her life, which did not happen till Michaelmas day 1723, at the age of 87. Biog. Brit. Hume. Letters of Lady Rachel Ruffell.

Russell, Alexander, a phyfician, who refided feveral years in the Englifh factory at Aleppo, was a native of Edinburgh, and at an early period of his life was devoted by his father to the profeffion of medicine. His education was, of courfe, obtained in his native univerfity; and on coming to London, he was induced to embark for Turkey, and fettled at Aleppo, with the appointment of phyfician to the Englifh factory there. He applied himfelf affiduoufly to the acquifition of the language of the country, and to form an acquaintance with the moft experienced practitioners, in order to learn their modes of practice. But he foon obtained a proud pre-eminence above all the phyficians there, and was confulted by all nations, ranks, and profeffions, by Franks, Greeks, Armenians, Jews, and even Turks themfelves. The pacha of Aleppo particularly diftinguifhed him by his friendfhip, and this intimacy enabled Dr. Ruffell to render the moft important fervices to the factory. The pacha, indeed, did not fail to confult him refpecting every act of importance; and many criminals, who were natives, owed their lives to the doctor's interpofition. The pacha carried his efteem for Dr. Ruffell fo far, that he fent fome valuable prefents to his aged father, faying to him, "I am obliged for your friendfhip and affiftance."

In 1755 Dr. Ruffell publifhed his "Natural Hiftory of Aleppo,"

Aleppo," a valuable and interefting work, containing efpecially fome important obfervations relative to the plague, which have been found ufeful in Europe, and poffibly have tended to check the progrefs of that dreadful fcourge. This work has been tranflated into different European languages.

On his return to England, in 1759, he fixed his refidence in the metropolis, and was elected phyfician to St. Thomas's hofpital, a fituation which he held to the time of his death, which occurred in 1770. The Royal Society were obliged to Dr. Ruffell for feveral valuable communications, and he prefented many important papers to the Medical Society.

Russell, Patrick, brother of the preceding, and his fucceffor as phyfician to the Englifh factory at Aleppo. He publifhed a copious "Treatife on the Plague," having had ample opportunities of treating that peftilential difeafe during the years 1760, 1761, and 1762. In this work, befides a journal of the progrefs, and a medical hiftory of the plague, Dr. P. Ruffell has inferted a full difcuffion of the fubjects of quarantine, lazarettoes, and of the police to be adopted in times of peftilence. He likewife publifhed a new edition of his brother's "Natural Hiftory of Aleppo," upon a very enlarged fcale.

Russell, a myfterious character in London, about the middle of the laft century. He was regarded as a parafite among people of fafhion; feems to have been in Italy, fung in good tafte, and compofed fome very elegant and pleafing Englifh ballads: fuch as, "Can Love be controlled by Advice;" "At fetting Day and rifing Morn;" "Young Daphne, brighteft Creature;" "If Truth can fix thy wavering Mind;" "Soft God of Sleep;" "Sweet were once the Joys I tafted;" "To curb our Will," &c.

Russell, in *Geography*, a county of Virginia, bounded N. by Greenbriar, and S. by Lee county; containing 6816 inhabitants.—Alfo, a townfhip in Hampfhire county, Maffachufetts; 15 miles W. of Springfield; incorporated in 1792, and containing 422 inhabitants.—Alfo, a townfhip in the county of Leeds, Upper Canada, lying to the northward of Kitley.

RUSSELLÆ, Roselle, in *Ancient Geography*, a town of Italy, in Etruria, S.E. of Populonium and Vetulonii, fituated on the right of Umbro, and at a fmall diftance from it. It engaged with fome other towns in fuccouring the Latins againft the Romans, according to the report of Dionyfius Halicarnaffus. Pliny fays, it became a Roman colony. Some veftiges of it appear at Rofelle.

RUSSELLED, in *Rural Economy*, a term fignifying withered or fhrivelled, as an apple.

RUSSELSHEIM, in *Geography*, a town of Heffe-Dermftadt, on the Maine; 6 miles E. of Mentz.

RUSSELVILLE, a town in Logan county, in the fouthern part of Kentucky, in a populous part of the ftate, about 40 miles from Nafhville.

RUSSET, a country word for a dark brown colour.

RUSSEY, Le, in *Geography*, a town of France, in the department of the Doubs, and chief place of a canton, in the diftrict of St. Hippolyte; 9 miles S. of it. The place contains 910, and the canton 5455 inhabitants, on a territory of 240 kiliometres, in 22 communes.

RUSSGANGENUM, in *Natural Hiftory*, a name given by the people of the Eaft Indies to a yellow and brafs-like foffile fubftance, found in many places there; it refembles the marcafites, only that on trial it is found to contain very little fulphur: it is probably an ore of zinc.

RUSSI, in *Geography*, a town of Italy, in the department of the Amona; 8 miles N.E. of Faenza.

RUSSIA comprehends, in its moft general acceptation, the whole Ruffian empire; but in a more limited fenfe, it properly includes thofe principalities and provinces, which for many paft ages, *i. e.* for about 1300 or 1400 years, have been inhabited by Ruffians. In this latter fenfe its divifions are as follow: *viz.* 1. Great Ruffia, to which the name of Ruffia, in the ftricteft import, has been applied, and which comprifes thofe large tracts of country, under different denominations, that have, without interruptions, compofed the Ruffian dominion, fuch as Mofcow, Vladimir, Novgorod, &c. &c. 2. Little Ruffia, comprehending the Ukraine, *i. e.* "the borders," or, in general, the three prefent governments of Kief, Tchernigof, and Novgorod-Sieverfkoi; long feparated from Ruffia, but again united to it in the year 1654. 3. White Ruffia, formerly denoting the prefent government of Smolenfk, to which have been added the two governments of Polotfk and Mohilef, fometimes called the White Ruffian territory. 4. New Ruffia, denoting the large tracts of country near the Ukraine, towards Poland and the Turkifh dominion, *viz.* New Servia and the province of St. Elizabeth, now belonging to the government of Ekaterinoflaf. But the Ruffian empire, in a more extended fenfe, includes not only the countries abovementioned, but other regions, added to it by conquefts and appropriations: fuch as, the kingdom of *Kazan*, the kingdom of *Aftrakhan*, and the vaft country of *Siberia*, which fee refpectively: the provinces on the fhores of the Baltic, captured from the Swedes by Peter I. and for ever incorporated with the Ruffian empire by two treaties of peace, *viz.* Livonia, Efthonia, Finland, and Ingria, or the prefent governments of Riga, Revel, Vyborg, and St. Peterfburg: the countries taken from Poland, now the governments of Polotfk and Mohilef, united to the empire by Catharine II.: the territory annexed by her to Ruffia in the peace concluded with the Turks in 1774: the Krim and the Cuban, or the province of Taurida and the government of Caucafus, united to the empire by that fovereign in 1783: the tributary iflands in the eaftern ocean, now added to Ruffia: the countries that have more recently fubmitted to the Ruffian fupremacy, *viz.* Kartuelia or Kartalinia, &c.: the poffeffions in America, confifting partly of the iflands, and partly of the continent of California, in which the principal eftablifhment is called Donalefk: and fome other countries, incorporated with the empire at various periods, as the Kirghis-Kozaks, of the middle and little horde, who fubmitted themfelves in 1731, and feveral others. From this furvey it appears, that the amplitude of the Ruffian empire is far greater than that of the largeft monarchy in ancient or modern times. Of its extent the emprefs, in 1783, thus expreffes herfelf: "The Ruffian empire is diftinguifhed on the globe by the extent of its territory, which reaches from the eaftern borders of Kamtfchatka to beyond the river Duna, which falls into the Baltic at Riga, comprifing within its limits 165 degrees of longitude; extending from the mouths of the rivers Volga, Kuban, Don, and Dnieper, which fall into the Cafpian, the Palus Mæotis, and the Euxine, as far as the frozen ocean, over 32° of latitude." If we take into the account fome iflands, which the emprefs has not mentioned, the Ruffian empire, fays Mr. Tooke, according to the neweft and beft charts, will be found to extend from about the 43d to the 78th degree of N. latitude, and from the 39th to the 215th degree of longitude, thus including the iflands lying in the eaftern ocean. Without reckoning the iflands, the empire extends in length above 9200 Englifh miles, and in breadth 2400. The writer now cited gives the following comparifon between the Roman empire, at the

the height of its grandeur, with that of Ruſſia. The Roman empire contained about 1,600,000 ſquare miles; or exactly as much as only the European part of Ruſſia. Its greateſt length, from the Euphrates to the weſtern ocean, amounted to 3000 miles, and the greateſt breadth, from the wall of Antoninus to the pillars of Hercules, 2000 miles; but if we take the length of the Ruſſian empire, we ſhall find it to be, from Riga to Anadyrſkoioſtrog, 9684 miles, and thence to the haven of Peter and Paul, in Kamtſchatka, 1750 more. Moreover, the poſſeſſions of the Romans extended ſomewhat ſhort of 32 degrees of latitude; whereas Ruſſia compriſes 35½. The Ruſſian empire received a freſh augmentation at the treaty of peace concluded with the Porte the 29th of December 1791; that is, the whole territory of Ochakof or Otchakov on the Bogue, as far as the Dnieſter, which laſt-mentioned river is now ſettled to be the boundary for ever.

Ruſſia has various frontiers: on the N. and E., omitting the eſtabliſhment on the continent of America, it is bounded by ſeas; on the other ſides, its limits are partly terra firma, partly ſeas, and here and there rivers, *viz.* to the W. Denmark, Sweden, and the Baltic; to the S. Courland, Poland, Turkey, the Euxine and the Caſpian, Perſia, China, and various tribes of almoſt ſavage, nomadic, or uncivilized nations. Other frontiers are fixed by treaty; as, with Denmark, concerning Lapland and Finland, in 1602; with China and the Mongoles in 1727; with Perſia in 1732, the river Terek being in ſome reſpects now regarded as the line of limitation; with Poland by various treaties, finally adjuſted in 1795; with Sweden in 1721 and 1743; with the Turks by ſeveral treaties from 1739 to 1791; with Courland in 1783, which finally ſurrendered its independence in 1796. From Tchutzkaia Zemlia, northwards over Kamtſchatka, the empire borders very nearly on America; being, by the lateſt obſervations, only ſeparated from it by a ſtrait of the ſea, called Behring's or Cook's ſtraits, not more than 175 Engliſh miles in breadth.

With regard to climate and temperature, the Ruſſian empire has been divided into three large regions, *viz.* the region lying above the 60th degree, and extending to the 78th degree of N. latitude; that lying between 50° and 60°; and that lying to the S. of 50° and reaching to 43°. The firſt is the rudeſt and coldeſt, and contains the greater part of the governments of Irkutſk, Tobolſk, and Vologda, the entire governments of Archangel, Olonetz, and Vyborg, with part of thoſe of Perm, Novgorod, and St. Peterſburg. The ſecond region, with regard to fertility, may be called temperate; and it comprehends the governments of St. Peterſburg, Revel, Riga, Polotſk, Mohilef, Smolenſk, Pſcove, Novgorod, Tver, Yaroſlaf, Koſtroma, Viætka, Permia, Kolyvan, a good portion of Irkutſk and Ufa, the governments of Moſcow, Vladimir, Niſhnei-Novgorod, Kazan, Kaluga, Tula, Riazan, Voronetch, Tambof, Penza, Simbirſk, Kurſk, Orel, Novgorod-Sieverſkoi, Tchernigof, and the greater part of Kief, Kharkof, and Saratof. The third region is the hot climate, yielding products, *e. g.* wine and ſilk, which the two former do not: in this lie Taurida, Ekaterinoſlaf, the greater part of Caucaſia, and a part of Kief, Kharkof, Voronetch, Saratof, Kolyvan, and Irkutſk. Mr. Hermann divides the empire more accurately by its climates into four regions; the firſt is the very cold region, from 60° to 78° N. lat., including Vyborg, Olonetz, Archangel, the greater part of Irkutſk, Tobolſk, and Vologda, and a part of Perm, Novgorod, and St. Peterſburg; the ſecond being the cold region from 55° to 60° N. lat., comprehending Revel, Riga, Polotſk, Pſcove, Tver, Moſcow, Yaroſlaf, Vladimir, Koſtroma, Viætka, the greater part of Perm and Kazan, and a part of Irkutſk, Kolyvan, Ufa, Simbirſk, Niſhnei-Novgorod, Kaluga, and Smolenſk: the third and moderate region extends from 50° to 55° N. lat. and includes Mohilef, Tchernigof, Orel, Kurſk, Tula, Tambof, Penza, the greater part of Kief, Kharkof, Voronetch, Riazan, Saratof, Kaluga, Simbirſk, Ufa, Kolyvan, and a part of Irkutſk, Kazan, Niſhnei-Novgorod, and Smolenſk. The fourth or hot region reaches from 43° to 50° N. lat. and contains Taurida, Ekaterinoſlaf, the greater part of Caucaſia, and a part of Kief, Kharkof, Voronetch, Saratof, Ufa, Kolyvan, and Irkutſk. In many diſtricts of the firſt region there is hardly any ſummer; the ſpring has in general much froſt, ſnow, and rain; the winter is always ſevere. In the ſecond region the ſummer is in many parts ſhort, and yet in moſt of them ſo warm and the days ſo long, that the fruits of the earth uſually come to perfect maturity, in a much ſhorter ſpace of time than elſewhere; the winter too, particularly in the governments of Irkutſk, Tobolſk, Perm, Viætka, &c. is for the moſt part very ſevere. In the third region there are very extenſive diſtricts, *e. g.* in the governments of Irkutſk, Kolyvan, and Ufa, where the winter is alſo long and cold, which is chiefly owing to the lofty mountains with which they abound; but the governments in the European diviſion of Ruſſia, lying under this meridian, moſtly enjoy a ſhort and tolerably temperate winter, and a fine warm ſummer. In the fourth region the winter is ſhort, the ſummer warm, often hot, and in many parts very dry.

The whole Ruſſian territory conſiſts at preſent of fifty alike-organized provinces, called governments or viceroyalties. Each government is again divided into ſeveral circles; and ſome of the largeſt are farther diſtributed into diſtricts. In each circle is a circle-town, where the circle-adminiſtration has its ſeat, and one of theſe circle-towns is at the ſame time the government-town, in which the governor-general and the principal officers reſide, and by which the whole government is uſually denominated. Beſides theſe fifty governments, there are two more countries, having a military civil conſtitution, *viz.* the country of the Donſkoy-Kozaks, and the country of the Euxine-Kozaks. (See Cossacks.) The whole number of provinces is therefore fifty-two: and, moreover, the Georgian ſtates Karduelia and Kakhetty, ſeveral petty diſtricts in the parts of Caucaſus, together with the country of the Kirghis-Kozaks, are to be reckoned among the countries under the protection and in the dependance of Ruſſia.

Hiſtory of the Ruſſian Empire.—Although no other European empire has been ſo frequently and ſo well deſcribed in the three laſt centuries by foreign travellers as the Ruſſian; yet neither did any other remain ſo long unknown to the civilized nations of our quarter of the globe. This fact may juſtly excite our ſurprize, if we conſider, that ſo early as the thirteenth century, the adventurers and ambaſſadors, who either viſited for private purpoſes, or were diſpatched by their ſuperiors to the courts and territories of the Tſchingiſkanides, partly took their route through Ruſſia (for inſtance, Carpin and his attendants: ſee Voyage de Jean du Plan Carpin, chap. 1. in the Recueil de Bergeron): that in the ſame century the Hanſe towns eſtabliſhed numerous factories and a flouriſhing commerce, both at Novgorod and Pleſco, and the Teutonic knights had founded a powerful ſtate on the borders of Ruſſia: that about the ſame period the Genoeſe, Venetians, and other Italian republics, occupied with colonies the coaſts of the Euxine, and the rivers that flow into that ſea, or at leaſt navigated them, and from theſe colonies and coaſts carried on an extenſive trade with all the countries far and near: that even long before this, enter-

priſing

prifing Danes and Normanni, for the purpofes either of traffic or depredation, explored the harbours of the White fea, and even the defart fhores of the great northern ocean, abounding in coftly furs: and that finally, Ivan the Threatening, and his fon Vaffilli Ivanovitch, waged frequent wars with the Poles, the Swedes, and the Teutonic knights, and had frequent correfpondence by embaffies, not only with their neighbours, but likewife with diftant princes and populations. Whether the warriors, merchants, and artifts who had a view of Ruffia, neglected to write down their obfervations, or their written remarks were never publifhed; the fact is, that as far down as the commencement of the fixteenth century, the learned of Europe knew much lefs of Ruffia than we at prefent know of New Holland. It is likewife often difficult to difcover from the earlieft writers on Ruffia, when it was they wrote, or when their writings were firft committed to the prefs; and though we fhould happily find out both the one and the other, we are not unfrequently at a lofs, whether to arrange thefe ancient journalifts and geographers according to the time when they wrote, or that in which their works were publifhed.

The firft particular accounts of Ruffia are found in the "Viaggio di Meffer Jofafa Barbaro alla Tana," and in the "Viaggio del magnifico M. Ambrofio Contarini," both in the fecond volume of the "Raccolta" of Ramufio. It is fcarcely probable that thefe travels were printed earlier than the collection of Ramufio, fince they are quoted by no author prior to the middle of the fixteenth century. Barbaro travelled in 1436, as a merchant alla Tana, or to the Crimea, and remained there fixteen years. He fpeaks only in the two laft chapters of Ruffia, and of the Tartarian countries which lay to the fouth and to the eaft of Ruffia; particularly of Citracan, or Aftrachan; and of Cafan, which city he defcribes as the principal mart of the trade in furs, which in his opinion were brought thither from Zagatai and Moxia. Barbaro muft have wrote his journey long after his return from the Crim, as he remarks that the Ruffians had conquered Cafan and Novgorod. Contarini travelled, in 1483, in quality of ambaffador from his republic, through Poland and the Ukraine to the court of Perfia, and returned, in 1487, acrofs the Cafpian, by Aftrachan, and through Ruffia proper. It is curious enough that he fpeaks of a *Roffia baffa* and *alta*, and of a *gran Roffia bianca*. Of Novgorod he fays: "la qual confina quafi con la Francia, et con la Almagna alta."

A great part of the Ruffian empire was anciently inhabited towards the N.E. and N. by a people of Finnifh origin, perhaps defcended from the ancient Scythians. Towards the N.W. were tribes confifting of a motley race of Sauromates and Grecian colonifts; and from them are defcended the modern Lithuanians, Lettovians, Livonians, and Courlanders; as were alfo the ancient Pruffians. The whole fouthern part of Ruffia, even to the Krimea or Crimea, was for fome time inhabited by Goths; and between the Volga, the Don, and mount Caucafus, was a nation defcended from the Medes, called Sauromates, that is, the northern Medes. In procefs of time, when barbarian nations iffued in fwarms from the E., and fome of the different tribes of Goths had, fince the middle of the third century, penetrated into the weftern regions of the Roman empire; fome of the Sauromates were under the neceffity of retiring farther towards the N. and the W. The fame political conftitution which is now prevalent, exifted at that remote period. Each individual of the nation was either mafter or flave. The various tribes which occupied the country derived their appellation from fome river, town, or diftrict; and from the more modern Varagian Roffi, the Ruffians, it is faid, about the year 862, received their name. No country in the globe contains fuch a mixture and diverfity of inhabitants: each diftinct nation having its own language, in fome cafes debafed and corrupted, and retaining, more or lefs, its own religion and manners; while the generality of the main ftems bear in their bodily ftructure, and in the features of their faces, the diftinctive impreffion of their defcent, which neither time nor commixture with other nations has been able altogether to efface.

The aborigines of Ruffia were *Finns* and *Slavonians*, fee each refpectively. Of the Slavonians, who inhabited the country about the Dnieper and the Upper Don, fome, oppreffed by the Bulgarians, fpread themfelves farther northward on the Dnieper, and conftructed Kief, while another colony penetrated up the Volkhof, and laid the foundation of Novgorod. After a dark period of more than 100 years, the Slavonians appear again among the Finns, and at this time the Ruffian ftate received its origin from the Scandinavians or Northmanni. The Slavonian fettlers, both on the Volkhof and the Dnieper, were oppreffed by two hoftile nations, *viz.* the Khazares from the Euxine, and the Varagians, Varingians, or Northmanni from the Baltic. (See KHAZARES and VARAGIANS.) In the ninth century, the Varagians conquered from the Ruffians, who were a kindred north-gothic people, firft mentioned in the year 839, and belonging to the Varagian race, and of courfe originally Normanns or Scandinavians, the modern diftricts of Revel, St. Peterfburg, and Archangel, and fubjected the Slavonians, Krivitfches, Tfchudes, Veffenians and Meræenes, various tribes, partly Slavonians and partly Finns, to a tribute. The Ruffians retired to Finland and Karelia; but at length the Slavonians, aided by the other tribes juft mentioned, expelled the Varagians, and formed themfelves at the lake Ilmen, near Novgorod, into a federative democratical republic. After experience of the imperfection of this conftitution, and finding it productive of internal difturbances, the five united nations refolved to call in the Ruffians for the purpofe of reftoring tranquillity, and affording them protection; and with this view they voluntarily offered to refign the fovereignty to them. The Ruffian prince Rurik, with his brothers Sineus and Truvor, accepted the invitation. Rurik, having collected together all his people, came in the year 862 to the mouth of the Volkhof, and affumed the government of the newly erected ftate; which, from its firft formation, confifted of fix feveral tribes, *viz.* Slavonian, Finnifh, and Varagian, extending over the regions of the prefent governments of Riga, Revel, Polotfk, Pfcove, Vyborg, St. Peterfburg, Novgorod, Smolenfk, Olonetz, Archangel, Vladimir, Yaroflaf, Koftroma, and Vologda. Whilft the Varagians, under Rurik, compofed the predominant part, the Slavonians and Ruffians were foon blended into one nation; and though the name of the latter was transferred to the whole nation, yet the Slavonian language and manners retained the fuperiority, that people being confidered as the moft prevalent, both with regard to number and civilization. Rurik, fixing his refidence at Staraya Ladoga, affumed the title of grand-prince; and when both his brothers died childlefs, he reunited their territories with his own, and in the fourth year of his reign, removed his refidence from Old Ladoga to Novgorod, which from that time became the capital of the Ruffian monarchy. Soon after the elevation and eftablifhment of Rurik, the Slavonians on the Dnieper, being oppreffed by the Khazares, befought Rurik to give them a prince of his own race; and he accordingly fent his ftep-fon Ofkold, who fubdued the Khazares, and founded at Kief the fecond Slavo-Ruffian dominion, dependent on the Novgorodian empire. Oleg, the immediate successor of Rurik, united Kief with the Russian territory, and appointed this second Slavonian family seat to be his residence and the capital of the country. Under the following reigns, the power of the empire rapidly increased. Russian armies appeared before the gates of Constantinople; many nations were rendered tributary; the Russians carried on a regular commerce to the coasts of the Euxine; they built cities, and not only embellished but gave laws to such as already existed. On the death of Vladimir the Great, in the year 1015, who embraced the Christian religion, and introduced it into Russia, the progress of the nation was checked by the partition of its territory among his twelve sons. This was followed by a variety of sanguinary contentions, till at length there arose a third state, *viz.* White Russia, or Vladimir. Of these three states, *viz.* Vladimir, Kief, and Novgorod, the principal was Vladimir, and Susdal was its capital. This distinction afterwards devolved on Vladimir; and finally on Moscow, a city which was founded in the year 1147, by George I. In the year 1237, the Mongoles and Tartars, who under their khan Tschingis had united themselves into a powerful state at the beginning of the 13th century, and subjected the greater part of Asia, put themselves under the conduct of his descendant Batu, khan of Kaptschak, and fell upon Southern Russia, where they founded a formal sovereignty. The Tartars, having effected their conquest, numbered the people in the principalities, imposed on them a heavy tribute, and thus riveted the oppressive yoke of foreign sovereignty which the Russians endured for upwards of 200 years.

Whoever has studied the Russian history with attention, must naturally be surprized that the nation, in consequence of the numerous and formidable revolutions which it underwent, was not utterly demolished or dispersed, their dominion entirely subverted, and their very name, as has been the case with so many other nations, totally effaced. The Russian nation, however, not only weathered out all the storms, which so frequently menaced its dissolution, but rose, as if refreshed with juvenile vigour, extended its gigantic arms on every side, vanquished all its hostile neighbours, and at a very early period of its greatness crossed the mountains, which for immemorial ages had been styled by their inhabitants the girdle of the globe, and there, as in a new world, progressively made conquests, no less for geography and natural history, than for their immense domain.

In 1462, Ivan Vassillievitch I. ascended the throne of Moscow, and after a reign of fourteen years, refused obedience to the Tartars, and by a series of victories, gained possession of the Tartarian kingdom of Kazan, and reduced its sovereign to a state of tributary vassalage. In 1477, the republic of Novgorod submitted to the force of his arms, and a similar fate befel the principalities of Pscove and Tver. Lithuania lost a considerable part of its territory. The princes of Severia voluntarily surrendered; and the increasing power of Ivan was withstood only by the Teutonic order in Livonia. Under his successor Kazan was lost for a short time; but Smolensk was incorporated into the Russian state. Ivan Vassilievitch II. at length burst the last shackles of the Mongole-Tartarian sovereignty. The entire conquest of Kazan was completed in seven years, the capital of the kingdom surrendering in 1552. Two years afterwards, Astrachan became a Russian province: and Ivan advanced into Caucasus, and subdued the whole Kabardey. Although the Ottoman Turks, aided by the Tartars of the Krim, ravaged the capital of Russia, this disaster was amply counterbalanced by the channel opened for maritime commerce by way of Archangel, and by the conquest of Siberia, events which date their commencement from the reign of Ivan, but which owed their completion to his successors. As others state these events, Ivan III., surnamed the Threatening, was the first who, towards the latter end of the fifteenth century, began to demolish this baneful oligarchy, and to throw off the yoke of the Tartars. The most considerable annexation he procured to his empire consisted in the reduction of Novgorod, and the northern provinces, which ages ago had been conquered by the Novgorodians, and retained under their dominion. His son and his grandson Vassillie Ivanovitch and Ivan Vassillievitch the Terrible, completed the grand project, which the father and grandfather had left for their successors. Under the reign of Vassillie Ivanovitch, baron Herberstein laid down the first perspicuous geography of the Russian empire, according to which we shall describe the boundaries of it towards the latter end of the fifteenth, and the commencement of the sixteenth centuries.

Herberstein uses the term Russia in a two-fold acceptation. By the one he understands all those countries that were inhabited by Russians; and in this larger sense he even comprehends the king of Poland and the grand duke of Lithuania among the Russian princes, since both of them possessed territories that were occupied by Russians. In the more contracted import, that author comprises simply the countries subject to the grand prince of Moscow. In the description of this proper Russia, taking his departure from Moscow, he first mentions the eastern and southern, and then the western and northern provinces.

Eastward, therefore, of the province of Moscow, the grand prince of Russia possessed the provinces of Vladimir, Nishnei-Novgorod, and Riazan; the river Sura forming the boundary between the Russian and Casanian territories. (Sura fluvius Mosci, et Casanensis regis dominium dividit, page 65.) Towards the south-east, during the reign of Ivan III. the Russian confines reached only about a day's journey from the city of Riazan; for Contarini arrived at the city Riazan the day after he entered the Russian territory. (Ramus. ii. 122. fol. b.) To the south, Tula was the last Russian city towards the Tartarian steppes (Herberst. p. 66. Tulla—est ultimum oppidum ad campestria deserta); and somewhat farther to the west was Kaluga, the fortified city, where the grand prince annually assembled his troops against the incursions of the Crimean Tartars. (Ibid. p. 68.) Towards the south-west, Vassillie Ivanovitch first conquered the principality of Novgorod Sieverskoi, which at that time comprehended also Tchernigof, and a part of the present government of Orel. (Ibid. 68—70.) Towards the west, Smolensk, which province Vassillie Ivanovitch, in 1514, severed from Poland or Lithuania, Pscove, and a part of the present Petersburg government, to the mouth of the Narova, formed the boundary. To the north of Moscow lay, lastly, the provinces Tver, Great Novgorod, Yaroslaf, Kostroma, and the provinces formerly subject to the Novgorodians, namely, Vologda, Ustiug, Viætka, Perm, and Dvina.

Reckoning the principalities specified by Herberstein to the division of the governments and viceroyalties made by Catharine II. then the empire subject to the grand prince Vassillie Ivanovitch, excepting Moscow and a part of the Petersburg government, comprised only those of Pscove, Tver, Novgorod, Archangel, Vologda, Yaroslaf, Kostroma, Viætka, Perm, Smolensk, Tchernigof, Novgorod Sieverskoi, Orel, Kaluga, Tula, Riazan, Vladimir, and Nishnei-Novgorod. Short of the present number of viceroyalties by those of Petersburg almost entirely, then those of Viborg, Revel, Riga, Olonetz, at least in part, Tobolsk, Polotsk, Mohilef, Kharkof, Kursk, Kurfk, Kazan, Simbirfk, Penza, Tambof, Voronetz, Saratof, Ufa, Kolyvan, Irkutfk, Minfk, Ifiaflaf, Brazlau, Kief, Ekaterinoflaf, Caucafus, and Taurida, together with the country of the Don Coffacks, and the provinces which fell to Ruffia on the laft partition of Poland.

Ivan the Terrible continued the aggrandizement of the empire, of which his father and grandfather had laid the foundation, with equal zeal and fuccefs. He conquered, in 1552 and 1554, Kazan and Aftrachan, and united the countries dependent on thofe cities for ever with his empire. It was during his reign that a band of Don Coffacks, whom he had driven as robbers from the inferior Volga, forced their paffage acrofs the Uralian mountains, overturned the dominion of the Tartars on the Tobol and Irtifch, and, unknown to the grand prince, conquered the north-weftern diftricts of Siberia to the laft-mentioned river. Though it cannot be faid that the Ruffian tzars had neglected to make conquefts in the northern Afia; it may, neverthelefs, be affirmed, in a certain fenfe, that the conqueft of Siberia was completed of itfelf in nearly the fame manner in which it was begun. The court of Mofcow undoubtedly liftened with encouraging atttention to the advantageous propofals that were made refpecting the extenfion and fortification of the Siberian diftricts, and royally rewarded the perfons who, by their prudence and bravery, had deferved fo well of the empire. The tzar fent, or at leaft agreed to the reinforcements that were wanted for the farther profecution, or the defence of the acquifitions, now that they were made. Thefe reinforcements were, however, generally fo fmall, that in Mofcow, much lefs abroad, they were fcarcely remarked. The hopes of obtaining riches either by a fortunate chace, or by extortions practifed on the unarmed tribes that were found inhabiting the fteppes and wilds of Siberia, annually allured thoufands of bold hunters and warriors into thofe parts; and thefe adventurers, fpurred on by their infatiable avarice and unbounded licentioufnefs, were perpetually exploring new regions and populations, which were not yet exhaufted and plundered of their all. Thus it happened, that about a century after Yermak had deftroyed the empire of the Tartars upon the Irtifch, almoft the whole of that prodigious tract of country was fubdued at a far lefs expence of blood and treafure than the fmalleft of the weftern and northern provinces which had hitherto been conquered had coft, or, as was afterwards feen, thofe which then remained to be fubdued.

Feodor, the fon and immediate fucceffor of Ivan the Terrible, abandoned his claim to Efthonia, and in return forced from Sweden in 1594, the ceffion of Ingria and Karelia. By Feodor's death, in 1598, the dynafty of Rurik became extinct; and during the fubfequent interregnum, many pretenders, under the name of Demetrius, involved the empire in confufion, till, in 1613, Mikhaila Romanof, or Michael Feodorowitz, of the dynafty of Romanow, defcended in the female line from Ivan IV. was elected fovereign, and by large facrifices purchafed the repofe of his empire. To the Swedes he was obliged to relinquifh Ingria and Karelia, and to the Poles, Smolenfk, Severia, and Tchernigof, and to make a formal renunciation of all claims upon Livonia, Efthonia, and Courland. From that period to the prefent day, Ruffia has not only been gaining its ancient poffeffions, but fo far extending and enlarging them, that the prefent circumference of the empire has no parallel in the hiftory of the world. Alexey, or Alexis, the fon and fucceffor of Michael, not only reconquered the countries ceded by his father to the Poles, but alfo reduced Kief and the Ukraine on the E. fide of the Dnieper, in 1655, to a re-union with the parent ftate of the Slavo-Ruffian nation. His fon, Peter I., "the creator of modern Ruffia," acquired to his empire in 1721, by a twenty years' war with Sweden, the provinces on the fhores of the Baltic, which had occafioned bloody contentions among the northern powers for many centuries: Livonia, Efthonia, Ingria, and a part of Kexholm and Karelia, were fubjected to the Ruffian fceptre, thus adding to the Ruffian empire great advantages for commerce, and a refpectable rank among the principal European powers. Catharine II. aggrandized Ruffia both within and without, by a reform of its government, and by feveral fuccefsful wars. She obtained from the Porte, in 1774, the poffeffion of the city of Azof, with its territory; and for the fecurity of the Ruffian navigation on the Euxine, the forts of Kinburn, Kertfch, and Yenicaly in the peninfula of the Krimea. In 1783 the whole province became, by treaty, a Ruffian government; and recovered its ancient name of the Tauridan Cherfonefe. Ruffia alfo, by the fame convention, enlarged her borders to the fouth by the Kuban, where at prefent the Caucafian mountains form the boundary of the Ruffian dominion. Afterwards the Porte was compelled to furrender a confiderable tract of country on the fhores of the Euxine, between the Bogue and the Dniefter. In the difgraceful partition of Poland, Catharine obtained for her fhare, in 1773, the four Lithuanian voivodefhips of Smolenfk, Vitepfk, Mftiflaf, and Polifh Livonia, with a part of the voivodefhips of Polotfk and Minfk. An unprofperous war terminated in 1793, with the lofs of the fertile provinces of the Leffer Poland and Lithuania; and at length the capital of the kingdom fell into the hands of the Ruffians; its political exiftence was annihilated, and in 1796 the laft veftiges of it were loft in the confines of the bordering ftates. One confequence of the annihilation of Poland was the acquifition of the duchies of Courland and Semigallia, including the circle of Pilten, which, on the diffolution of their feudal connection with the republic, by a refolution of the ftates of the country, fubmitted themfelves unconditionally in 1795 to the fceptre of the emprefs.

Catharine extended her territory, by the mild authority of her laws, and the methods of civilization which fhe adopted, as well as by her conquefts and treaties. Accordingly the tzar of Kartuelia and Kakhetty put himfelf under the protection of the Ruffian empire, by acknowledging, in 1783, the fupremacy of its monarch. She alfo invited people from all countries to fettle in her dominions, and thus eftablifhed numerous colonies. She reduced a multitude of tributary nations dwelling in the interior of Siberia to fubmit to her laws. She fet on foot and encouraged feveral voyages of difcovery, which obtained for the Ruffian empire a new fovereignty in the eaftern ocean, and on the weftern coaft of America.

The brilliant conquefts of Catharine may, indeed, immortalize her fame as a conqueror; but they alone will never render the memory of that accomplifhed and fagacious monarch beloved and bleffed. Cordial affection and admiration are the proper tribute both of contemporaries and pofterity, due only to her as the wife and benign legiflatrix, inftructrefs, and patronefs of her numerous populations and countries. Thoufands of perfons, to whofe judgment even upright and excellent fovereigns cannot be indifferent, lament at prefent, and will lament to lateft ages, that the emotions of affection and admiration, fo congenial to the heart with which the exalted legiflatrix, inftructrefs, and patronefs of the nations obedient to the Ruffian fceptre has infpired, and ever will infpire them, are painfully difturbed

turbed and abated, either by the recollection of the blood which one half of her conquefts coft, or the maxims that were followed in obtaining poffeffion of the other.

Refearches refpecting the extent and dimenfions of countries would be of far greater value than can at prefent be allowed them, if the internal ftrength of empires increafed in equal ratio with their extenfion, or the real happinefs of their inhabitants with both. Ruffia affords the moft convincing proof that this is not the cafe. No European nation ever ruled over countries of fuch vaft extent as the Ruffian; and yet there have been, and ftill are in Europe, feveral nations exceeding the Ruffian in population, or at leaft in power and well-being. The ftatements of the magnitude of the Ruffian empire lofe greatly of their intereft by differing fo widely from each other. Le Clerc gives to the Ruffian empire a fuperficial content of 949,375 leagues, and cenfures the hiftorian l'Evêque for having erred in his ftatement by at leaft 424,375 leagues. The German geographers have not fo great a difcrepancy in their account as the French. In the mean time, between thofe who fet it down at the leaft, and thofe who affign to it the greateft number, there is a prodigious interval, an interval which Germany and France together could not fill up. We mean France before the revolution. Three hundred thoufand fquare geographic miles compofe the leaft, three hundred and thirty thoufand the greateft extenfion which German authors have affigned to the Ruffian empire.

Of thofe tribes called Kozaks or Coffacks, which are of Ruffian origin, we have given a brief account under the article COSSACKS. Of the three Slavonian nations, properly fo called, that are inhabitants of the Ruffian empire, next to the principal nation, the *Poles* are the moft numerous. Thefe, it is faid, at the fame time with the Ruffian Slavi, and on the fame occafion, came from the Danube to the Viftula. Their ftate, now nearly extinct, was probably founded in the ninth century; and they fprung from the fame ftock with the Ruffians. According to the prefent ftate of the Ruffian empire, the Poles form a very confiderable part of the aggregate population. They may be found, in an immenfe multitude, in the governments of Polotfk, Mohilef, Minfk, Brazlau, Vofnefenfk, Podolia, Volhynia, Vilna, and Slonimfk; and in fmaller numbers, as colonifts, in the circle of Selenghinfk, on the Irtifch, and in various other parts of the empire. The third Slavonian nation within the borders of Ruffia is compofed of the people called *Servians* or *Serbes*. (See SERVIANS.) Befides thofe tribes which we have already enumerated, there are two others in the Ruffian empire, who are fuppofed to be related to the Slavi: thefe are the Lithuanians and the Lettifh. (See LITHUANIA and LETTES.) For an account of the *Kalmucks*, *Mandfhures*, *Mongoles*, and *Tartars*, as compofing primitive ftocks of the nations dwelling in Ruffia; fee thefe feveral articles refpectively. In the Ruffian empire there are alfo fome nations whofe origin is utterly uncertain. Mr. Tooke reduces them to two claffes, one comprifing the *Samoyedian*, and the other the eaftern *Siberian* nations. (See SAMOYEDES and SIBERIA.) Of the European nations, fome bodies of which are difperfed through the Ruffian empire, the moft numerous are the German. In the governments of Riga, Revel, and Courland, they form the moft confiderable, though not the moft numerous, part of the inhabitants. The Germans refiding in the government of Riga amount, according to the lateft enumeration, to 30,000, and thofe in that of Revel to 15,000; and in Courland they are thought to be ftill more numerous. In Mofcow and St. Peterfburg they live by thoufands; in the latter alone they are known to be upwards of 17,000. As colonifts, properly fo called, many thoufand German families came, in 1763, into the governments of St. Peterfburg, Saratof, Voronetch, and Tchernigof, as fettlers, the number of whom, fince the year 1783, is much increafed by new fettlements in the government of Ekaterinoflaf, and in the province of Taurida. All thefe, and the multitude of fuch as live feparately about the empire, taken together, may, as Mr. Tooke fuggefts, probably far exceed 100,000. Of the other European nations, there are only detached colonies, efpecially in the large towns. In the governments of Vyborg and Revel, and in fome of the iflands of the Baltic, there are Swedes, but not amounting to a very confiderable number. The iflands Vorms and Rugen, in the Baltic, are partly inhabited by Danes, but they are moft numerous in Mofcow and St. Peterfburg, and fome of the large towns. In moft of the fea-ports there are Englifhmen, who make no long ftay, but return to their native country as foon as their affairs permit. French and Italians are alfo difperfed over the whole empire. In Little Ruffia, at Nefhin, in the government of Tchernigof, in that of Ekaterinoflaf, and in Taurida, the Greeks form fome refpectable colonies. In the government of Ekaterinoflaf there are alfo Albanians, Moldavians, Valakhians, and Arnauts, though their number is not great. The Ottoman Turks are, in a great degree, difperfed; but they are found together in fmall numbers at Orenburg, in the former Otchakof fteppe, and in fome other places. In the diftricts of Aftrachan and Orenburg there are many Perfians, and on the Kamma there is a colony of Perfians and Arabs. The Armenians are numerous in the towns of Orenburg, Kitzliar, Mofdok, St. Peterfburg, and Mofcow; but in the governments of Caucafus and Ekaterinoflaf they compofe a colony confifting of fome thoufands. The town Nachitfchevan, on the Don, is almoft wholly inhabited by them. In Aftrachan and Kitzliar are fettlements of Indians. The Jews are numerous in fome of the provinces, particularly thofe of Poland, now annexed to the Ruffian empire, and in Taurida, where they are partly fixed as ancient inhabitants. Gypfies are found ftrolling in large companies in the provinces both of Great and Little Ruffia. Upon the whole, Mr. Tooke obferves, that the inhabitants of the Ruffian empire form at leaft 80 diftinct nations, differing effentially in lineage, and alfo in manners and language.

Climate, Weather, and natural Qualities of the Soil of Ruffia.—As to the *foil* as well as the *climate*, there is a great diverfity in the different provinces of the Ruffian empire. Some tracts of land in Great and Little Ruffia, in the provinces bordering on the Baltic, and many others, are kept in conftant cultivation and tillage. In other diftricts, *e. g.* in Little Ruffia, about the Don, &c. the land is only cultivated occafionally; and again in other parts of the empire, lands fit for agriculture are left wholly unemployed, for want of labourers. The quality of the foil is very different in different tracts; in Livonia and Efthonia, good fields yield 8, 10, and 12-fold, and, in fome cafes, 16, or more than 20-fold; but in different ground about 3. The harvefts about the Don are commonly 10-fold; but towards Tomfk, on the Tfhumufh, and in the whole region between the Oby and the Tom, many fields afford an increafe of 25 to 30-fold; and at Krafnoiarfk a crop has not been known to fail: of winter corn they reap 8, of barley 12, and of oats 20-fold. In Little Ruffia, on the Don, and in many other places, the foil is fufficiently fertile, without manure. This is alfo the cafe in a great part of Siberia, *e. g.* on the Samara; on the Ufa, in the country of the Bafhkirs; here and there in the Baraba; and alfo on the Kamma, in the government of Ifetfk; on the Oby near Barnaul, at Krafnoiarfk, and on the Selenga.

All travellers agree in praiſing the ſalubrity of the atmoſphere in Ruſſia, and the abſence or infrequency of ſeveral diſeaſes with which the other countries of Europe are viſited, ariſing from it. Herberſtein and his followers, from the general healthineſs of the Ruſſian climate, have explained this remarkable fact: that, from time immemorial, the plague has never communicated itſelf from the ſources of the Don to the north and eaſt; which opinion, however, has been confuted, even in ancient times, by ſeveral dreadful peſtilences, and likewiſe in the laſt century, by the formidable plague which, in 1770—1772, raged in the city and territory of Moſcow. Since the diſtricts of the Lower Don and Dnieper, and thoſe between the Dnieper and the Dnieſter, have been incorporated with the Ruſſian empire; the country of the Don Coſſacks, and what was formerly called Poliſh Ukraine, form an exception to the juſtly boaſted ſalubrity of the climate of European Ruſſia. Almoſt every year thouſands of perſons are carried off by all kinds of ardent and putrid fevers, dyſenteries, inflammations of the cheſt, pleuriſies, &c. from July to the beginning of winter, eſpecially in thoſe parts which are ſurrounded with fetid moraſſes, or have no other than ſtagnant and putreſcent water.

While, upon the whole, they extol the ſalubrity of the Ruſſian climate, they, in general, complain of the intenſe cold of the winter, and the equally exceſſive heat of the ſummer, which, in the northern and central Ruſſia, very often prove deſtructive to men and beaſts, no leſs than to the fruits of the earth. Almoſt all travellers adduce the ſame allegations, or inſtances of the inſufferable heats and froſts of the Ruſſian empire. The winter, ſay Herberſtein and his followers, laſts from ſix to eight months. During that ſeaſon, all the rivers and lakes are covered with ell-thick ice, and the ground with ell-deep ſnow. Where the ground is not covered, it is rent in wide and deep chaps by the winter cold, as in the milder parts of Europe by long continued ſummer drought and heat. In the coldeſt days, on firſt going out of the warm apartments into the open air, the breath is taken away, or contracted almoſt to ſuffocation. Spittle ejected is converted into ice before it reaches the earth; and if we touch metal with moiſt hands, the ſkin is left adheſive to it, as though the metal were glowing hot, and the ſame ſenſation is experienced from the contact. With the utmoſt precaution it nevertheleſs frequently happens, that thoſe who take only a ſhort walk, in a few minutes have their noſe, ears, or fingers frozen. Men and cattle bringing proviſions to town are often frozen to death. Ravenous and other birds fall dead to the ground, and fruit-trees are riven by the piercing froſt. It is affirmed by Gœteeris, pp. 88, 89, that it ſometimes happens that fleſh and fiſh, which have been boiling and roaſting more than an hour, on being cut up on table, were ſtill frozen within. The ſame author relates that the beards of himſelf and others were hard frozen to the bed-clothes while aſleep. The greateſt advantage ariſing from long and ſevere winters in Ruſſia is this; that it levels all roads, and opens them in every direction, ſo that travelling from one place to another is incredibly rapid and cheap; therefore, even in ancient times, when many canals were not yet dug, many roads and bridges not conſtructed, and many ſwamps not drained, the winter, ſtill more than at preſent, was the proper ſeaſon for commerce and the tranſport of commodities. Whereas, no ſooner has the vernal ſun diſſolved the incruſtation of the waters and the land, but at once the rivers and ſtreams overflow their banks, converting the lower plains and vallies into lakes or moraſſes. Within a few days after the ſnow has diſappeared, the foreſts and trees are clothed with beautiful foliage, and the ploughed lands, meads, and paſture-grounds, with the moſt luxuriant corn and herbage, which, owing to the humidity of the ſoil, and the rapidly increaſing ardours, ſhoot upwards with an almoſt viſible growth. The times of ſowing and reaping, therefore, border on each other in Ruſſia much nearer than in other European countries. Violent rains, boiſterous winds, and continued fogs, are more frequent than thunder-ſtorms, as immoderate, or late froſts, are oftener injurious than long droughts. Sometimes, however, Ruſſia experiences ſuch hot and dry ſummers, that fields of ſtanding corn and foreſts take fire, ſo that entire provinces are filled with noxious ſmoke, and in ſome ſort darkened by it. Among the principal annoyances of the hot ſeaſons, are the innumerable ſwarms of muſquitos, from which no reſt is to be had night or day, and the cold nights that not unfrequently ſucceed to ſultry days.

Ruſſia being generally a level country, or at moſt only riſing to moderate hills, it is ſomewhat curious that, though deſtitute of mountains, it contains more foreſts, lakes, and rivers, more brooks and running ſprings, than any other territory in Europe.

The north-eaſtern provinces, from the Volga to the Ural, are deſcribed by former travellers as a country for the moſt part covered with inexplorable foreſts, and that even where it is cultivated, it ſtrikes the eye as having been not very long ſince clothed with wood. Herberſtein, p. 61, ſpeaks thus even of the province of Moſcow: "Totam porro regionem non ita diu admodum ſylvoſam fuiſſe, ex magnis arborum truncis, qui etiamnum extant, apparet." "Il eſt vrai," ſays Miége, "qu'il eſt tellement plein de forêts, que dans l'éſpace de 500 lieuës, que nous fimes à travers ce pays là, nous en eumes toujours en vue, quoique ce fut la partie la mieux peuplée du pays." Ruſſia is, even at preſent, far more woody than any other European countries. The Volchonſkoi foreſt, through which the road lies from Viæſma to Moſcow, extends on all ſides to unknown diſtances; and in this foreſt it is ſaid, that, even in the laſt century, numerous colonies were diſcovered, which, from their origin, had been utterly unknown, not only to the government, but even to the neareſt inhabitants. Of ſuch colonies ſeveral may probably ſtill exiſt in the prodigious foreſts with which the diſtricts of Olonetz, Archangel, Perm, and other northern diſtricts are covered. Even the road between Moſcow and Peterſburg runs moſtly through an uninterrupted ſucceſſion of woodland, in which villages are rarely ſeen. The foreſts of Ruſſia conſiſt chiefly of cedars, pines, firs, linden, and birch; and the ſhores of the Volga, the Occa, the Don and its tributary rivers, are adorned with vaſt foreſts of oak, from which the ſhip-timber is conveyed to the ports of the Baltic, and to the wharfs of the Don and the Euxine. The regions between the inferior Volga, between the Don and Dneiper and Dnieſter, have fewer or even no woods at all, and the inhabitants are obliged, in many places, to dreſs their victuals with dried cow-dung.

It would be in vain to attempt at particularizing the lakes, pools, and marſhes, the rivers, brooks, and ſprings which are ſaid by the ancient travellers to be innumerable even to the inhabitants themſelves. Thoſe who came from Poland, or Livonia, repreſent travelling through Ruſſia as extremely perilous, not only on account of wolves and robbers, but from the badneſs of the roads, and the miſerable ſtate of the bridges. When people of quality were going a journey, orders were previouſly ſent to the country-folks of the parts adjacent, to make the roads and bridges in ſome degree paſſable. The high roads are now, in many parts of Ruſſia, as fine as in other European countries. If the wooden bridges are in ſome places badly maintained, and from the defect of here or there a balk are inconvenient and troubleſome to the traveller; they do not, however, ſo often endanger his neck. The roads are at leaſt ſufficiently wide, and every where provided

vided with verst-posts. See Coxe's Travels, vol. i. where the road between Petersburg and Moscow is described.

Those who have gone from Archangel up the Dwina and the Yug by ship, and then generally in sledges from Vologda to Moscow, unanimously affirm, that nowhere is more convenient and pleasant travelling than in Russia; the eye being incessantly delighted by the alternation of magnificent forests, rich pastures and corn-fields, but principally by the inexpressible abundance of running waters. (Fletcher, pp. 414, 415.) This latter commendation is, however, more fitly applicable to the northern than to the midland and southern parts of Russia, since in these the rivers have a slow current, and in summer are nearly stagnant; so that from Moscow quite to the Crimea scarcely any other than bad or indifferent spring-water is found. Suyef, p. 7.

On no topic are travellers more agreed, than in extolling the fertility of most of the Russian provinces. The soil, they inform us, consists generally of a black, fat mould, which produces all kinds of corn and grain, orchard fruits and garden vegetables, as also hemp and flax, in the greatest abundance; and, in many places, even without needing manure. The meadows and pasture-grounds feed incredible droves and herds both of large and small cattle: the forests are the haunts of an unspeakable quantity of not only the choicest species of game, but likewise of such animals as yield furs, which are every where eagerly sought after: the lakes, ponds, rivers, and brooks, in short, nourish a far greater variety of the most delicious kinds of fish, than all the other countries of our quarter of the globe taken together.

With respect to fertility of soil, the preference is generally given to the province of Vladimir, or somewhat rather, perhaps, to that of Riazan. The soil is, in the former of these provinces, of such fecundity, that not unfrequently from one bushel of sowing a produce of from twenty to thirty bushels is obtained. Still more prolific is the province of Riazan; where, according to report, very often one single grain of wheat will shoot out two or more straws, and they so thick and strongly grown together, that a horse cannot easily break his way through, and growse can with difficulty rise from among them. These provinces likewise produce honey, wax, fish, fowl, and all sorts of game, in the greatest profusion, and of the best quality; even the human inhabitants of them are bolder and more warlike than other Russians. If any one should think proper to put the Ukraine and the country of the Don Cossacks in competition with these two provinces, we have only to allege against it, that, indeed, in many parts of the Ukraine no manure at all is used; because if it were, it would either burn up the farina fecundans of the seed, or only produce enormous straws and foliage, destitute of ears and fruits. The stalks of the Ukraine corn are so tall and thick, that they are more like reed-stems than corn-straws.

Honey and wax are sought for in hollow trees, where the wild bees deposite their treasures, or in trunks of trees excavated for the purpose of serving as hives, which the boors fence with wires, to preserve them from the depredations of the bears. Several authors repeat the story, which Jovius heard of the ambassador Demetrius; that a boor once looking for honey in the forest, fell up to the neck in a hoard of it in a large hollow tree, whence, after passing a couple of days in that sweet situation, he was extricated at last by catching hold of the hind legs of a huge bear.

No country of Europe abounds so much as Russia in fish and game, particularly in the choicest wild-fowl, *viz.* the woodcock, the heath-cock, the pheasant, the partridge, the bustard, the snipe, &c. Cavear was already a principal article of commerce in the 16th century, and was exported by the French, Dutch, and English to Italy and France, having been first brought hither by Capt. Chancellor, in the reign of queen Elizabeth. It is mentioned by Shakspeare in his Hamlet: "Cavear to the multitude." But we must break off. To enter into details of wild and tame animals, of mines and metals, of edible roots and vegetables, of orchard fruits, of flowers and grasses, of wild herbs and berries, of the cheapness of the several necessaries of life, and the gradual increase of their prices, would swell this article beyond all proper bounds. We must, therefore, content ourselves with referring the reader for these and other particulars to the travellers who have given their observations to the public; such as Herberstein, Jovius, Olearius, Petreius, Margaret, Dr. Fletcher, Muller, the two Gmelins, Le Bruyn, Gœteeris, Cook, Korb, Tanner, Kupel, Herrmann, Hammard, Guagnino, Coxe, and more especially our inquisitive and laborious countryman Mr. Tooke; who have all treated not only of the climate, but also of the soil and produce.

It is easily conceivable, that in a country of such vast extent as Russia the climate must be extremely various, and this difference may even be reckoned, in some respects, among its advantages. In several provinces the winter is of long duration, and extremely cold; the short summer is, however, on that account, the hotter. And in these regions, for instance about Kolmogor, Archangel, several districts of Siberia, &c. the alternations of cold and heat are uncommonly rapid and frequent. The agreeable introduction to summer and winter, which we call spring and autumn, is here scarcely known. Amidst the burning heats of summer in these parts, you have frequently to contend with piercing cold. A simple change of the wind is able to produce this sudden alteration. In a place not quite 60° N. lat. it frequently happens that, after a sultry day, towards evening, if the wind veers to the north, such a cold ensues as to render a fur cloak not inconvenient. The formidable severity of the frost makes it necessary to adopt the practice of caulking the windows and covering the outside of the doors of the apartments with a felt made of cow-hair, called by the Russians *voilok*. To the same extremity of frost it is owing, that, in some parts of Russia, they have no orchard fruits.

In general the governments of Moscow, Nishnei-Novgorod, and Kazan, together with Astrachan, the Ukraine and Livonia, are the most temperate parts of the Russian empire. Upon the whole, the climate of Russia is not unfriendly to health and longevity. Proofs of this may be drawn from the unfrequency of diseases among the common people comparatively with other countries, notwithstanding their intemperate manner of life, from the considerable number of aged persons seen in Russia, though there are few physicians, excepting in St. Petersburg and Moscow, which swarm with doctors and surgeons (and where it is remarkable that deaths are earlier), and from the great fertility of the women. The sudden transitions from cold to heat, and *vice versâ*, which are occasionally experienced in Russia, are held unwholesome by many; and it must be confessed, that this is true respecting foreigners, yet only for a few years, till they are enured to these changes. For afterwards, strangers as well as natives, in spite of these vicissitudes, generally enjoy a good state of health in those provinces.

The Russian climate has, moreover, even in those regions where it is very rigorous and cold, its peculiar advantages and comforts, among which are the following: the winter, however rude and austere, is in some respects more pleasant than the winter of countries that boast of equable temperature. From the middle of November till April, nay, in some places from September till May, it scarcely ever rains. The roads are, therefore, in winter not so

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mirey and the ſtreets not ſo ſloppy as with us. The ſnow generally falls from November to January, or from Auguſt and September to December. Afterwards the ſky is almoſt conſtantly ſerene. It is likewiſe a well-known fact, that in Ruſſia far leſs hardſhip is ſuffered from the cold, than in countries where the climate is incomparably milder: for there proper precautions are taken againſt the cold, becauſe it is known for certain that it will be intenſe.

How comes it then, it will be aſked, that ſo many people are in Ruſſia annually frozen to death? That, for inſtance, in one winter, no fewer than two hundred perſons in Moſcow alone were found to have thus miſerably periſhed? In a country like Ruſſia, it may indeed unfortunately happen that perſons are frozen to death, eſpecially ſuch as have their buſineſs out of doors. Such diſaſters would, however, be very rarely heard of, if the people were more prudent. It is not ſo much the cold, as the brandy which the labouring claſs gulp down in ſuch quantities during the winter, that kills ſo many. From the years 1759 or 1795, no general concluſion can juſtly be drawn. The winter was then, in ſeveral countries, but particularly in Ruſſia, uncommonly ſevere. In ordinary years, the number of theſe caſualties throughout the empire is not ſo conſiderable.

One of the moſt important benefits of the Ruſſian climate is, that in winter (as we have already hinted) the public ways and roads are in excellent order. The quantity of ſnow renders them perfectly level and commodious for travelling. No ſeaſon is, therefore, more ſtudiouſly choſen for that purpoſe than the depth of winter; not only for the ſake of greater expedition, but many of the highways, being laid with balks or trunks of trees in all other parts of the year, are extremely rough and unpleaſant.

Travelling in Ruſſia is performed either with poſt-horſes and *yemſhiks*, or with hired horſes and *iſvoſchiks*. At the poſt ſtations only horſes are to be had; the carriage muſt be the traveller's. The expence of poſting is trifling, in compariſon of what is paid the extra poſt in Germany. When we travel with hired horſes and iſvoſchiks, it is not neceſſary to have one's own carriage. We agree with the iſvoſchik or driver for horſes, carriage, and proviſions for the whole journey, whether fifty, a hundred, or a thouſand verſts. This method of travelling is ſomewhat more tedious than with poſt-horſes, becauſe the ſame horſes being continued throughout, it is neceſſary to ſtop at nights; but it is very cheap. Of theſe iſvoſchiks, in St. Peterſburg alone are at leaſt five thouſand. The greater part of them gain their livelihood by letting out carioles and ſledges for going about the town. Each of them has a number ſtamped on a tin-plate at his back, which is renewed or changed every year. For long journies coaches are rarely uſed, but either *ſchlafwagens* or *kibitkis*. Both are half covered, and made nearly in the ſame form; only the former are better and more commodious than the latter. In both the paſſenger lies upon a bed; and they are ſo conſtructed, that he can eaſily change his poſition either by lying at length or ſitting upright. Both may be raiſed upon either wheels or ſledges, as the ſeaſon requires. Portmanteaus and deep trunks are not ſuitable to theſe carriages; but inſtead of them, flat boxes are placed beneath the bed. *Kozokes*, or ſledges entirely cloſe, having a door and a ſmall pane of glaſs for a window, are likewiſe not uncommon.

The traveller muſt provide himſelf with wine and various other articles of diet for the whole journey; as in all Ruſſia, to the exception of St. Peterſburg, Moſcow, and a few other towns, no regular inns are found, and nothing is to be had upon the road but bread, milk, which often abounds with taracans (a ſpecies of beetle deemed ſacred by the vulgar Ruſſians, believing that they procure a bleſſing to the houſe), wretched quas, and ſtill more wretched brandy. The Ruſſian miles or verſts are in length about one-ſeventh of a German mile, or ſomewhat above three quarters of an Engliſh mile. In ſhort, $104\frac{1}{2}$ verſts are calculated to make one degree of the equator. A Livonian verſt is rather longer than a Ruſſian. In moſt parts, verſt-poſts are ſet up from verſt to verſt; which though by far not ſo handſome as the Saxon and Hanoverian mile-ſtones, yet completely anſwer the ſame purpoſe.

One very beneficial effect of the climate ought not to be omitted, which is, that ſome animals change their colour in the winter. This is particularly obſervable with the hares and ſquirrels; the former turning perfectly white, the latter grey; in Siberia of ſo dark a grey as to border upon black, in the other parts of Ruſſia only light grey. When the hares, however, are ſaid to become white, it is to be underſtood of the generality of the common Ruſſian hares, of the *ſaitzi*, which are ſomewhat ſmaller and not quite ſo well flavoured as the hares of Germany and England. Beyond Moſcow, and in ſome other parts, a larger kind of hares are caught, called *ruſſaki:* theſe retain their hue. It is certain, that this change of colour in ſome animals of Ruſſia is owing to the climate, to the ſeverity of the cold. As heat is known to expand bodies, cold muſt naturally have a contrary effect, and cauſe contraction. This effect is firſt and moſt remarkably perceptible on the ſurface of bodies, which in animals abounds with hair-tubes. Theſe, on becoming contracted, can admit only the fine aqueous particles, and not the earthy parts of the blood. On this, however, depends the colour. They are white or in general brighter, when but few earthy particles can enter theſe hair-tubes. Such animals, therefore, as are not very ſtrongly conſtituted for reſiſting the cold, muſt, in intenſe froſt, after ſhedding their original dark hair, neceſſarily become whiter. That the ſquirrels do not, like the Ruſſian hares, turn white, but only grey, is a proof that theſe animals are ſtronger than the ſaitzi, and probably proceeds from hence, that the colour of the ſquirrel is naturally darker, or at leaſt deeper, than that of the Ruſſian hare. It is no objection, that the Siberian ſquirrel becomes dark grey, bordering upon black. Nothing more can be deduced from thence, than that theſe creatures are of an incomparably more robuſt and hardy nature than the Ruſſian ſquirrels. However dark their hue, it is however not ſo deep as the red-brown which they put on in ſummer. The black ſtripe along the back they retain both in ſummer and winter. If this explanation of the change of colour in animals be admitted; it muſt follow of courſe, that all white animals, including the tame, are weaker than the brown, and this ſeems warranted by experience; at leaſt wild cattle, which are in general accounted ſtronger than the tame, are commonly of a darker hue. To conclude; in Ruſſia the ſaitzi and the ſquirrel in the houſe change their colour as completely as in the foreſt, fodder and nouriſh them how you will.

The greater part of Ruſſia is a flat country, like Poland, of a rich ſoil, marſhy here and there. If we except the great Verchoturian and the Ural chain of mountains, which divide Siberia from the reſt of Ruſſia, the ridge which ſeparates Siberia from the country of the Kalmucks and Mongoles, and the Altai between the Irtiſch and Ob, that between the Yeniſei and the Baikal, called the Sayane mountains, and the leſs conſiderable between the Yeniſei and the Lena; we ſcarcely find in all Ruſſia any elevations that properly deſerve the appellation of mountains.

The *mountains* are diſtributed by Mr. Tooke into eleven claſſes, or diviſions, of which the greater part conſiſts of principal chains of themſelves, whilſt others are only con-

tinuations

tinuations of huge ridges, extending for the moſt part into the bordering territories; theſe diviſions are the *Sieverniya-gori*, or northern mountains, extending between the Baltic and the White ſea; the *Valday* mountains; the mountains of *Taurida;* the mountains of *Caucaſus;* the *Ural* mountains; the *Altay* mountains; the *Sayane* mountains; the *Baikal* mountains; the *Nerchinſkaia* mountains; the *Okhotſkoy* mountains; and the *Kamtſhatſkoy* mountains; an account of which occurs in appropriate parts of the Cyclopædia.

Foreſts rarely occur in ſome parts of the Ruſſian empire, but in others they abound even to ſuperfluity. Such is the caſe between St. Peterſburg and Moſcow, and between Vladimir and Arſamas: alſo in Siberia, about the Ural mountains, in the diſtrict of the river Tara, on the Ufa as far as the Kama, and between the provinces of Perm and Ufa. The foreſt of Aterſkoy is in extent 75 verſts.

For an account of the ſteppes of Ruſſia, ſee STEPPE. The *ſeas* forming the boundaries of the Ruſſian empire are the *Frozen*, or Northern ocean, the Eaſtern or *Pacific* ocean, the *Euxine* or Black ſea, the *Baltic* or Eaſt ſea: and the inland ſeas and lakes are the *Caſpian*, the *Baikal*, the *Ladoga* lake, the lake *Onega*, the lake *Peipus*, the *Ilmen* lake, the *Bielo-Ozero*, or White lake, the lake *Tſhany*, and the lake *Altin-nor*, which ſee reſpectively.

The chief navigable *rivers* that flow into the Baltic, are the *Duna* and the *Neva;* thoſe that fall into the White ſea are the *Dvina*, and the *Kuloi* and *Meſen*, both of which flow E. of the Dvina into the White ſea, not far from each other, in the diſtrict of the town of Meſenſk, the former taking its riſe in the government of Archangel, and the latter in that of Vologda. The rivers that fall into the Frozen ocean are the *Petſhora*, called alſo Bolſhaia, which takes its riſe in the weſtern ſide of the Ural mountains, in the government of Vologda, and following a N.W. courſe falls into the northern ocean, in the government of Archangel; the *Oby*, the *Irtyſh*, the *Tobol*, the *Yeniſſey*, the *Tunguſkis*, the *Khatanga*, the *Lena*, the *Yana*, the *Indighirka*, and the *Kolima*, which ſee. The rivers that flow into the Eaſtern or Pacific ocean are the *Anadyr*, the *Kamtſhatka*, and the Amoor or Amur, formed of the Argoon and the Shilka. The rivers that flow into the Caſpian are the *Yemba* or *Emba*, the *Ural*, formerly the Yaik, the *Volga*, which takes up the Kamma and the Okka, and the *Terek*. The rivers that fall into the Euxine are the *Kuban* or ancient Hypanis, the *Don* or Tanais, which takes up the Voronetz, the Khoper, the Donetz, and the Manitſh, the *Dnieper* or Boryſthenes, and the *Bogue*. See each reſpectively. For an account of the canals of Ruſſia, ſee CANAL.

Population of the Ruſſian Empire.—In adverting to the *population* and *populouſneſs* of the Ruſſian empire, Mr. Tooke, we obſerve, properly diſtinguiſhes between theſe two terms; meaning by the former the abſolute number of the inhabitants of a country, and by the latter, the relation which this number bears to the ſurface of ground on which they dwell. By a reviſion made, or at leaſt completed, in the year 1783, the 41 viceroyalties of which Ruſſia at that time conſiſted, contained of male inhabitants;

Merchants - - -	107,408
Burghers - - -	293,793
Odnodvortzi and free countrymen -	773,656
Exempt from taxes - -	310,830
Crown boors - - -	4,674,603
Private boors - - -	6,678,239
Total	12,838,529

By doubling the above total, we obtain for the whole number of males and females in the above mentioned viceroyalties, an amount of 25,677,000.

In order to obtain the augmented population ſince the year 1783, we have the following ſtatement:

The total for 1783 - - -	25,677,000
The amount of the Coſſacks of the Don and Euxine - -	220,000
Unnumbered tribes and claſſes at the reviſion in the year 1783 - -	1,500,000
Total for 1783	27,397,000
Annual increaſe of 250,000 in 12 years -	3,000,000
New acquiſitions ſince 1783, or the nine viceroyalties of Taurida, Minſk, Brazlau, Voſneſenſk, Podolia, Volhynia, Courland, Vilna, and Slonim - -	5,755,000
Grand Total	36,152,000

Whence, by the moſt moderate eſtimate, the whole population of the Ruſſian empire may be ſtated for the year 1795, in round numbers, at 36,000,000.

Of this maſs of population, the greateſt part belongs to European Ruſſia. The five governments of Perm, Ufa, Kolyvan, Tobolſk, and Irkutſk, comprehended under the general name of Siberia, contain, according to the reviſion-liſts, only 2,215,000, and allowing for the unnumbered claſſes and tribes, perhaps above 3½ millions of inhabitants. Hence it appears, that the population of the European part is about fourteen times greater; and the Ruſſian empire, which, with regard to ſuperficial contents, moſtly belongs to Aſia, muſt in reſpect of population be reckoned as belonging to Europe. The population of the different governments is very various; the moſt populous being that of Moſcow, which contains upwards of 1,139,000 perſons, and the leaſt populous is that of Taurida, the inhabitants of which are computed at about 150,000.

But although the Ruſſian empire ranks high in *population*, with reſpect to *populouſneſs* its place is very ſubordinate. European Ruſſia has a population of 405, and Aſiatic Ruſſia of 11 perſons to a ſquare mile: and if we compare the governments with one another, the reſult will be, that of 45 (the five newly acquired not being reckoned), eight contain below 100; nine contain from 100 to 500; ſeventeen from 500 to 1000; ſeven from 1000 to 1500; three from 1500 to 2000; and only one above 2000, inhabitants, on a ſquare mile. This laſt honourable precedence is held by the government of Moſcow, which (including the metropolis) numbers 2403 perſons on the foreſaid ſuperficies. To the ſecond claſs belong the governments of Kaluga, Tula, and Tchernigof: and to the third, Riazan, Kurſk, Kief, Orel, Kharkof, Yaroſlaf, and Novgorod Sieverſk. The ſixth and pooreſt claſs compriſes, with the countries of the Coſſacks, the north European and Siberian deſerts, where the degree of population is ſo low, that the government of Tobolſk has but ſeven, and that of Irkutſk only three perſons in every ſquare geographical mile. In theſe countries, however, the unregiſtered tribes are the moſt numerous. The moſt populous diſtrict of the Ruſſian empire lies between the 49th and 58th degrees of N. lat.; and further both to the N. and S., as well as E. beyond the 65th degree of longitude, this populouſneſs is continually decreaſing. From a table of birth, deaths, and marriages in 1799, extracted by Mr. Tooke from a German publication, we may deduce the following concluſions. The overplus of

births,

births, unparallelled in the annals of political economy, forms a characteristic feature of the Russian empire; and shews, that if the same increase of population should proceed for 10 years, the number of Russian subjects will be augmented by 5,000,000. It also appears, that upwards of 23 boys were born to 20 girls, whereas 104 persons only of the former died to 100 of the latter; and this favourable proportion of the males to the females indicates the military grandeur to which the Russian empire is capable of attaining; unimpeded by such wasteful wars as that which has recently occurred. Moreover, it appears that the mortality in common years throughout all the Russian dominions is as 1 to 58; whence it may be calculated, that the number of Russian subjects of the Greek church would amount, exclusively of the inhabitants of the eparchy of Bruzlaw, to 31,339,620 souls. Adding to this number the inhabitants of the new possessions in Poland, which in 1795 contained 4,592,544 persons, and about 5,000,000 of Russian subjects of various Christian sects, and of the Jewish, Laman, and Schaman professions, the whole population of the Russian empire will appear to amount to upwards of 40,000,000 of souls.

Progress of Population in Russia.—The first census, namely that in 1722, gave 5,794,928 males; which, admitting an equal number of women, makes a population of 11,589,856 individuals. How much ought we to add for the new acquisitions, in which the census, or revision, as it is termed in Russia, did not take place?

According to Mr. Hermann, in his Statistic Journal, vol. i. part 2. p. 54, an enumeration made in Little Russia, in 1768, gave 955,228 inhabitants; another made in Finland, in 1755, gave 117,998; Esthonia, in 1773, had 176,000; Livonia, 447,360. All these make a sum total of 1,696,586 persons. These enumerations, however, being made 20, 30, 50 years after the first revision, it is possible that the population may have increased or diminished during the interval. If we compare these data with the enumeration made in 1805, we shall find that Finland, in 49 years, has gained 64,392 inhabitants; Esthonia, in 31 years, 36,948; and Livonia, 138,097: making a sum total of 239,437. The population in the provinces bordering the Baltic, then, has gained about one-fourth during the latter half of the 18th century. On comparing the population of Little Russia, as above stated, with that of the governments of Tchernigof and Pultava, a surplus will be found, in 1804, of 1,465,465 individuals above the enumeration of 1768. According to this statement, the population has more than doubled during the last 50 years. This result corresponds very well with the observations made on the registers of births and deaths, that the progress of population is very slow in the Baltic provinces, and very rapid in Little Russia. It has gained of late, especially by the commerce of Odessa; the price of land has risen considerably, and the fertile steppes have likewise been cultivated.

Admitting the like proportion in the progress of population in these provinces, during the former half of the 18th century, which is certainly a great admission, we must deduct from the above stated population of the Baltic provinces one-fourth, and there will remain 555,979; and one half of the population of Little Russia in 1768, leaving 477,614. Agreeably to this statement, the population of all the provinces acquired posterior to 1722, may be estimated at 1,033,533.

It remains now to compute what may have been the number of free persons not included in the revision. Seeing that, at the last revision of 1796, there were 16,000,000 of males included in the list of those who paid the regular obrok, for 1,000,000 that did not pay that tax, we may compute, that at the first revision, in which the number of revisionaries was 5,000,000, there were 300,000 male freemen, composing, together with their wives, the sum of 600,000.

In conformity with these calculations, the probable population of Russia, in 1722, will be,

Revisionaries - - -	11,589,859
Free individuals - - -	600,000
Conquered provinces - -	1,033,533
	13,223,392

Le Clerc, in his Essay on the Population of Russia, published in 1777, states it at 14,000,000; Benedict Francis John Hermann, at the same; which is probably accurate. But when Voltaire reckons the population during the last years of Peter the Great at 18,000,000, he confounds a later period with the era of that monarch. It appears to me, adds Mr. C. T. Hermann, that 14,000,000 would be the most probable amount, if we consider the imperfection inseparable from a first census, and the uncertainty of the calculations respecting the newly conquered provinces.

The second revision, in 1742, gives 6,673,167 males; and, supposing a like number of females, we have 13,346,334 for the inhabitants of Russia at that time. To this must be added the conquered provinces, and the free individuals. As we subtracted a fourth from the population of the Baltic provinces in 1722, the deduction of one-eighth will suffice for their population in 1742; the remainder is 648,689: and, subtracting a quarter from the population of Little Russia in 1768, there remains 706,421; making a total of 1,355,110 for the population of the conquered provinces. The number of revisionaries having augmented by 1,000,000 since 1722, we must increase the number of freemen at least by 50,000, considering the progress of industry, and the better regulations adopted by government. The population, therefore, in 1742, will be,

Revisionaries - - -	13,346,334
Free individuals - - -	700,000
Conquered provinces - -	1,335,110
	15,381,444

Hermann admits for 1742 the round number of 16,000,000. This is a very probable estimate, as the enumerations in Russia are always below the mark.

The third revision, in 1762, gives 7,363,548 males, which supposes a total of 14,727,096 individuals; and, by the proper ratio, we take the population of the conquered provinces at 1,696,586. The revisionaries being nearly one half what they are at present, we may compute the same to hold with the freemen, which would make their number 400,000. The probable population, therefore, of 1762 is as follows:

Revisionaries - - -	14,727,096
Free individuals - - -	300,000
Conquered provinces - -	1,696,586
	16,723,682

Marshal in 1768 and 1770, and Williams also in 1768, admit 18,000,000; l'Evêque in 1782, and le Clerc in 1783, 19,000,000; Schlœtzer and Busching, in 1765, 20,000,000;

20,000,000; and Mr. C. T. Hermann is of this laſt opinion. The real number, in 1762, apparently lies ſomewhere between 18 and 19,000,000.

The fourth general reviſion, in 1782, gives 12,838,529, and, with the females, 25,677,058; or, according to Hermann, 26,358,822. The two capital cities, the military and the nomadic tribes, are not included in this calculation. Theſe at preſent amount to 2,960,000: at that time we may ſuppoſe them to have amounted to 2,000,000. By this ſtatement, the population of Ruſſia, in 1782, would have been between 27 and 28,000,000. Crome, in 1785, admits 23,000,000; Suſmilch, 24,000,000; Pleſchtſcheef (not reckoning the clergy, the civil eſtabliſhment, the military, and the Nomades) admits 26,617,698 in 43 governments; while Hupel in 1780 to 1790, and Hermann, compute 28,000,000.

The fifth reviſion, in 1796, gave 17,816,370 males, which, ſuppoſing an equal number of females, makes the population amount to 35,632,740; or, according to the datum 16,223,229, (which we conſider greatly below the truth,) 34,038,599. If we add the two capitals, the military, and the Nomades, computing them at 2,960,000, the population in 1796 will amount to 36,998,599. Buſching and Beauſobre make it 30,000,000; Schlœtzer, 33,000,000; Hermann, 33,250,000; Meuſel between 35 and 36,000,000; and Storck, 36,000,000.

Following theſe data, the progreſs of population in Ruſſia, brought on partly by the improvement of the interior, partly by new acquiſitions, has been as follows:

In 1722	-	14,000,000.
1742	-	16,000,000, after 20 years.
1762	-	19,000,000, after 20 years.
1782	-	28,000,000, after 20 years.
1796	-	36,000,000, after 14 years.
1806	-	41,000,000, after 10 years.

This aſtoniſhing increment has proceeded in a great meaſure from new acquiſitions. It would prove highly intereſting, were we able to aſcertain nearly the progreſs of the Ruſſian population, independent of the recent acquiſitions.

We ſhall admit for Little Ruſſia and the Baltic provinces the number exhibited by the enumerations of 1755, 1768, and 1772, which yields a total of 1,696,586; ſubjoining the new acquiſitions ſince 1773, according to the data publiſhed by general Oppermann on his map of 1796, conſtructed by order of government, for delineating the new limits. According to this author, Ruſſia acquired,

	Individuals.
By the firſt diſmemberment of Poland in 1773	1,226,966
By the peace with the Ottoman Porte in 1774 and 1783 - - - - - - -	171,610
By the peace with the ſame power in 1791 -	42,708
By the ſecond partition of Poland in 1793 -	3,745,663
By the annexation of Courland - - -	387,922
By the ſubſequent partition of Poland in 1795	1,407,402
Total of the acquiſitions ſince 1773 - -	6,982,271
Adding the Baltic provinces and Little Ruſſia, we get - - - - - -	8,678,357

Here we have the total amount of the population of the countries conquered, down to 1795.

All this, however, was obtained by means of firſt enumerations, which were of courſe incorrect. Thoſe made down to 1804 ought to be more accurate. The adminiſtration muſt have acquired conſiderable influence, eſpecially after the organization of the governments in 1775. It will be of importance, therefore, to know the effect of theſe cauſes, as exhibited by the laſt cenſus, in 1804, which Mr. Hermann delivers to us in the following tables.

Little Ruſſia comprehends the governments of Kief, Tchernigof, Pultava, Ukrainſkoi-ſlobode, with a part of Ekaterinoſlaf and Kurſk; to which muſt be added the country of the Donſkoi Coſſacks, as peopled by the inhabitants of Little Ruſſia. The whole of this vaſt territory, called the Ukraine, formed the boundary between the Turks and Tartars. Its population, in 1804, was as follows:

	Males.	Females.
Kief - - -	574,217	538,404
Tchernigof - -	534,712	538,570
Pultava - -	713,772	732,639
Ukrainſkoi-ſlobode -	420,304	418,781
Ekaterinoſlaf - -	210,815	183,363
Coſſacks of the Don	161,100	194,521
	2,614,920	2,606,278

The Swediſh provinces are a part of Karelia and Ingria, conſtituting at preſent the governments of St. Peterſburg, Finland, Eſthonia, and Livonia. Their population, in 1804, was as follows:

	Males.	Females.
St. Peterſburg -	268,748	270,920
Finland - -	94,397	87,393
Eſthonia - -	107,357	105,591
Livonia - -	290,014	295,443
	760,516	759,947

So that the number of individuals in the Swediſh provinces and in Little Ruſſia is 6,741,661.

On comparing this number with the preceding enumerations, it will be ſeen that the Swediſh provinces have gained one-fourth, and that Little Ruſſia has nearly doubled; ſince it is certain that, in this laſt cenſus, the ſeveral provinces belonging to Little Ruſſia in its largeſt extent have not been included.

The Poliſh provinces annexed from 1773 to 1795, including Courland, are White Ruſſia, Lithuania, and the Poliſh Ukraine, or the governments of Minſk, Vitepſk and Mohilef, Grodno and Vilna, Podolia and Volhynia. The ſtate of their population, in 1784, was as under:

	Males.	Females.
Minſk - - -	431,586	426,940
Vitepſk - -	343,716	330,624
Mohilef - -	403,614	397,381
Grodno - -	300,278	290,782
Vilna - - -	465,224	460,046
Podolia - -	379,215	556,870
Volhynia - -	564,586	522,182
Courland - -	191,910	189,366
	3,080,129	3,174,191

According to general Oppermann, the population of theſe provinces, in 1796, amounted to 6,767,953; whence it appears that the population of Poland is ſtationary.

The Turkiſh provinces are Cherſon, Taurida, the country of the Coſſacks of the Euxine, and the reſidue of Ekatebirths, unparallelled in the annals of political economy, forms a characteriftic feature of the Ruffian empire; and fhews, that if the fame increafe of population fhould proceed for 10 years, the number of Ruffian fubjects will be augmented by 5,000,000. It alfo appears, that upwards of 23 boys were born to 20 girls, whereas 104 perfons only of the former died to 100 of the latter; and this favourable proportion of the males to the females indicates the military grandeur to which the Ruffian empire is capable of attaining; unimpeded by fuch wafteful wars as that which has recently occurred. Moreover, it appears that the mortality in common years throughout all the Ruffian dominions is as 1 to 58; whence it may be calculated, that the number of Ruffian fubjects of the Greek church would amount, exclufively of the inhabitants of the eparchy of Bruzlaw, to 31,339,620 fouls. Adding to this number the inhabitants of the new poffeffions in Poland, which in 1795 contained 4,592,544 perfons, and about 5,000,000 of Ruffian fubjects of various Chriftian fects, and of the Jewifh, Laman, and Schaman profeffions, the whole population of the Ruffian empire will appear to amount to upwards of 40,000,000 of fouls.

Progrefs of Population in Ruffia.—The firft cenfus, namely that in 1722, gave 5,794,928 males; which, admitting an equal number of women, makes a population of 11,589,856 individuals. How much ought we to add for the new acquifitions, in which the cenfus, or revifion, as it is termed in Ruffia, did not take place?

According to Mr. Hermann, in his Statiftic Journal, vol. i. part 2. p. 54, an enumeration made in Little Ruffia, in 1768, gave 955,228 inhabitants; another made in Finland, in 1755, gave 117,998; Efthonia, in 1773, had 176,000; Livonia, 447,360. All thefe make a fum total of 1,696,586 perfons. Thefe enumerations, however, being made 20, 30, 50 years after the firft revifion, it is poffible that the population may have increafed or diminifhed during the interval. If we compare thefe data with the enumeration made in 1805, we fhall find that Finland, in 49 years, has gained 64,392 inhabitants; Efthonia, in 31 years, 36,948; and Livonia, 138,097: making a fum total of 239,437. The population in the provinces bordering the Baltic, then, has gained about one-fourth during the latter half of the 18th century. On comparing the population of Little Ruffia, as above ftated, with that of the governments of Tchernigof and Pultava, a furplus will be found, in 1804, of 1,465,465 individuals above the enumeration of 1768. According to this ftatement, the population has more than doubled during the laft 50 years. This refult correfponds very well with the obfervations made on the regifters of births and deaths, that the progrefs of population is very flow in the Baltic provinces, and very rapid in Little Ruffia. It has gained of late, efpecially by the commerce of Odeffa; the price of land has rifen confiderably, and the fertile fteppes have likewife been cultivated.

Admitting the like proportion in the progrefs of population in thefe provinces, during the former half of the 18th century, which is certainly a great admiffion, we muft deduct from the above ftated population of the Baltic provinces one-fourth, and there will remain 555,979; and one half of the population of Little Ruffia in 1768, leaving 477,614. Agreeably to this ftatement, the population of all the provinces acquired pofterior to 1722, may be eftimated at 1,033,533.

It remains now to compute what may have been the number of free perfons not included in the revifion. Seeing that, at the laft revifion of 1796, there were 16,000,000 of males included in the lift of thofe who paid the regular obrok, for 1,000,000 that did not pay that tax, we may compute, that at the firft revifion, in which the number of revifionaries was 5,000,000, there were 300,000 male freemen, compofing, together with their wives, the fum of 600,000.

In conformity with thefe calculations, the probable population of Ruffia, in 1722, will be,

Revifionaries - - -	11,589,859
Free individuals - - -	600,000
Conquered provinces - -	1,033,533
	13,223,392

Le Clerc, in his Effay on the Population of Ruffia, publifhed in 1777, ftates it at 14,000,000; Benedict Francis John Hermann, at the fame; which is probably accurate. But when Voltaire reckons the population during the laft years of Peter the Great at 18,000,000, he confounds a later period with the era of that monarch. It appears to me, adds Mr. C. T. Hermann, that 14,000,000 would be the moft probable amount, if we confider the imperfection infeparable from a firft cenfus, and the uncertainty of the calculations refpecting the newly conquered provinces.

The fecond revifion, in 1742, gives 6,673,167 males; and, fuppofing a like number of females, we have 13,346,334 for the inhabitants of Ruffia at that time. To this muft be added the conquered provinces, and the free individuals. As we fubtracted a fourth from the population of the Baltic provinces in 1722, the deduction of one-eighth will fuffice for their population in 1742; the remainder is 648,689: and, fubtracting a quarter from the population of Little Ruffia in 1768, there remains 706,421; making a total of 1,355,110 for the population of the conquered provinces. The number of revifionaries having augmented by 1,000,000 fince 1722, we muft increafe the number of freemen at leaft by 50,000, confidering the progrefs of induftry, and the better regulations adopted by government. The population, therefore, in 1742, will be,

Revifionaries - - -	13,346,334
Free individuals - - -	700,000
Conquered provinces - -	1,335,110
	15,381,444

Hermann admits for 1742 the round number of 16,000,000. This is a very probable eftimate, as the enumerations in Ruffia are always below the mark.

The third revifion, in 1762, gives 7,363,548 males, which fuppofes a total of 14,727,096 individuals; and, by the proper ratio, we take the population of the conquered provinces at 1,696,586. The revifionaries being nearly one half what they are at prefent, we may compute the fame to hold with the freemen, which would make their number 400,000. The probable population, therefore, of 1762 is as follows:

Revifionaries - - -	14,727,096
Free individuals - - -	300,000
Conquered provinces - -	1,696,586
	16,723,682

Marfhal in 1768 and 1770, and Williams alfo in 1768, admit 18,000,000; l'Evêque in 1782, and le Clerc in 1783, 19,000,000; Schlœtzer and Bufching, in 1765, 20,000,000;

20,000,000; and Mr. C. T. Hermann is of this laſt opinion. The real number, in 1762, apparently lies ſomewhere between 18 and 19,000,000.

The fourth general reviſion, in 1782, gives 12,838,529, and, with the females, 25,677,058; or, according to Hermann, 26,358,822. The two capital cities, the military and the nomadic tribes, are not included in this calculation. Theſe at preſent amount to 2,960,000: at that time we may ſuppoſe them to have amounted to 2,000,000. By this ſtatement, the population of Ruſſia, in 1782, would have been between 27 and 28,000,000. Crome, in 1785, admits 23,000,000; Suſmilch, 24,000,000; Pleſchtſcheef (not reckoning the clergy, the civil eſtabliſhment, the military, and the Nomades) admits 26,617,698 in 43 governments; while Hupel in 1780 to 1790, and Hermann, compute 28,000,000.

The fifth reviſion, in 1796, gave 17,816,370 males, which, ſuppoſing an equal number of females, makes the population amount to 35,632,740; or, according to the datum 16,223,229, (which we conſider greatly below the truth,) 34,038,599. If we add the two capitals, the military, and the Nomades, computing them at 2,960,000, the population in 1796 will amount to 36,998,599. Buſching and Beauſobre make it 30,000,000; Schlœtzer, 33,000,000; Hermann, 33,250,000; Meuſel between 35 and 36,000,000; and Storck, 36,000,000.

Following theſe data, the progreſs of population in Ruſſia, brought on partly by the improvement of the interior, partly by new acquiſitions, has been as follows:

In 1722	-	14,000,000.	
1742	-	16,000,000,	after 20 years.
1762	-	19,000,000,	after 20 years.
1782	-	28,000,000,	after 20 years.
1796	-	36,000,000,	after 14 years.
1806	-	41,000,000,	after 10 years.

This aſtoniſhing increment has proceeded in a great meaſure from new acquiſitions. It would prove highly intereſting, were we able to aſcertain nearly the progreſs of the Ruſſian population, independent of the recent acquiſitions.

We ſhall admit for Little Ruſſia and the Baltic provinces the number exhibited by the enumerations of 1755, 1768, and 1772, which yields a total of 1,696,586; ſubjoining the new acquiſitions ſince 1773, according to the data publiſhed by general Oppermann on his map of 1796, conſtructed by order of government, for delineating the new limits. According to this author, Ruſſia acquired,

	Individuals.
By the firſt diſmemberment of Poland in 1773	1,226,966
By the peace with the Ottoman Porte in 1774 and 1783 - - - - - - -	171,610
By the peace with the ſame power in 1791 -	42,708
By the ſecond partition of Poland in 1793 -	3,745,663
By the annexation of Courland - - - -	387,922
By the ſubſequent partition of Poland in 1795	1,407,402
Total of the acquiſitions ſince 1773 - -	6,982,271
Adding the Baltic provinces and Little Ruſſia, we get - - - - - - -	8,678,357

Here we have the total amount of the population of the countries conquered, down to 1795.

All this, however, was obtained by means of firſt enumerations, which were of courſe incorrect. Thoſe made down to 1804 ought to be more accurate. The adminiſtration muſt have acquired conſiderable influence, eſpecially after the organization of the governments in 1775. It will be of importance, therefore, to know the effect of their cauſes, as exhibited by the laſt cenſus, in 1804, which Mr. Hermann delivers to us in the following tables.

Little Ruſſia comprehends the governments of Kief, Tchernigof, Pultava, Ukrainſkoi-ſlobode, with a part of Ekaterinoſlaf and Kurſk; to which muſt be added the country of the Donſkoi Coſſacks, as peopled by the inhabitants of Little Ruſſia. The whole of this vaſt territory, called the Ukraine, formed the boundary between the Turks and Tartars. Its population, in 1804, was as follows:

	Males.	Females.
Kief - - -	574,217	538,404
Tchernigof - -	534,712	538,570
Pultava - -	713,772	732,639
Ukrainſkoi-ſlobode -	420,304	418,781
Ekaterinoſlaf - -	210,815	183,363
Coſſacks of the Don	161,100	194,521
	2,614,920	2,606,278

The Swediſh provinces are a part of Karelia and Ingria, conſtituting at preſent the governments of St. Peterſburg, Finland, Eſthonia, and Livonia. Their population, in 1804, was as follows:

	Males.	Females.
St. Peterſburg -	268,748	270,920
Finland - -	94,397	87,393
Eſthonia - -	107,357	105,591
Livonia - -	290,014	295,443
	760,516	759,947

So that the number of individuals in the Swediſh provinces and in Little Ruſſia is 6,741,661.

On comparing this number with the preceding enumerations, it will be ſeen that the Swediſh provinces have gained one-fourth, and that Little Ruſſia has nearly doubled; ſince it is certain that, in this laſt cenſus, the ſeveral provinces belonging to Little Ruſſia in its largeſt extent have not been included.

The Poliſh provinces annexed from 1773 to 1795, including Courland, are White Ruſſia, Lithuania, and the Poliſh Ukraine, or the governments of Minſk, Vitepſk and Mohilef, Grodno and Vilna, Podolia and Volhynia. The ſtate of their population, in 1784, was as under:

	Males.	Females.
Minſk - - -	431,586	426,940
Vitepſk - -	343,716	330,624
Mohilef - -	403,614	397,381
Grodno - -	300,278	290,782
Vilna - - -	465,224	460,046
Podolia - -	379,215	556,870
Volhynia - -	564,586	522,182
Courland - -	191,910	189,366
	3,080,129	3,174,191

According to general Oppermann, the population of theſe provinces, in 1796, amounted to 6,767,953; whence it appears that the population of Poland is ſtationary.

The Turkiſh provinces are Cherſon, Taurida, the country of the Coſſacks of the Euxine, and the reſidue of Ekate-

Ekaterinoſlaf, to which may be added Caucaſia. The population of theſe provinces is,

	Males.	Females.
Cherſon - -	145,814	124,321
Taurida - -	102,826	88,864
Coſſacks of the Euxine	20,240	9,155
Caucaſia - -	34,849	29,240
	303,729	251,580

As the Coſſacks of the Euxine have very few women, and ſtill retain many cuſtoms derived from their anceſtors, the famous Zaporogian Coſſacks, ſo called from *za*, *trans*, beyond, and *parogi*, cataracts, (the Coſſacks beyond the cataracts,) the foregoing ſtatement is probably correct. We learn from general Oppermann, that in the Turkiſh provinces conquered in 1774, 1783, and 1791, there were 214,318 individuals of both ſexes. This ſmall population, in a tract of country ſo immenſe, has increaſed undoubtedly, in conſequence of a more regular adminiſtration; but not ſo much as would at firſt ſight appear, becauſe we muſt ſtrike off the Coſſacks of the Euxine, Caucaſia, and the Ruſſian and foreign colonies domiciliated in theſe regions. Beſides, if we conſider the incompleteneſs of a firſt enumeration, it is but reaſonable to ſuppoſe that general Oppermann's eſtimate is too ſmall.

Thus it appears that the population of the territories acquired ſince 1773 was, in 1804,

Little Ruſſia - - -	5,221,198
Swediſh provinces - -	1,520,463
Poliſh provinces - - -	6,454,320
Turkiſh provinces - -	555,309
	13,751,290

According to the data above noticed, we are to ſubtract from the aggregate population of Ruſſia, for the provinces acquired,

From 14,000,000 in 1722		
1,033,533	-	12,966,467
From 16,000,000 in 1742		
1,355,110	-	14,644,890
From 19,000,000 in 1762		
1,696,586	-	17,303,414
From 28,000,000 in 1782		
8,678,857	-	19,321,143
From 36,000,000 in 1796		
13,751,290	-	22,248,710
From 41,000,000 in 1806		
13,751,290	-	27,248,710

The laſt column gives us the rate at which the population of Ruſſia proper has increaſed.

Whence it follows, that the population of Ruſſia, excluſive of the conqueſts ſince the reign of Peter I., gained in 20 years, between 1722 and 1742, 1,678,423, or 83,921 annually. In the 20 years between 1742 and 1762, 2,658,524, or 132,926 annually; that is to ſay, 49,005 more annually than during the firſt period. In the 20 years between 1762 and 1782, 1,676,253, or 88,812 annually; leſs by 49,114 than during the ſecond period. In the 14 years between 1782 and 1796, 2,927,567, or 146,378 annually; more by 62,566 than during the preceding period. In the 10 years between 1796 and 1806, 5,000,000, or 200,000 annually; more by 53,622 than during the antecedent period.

By the above table, it is obvious that the population of Old Ruſſia has more than doubled, or that it is at preſent to what it was in 1722, as $2\frac{1}{5}$th to 1. It is apparent alſo that the progreſs of population has not been uniform, that it has had accelerations and retardations, that the moſt favourable periods were during the reign of the empreſs Elizabeth, between 1741 and 1761, and the years of the peace of Catharine II. between 1782 and 1796. The population ſtill advances in the later periods, but the rate is ſlower. What may be the cauſe of theſe phenomena?

The population of Ruſſia has more than doubled during the laſt century, though Smith ſuppoſes that the population in civilized countries only doubles once in 500 years. It has doubled in conſequence of a better regulated adminiſtration; of the ſecurity the government has afforded to the nation; of the capitals belonging to foreigners placed in the country, and which for a long time conſtituted the ſoul of the inland commerce; in conſequence of the progreſs of national induſtry, which was the reſult; of the increaſe of knowledge, by new commercial connections with other countries of Europe, and by the means of inſtruction furniſhed by government to the other inhabitants of Ruſſia; and, finally, in conſequence of the removal of ſeveral obſtacles which checked the progreſs of induſtry, as the abolition of the cuſtom-houſes of the interior, under the reigns of the empreſſes Elizabeth and Catharine II., the improvement of the roads, and the multiplication of canals.

What a diſmal picture does Ruſſia preſent to us in the fifteenth, ſixteenth, and ſeventeenth centuries! Joſafa Barbaro, in 1436, reports, that from Moſcow to the frontiers of Poland, the whole country was one vaſt deſart; the villages, burnt and abandoned, offered no other accommodation to ſtrangers than a place to kindle a fire. Contarini confirms this ſtatement in 1483. Meyerberg, in 1661, found between Viaſma and Moſaiſk, a diſtance of 130 verſts, only a ſingle village. The road between Smolenſk and Moſcow was dangerous, according to Lyſeck, in 1675, on account of the wolves that attacked travellers. Ulfeldt, the Daniſh ambaſſador, in 1625, found the country between Moſcow, Novgorod, and Pſcove, laid entirely waſte by the inteſtine wars under Ivan Vaſſillievitch II. Poſſevin, in 1581 and 1582, travelled whole days in the interior of Ruſſia without meeting a ſingle individual. The whole country between Kazan and Aſtrachan was a continued deſart. Even the cities had greatly ſuffered. Poſſevin eſtimates the population of Moſcow at 30,000; that of Novgorod was diminiſhed by the plague to 3000; and Kief, in the time of Herberſtein, in 1516, was almoſt in ruins. Beſides the davaſtations committed by the domeſtic feuds and foreign invaders, the number of impoſts, and the ſeverity of the commiſſioners who levied them, depopulated the northern provinces which had not ſuffered from thoſe diſaſters. We learn from Fletcher, that in the year 1588, 50 villages were abandoned between Vologda and Yaroſlaf. At Uſtiug bread was almoſt unknown, and the ſame deſtitution of that article of life was felt on the Dvina in the time of Herberſtein. Famine and peſtilence often committed their ravages among the melancholy remnants of this unfortunate population, as in 1525, in 1601, and in 1615. M. Meiner informs us, that the city of Novgorod loſt in one winter no fewer than 18,000 individuals, conſtituting nearly the whole of its population.

It

It is neither to the mildnefs of the climate, nor to the fertility of the foil, that we are to afcribe the rapid increafe of population during the eighteenth century; but to a better organized adminiftration, and the fecurity which refulted from it. An infant ftate, fuppofing it tolerably well governed, and connected with countries long civilized, ought to make prodigious progrefs in improvement and population.

That period of the reign of Catharine II., in which fhe took in hand the amelioration of the feveral governments, was particularly propitious to the progrefs of population. The organization of the governments in 1775 was the great political fcheme that procured the fubjects a greater degree of fecurity and happinefs. The ukafe of 1782, refpecting the liberty of working the mines, the eftablifhment of normal fchools in 1783, the rights granted to the nobility in 1785, the improvement of the high roads in 1786, and efpecially the erection of the bank in the fame year, were all calculated to promote the happinefs of the fubject, as far as it depended on the government. The bank, from its very commencement, had a furprifing effect upon the progrefs of agriculture. That patriotic fovereign removed feveral obftacles to the profperity of her fubjects, fuch as the want of liberty to be induftrious, the want of communications, the want of knowledge, and of a medium of circulation.

The population of Ruffia has more than doubled during the eighteenth century. Have we reafon to expect the fame progrefs during the nineteenth?

If we confider only the extent of the furface capable of cultivation, which is computed at 80,000,000 of fquare miles, we muft conclude that Ruffia is capable of fupporting 960,000,000 of inhabitants, or almoft as many as at prefent exift on the earth. If we confider the furplus of births as a total gain to the population, this furplus, amounting at leaft to 500,000 annually, would in 32 years amount to 60,000,000, in 56, to 80,000,000, &c.

Experience, however, fhews us that the progrefs of population does not depend folely upon the extent of foil capable of cultivation. There are fpots left uncultivated in the countries where agriculture has made the greateft advances, even in England, Flanders, and Lombardy. This progrefs depends ftill lefs on the furplus of births. Every where the number of births exeeeds that of deaths. The population is always proportionate to the ftate of national wealth. The moft decifive proof, therefore, of the profperity of a country, is the increafe of the number of its inhabitants. In Ruffia the population has more than doubled in 34 years. Whence we may infer, that its agriculture, the principal branch of its induftry, has alfo doubled. The increafe of Ruffian commerce depends upon peace, and upon the augmentation of knowledge. On thefe accounts we cannot expect fo rapid an increafe of national riches, and confequently of population, during the nineteenth century as obtained during the eighteenth.

Experience has demonftrated the accuracy of this mode of reafoning. The progrefs of the population has become flower fince the fifth revifion. The annual furplus of 60,000 has been reduced to 50,000 during the laft ten years.

To eftablifh this fact, M. Hermann has compared the ftatements refpecting the population of the governments of Mofcow, Tula, Kaluga, Yaroflaf, Orel, Kurfk, Vladimir, Riazan, Penza, Kazan, Tver, Smolenfk, Tambof, Nijegorod, Pfcove, Voronetch, Simbirfk, Koftroma, Viætka, Novgorod, Saratof, Perm, Orenburg, Vologda, Olonetz. The ftatements refpecting the population of thefe 25 governments, according to the fourth revifion of 1782, gives 9,939,790, males; that of the fifth revifion of 1796, fourteen years after, 10,228,672; that of the enumeration of 1804, eight years after, 9,989,531. So that the population gained during the firft period 867,873, and during the fecond period loft 239,141. In the firft period there are only three governments whofe population has diminifhed; *viz.* Kaluga, Koftroma, and Voronetch. All the others had increafed. But during the fecond period Mofcow alone gained confiderably, namely, 100,000 males; Voronetch, which had loft before, gained 150,000 males; and Viætka gained 37,000. Kurfk and Orel have gained a few thoufands; Tula, Yaroflaf, and Perm, fome hundreds. The other feventeen governments have loft, and feveral of them confiderably. In like manner, Tambof has loft 88,000 men, Nijegorod 55,000, and Simbirfk 110,000 men in eight years!

It is worthy of obfervation, that thofe governments which have been long in a high ftate of cultivation, as Tula, Yaroflaf, Kaluga, Tver, Pfcove, Koftroma, Smolenfk, Vladimir, have neither loft nor gained much. The population, and of courfe the induftry, is ftationary. The governments lefs improved, as Viætka and Voronetch, have gained confpicuoufly; whereas the governments richeft in corn, as Tambof, Nijegorod, Simbirfk, have loft the moft.

The rapid progrefs of population between the fourth and fifth revifions is the natural effect of the fenfible advances made by agriculture, in confequence of the many recent beneficial inftitutions, and efpecially the eftablifhment of the bank. Thefe inftitutions and new funds have already produced their effect. At prefent, the ancient fources of national wealth flow lefs abundantly, and it is not eafy to open new ones. It may be prefumed then, that the population of Ruffia will remain a long time between 41,000,000 and 43,000,000. Unforefeen circumftances, however, may give a confiderable population to the fouth of Ruffia. For inftance, the aftonifhing commerce of grain at Odeffa, between 1800 and 1805, increafed the value of all the lands as far as Kief, and even the fertile fteppes were brought into cultivation. Labourers were wanting; and even half the produce was offered to thofe who would gather in the other half. The commerce of Taganrok likewife furnifhes ground for hope: and agriculture appears to be making fome progrefs among the nomadic tribes.

A country is fufficiently peopled when the generality of the inhabitants are in eafy circumftances. Such a population alone is defirable, and ufeful to government. A country is not fufficiently peopled when the demand for labourers, and the means of maintaining them, are exceffive, as in fome of the fouthern provinces of Ruffia. A country fuffers from its population, when the thoufands of rich are obliged to maintain the millions of poor. Such a fallacious population muft either perifh, or emigrate, or occafion revolutions.

The nations inhabiting the Ruffian empire are; Ruffians, Coffacks, of whom are four denominations, Samoyedes, Morduanes, Cheremiffes, Chuvafhes, Votiaks, Vogules, Permiaks, Sirianes, Oftiaks, Barabinzes, Tungufes, divided into the Connei Tungufi, Olenni Tungufi, and Sabatfhi Tungufi, thus difcriminated becaufe fome Tungufes travel with horfes, fome with rein-deer, and others with large dogs, Kalmucks, Burats, Yakutes, Yukagiri, Korzaki, Kamtfhadales, Tartars, who are likewife divided into feveral kinds, Finns, Efthonians, Lettes, Livonians, Armenians, Indians, befides the Germans and other Europeans. To thefe might be added the Chuktfhi, Tfhalatfhi, the Kurilli, and perhaps yet others. Thefe different tribes and populations are of as various manners, tempers, and habits of life: to fpecify them diftinctly would engage us in too wide a field of

Ekaterinoslaf, to which may be added Caucasia. The population of these provinces is,

	Males.	Females.
Cherson - -	145,814	124,321
Taurida - -	102,826	88,864
Cossacks of the Euxine	20,240	9,155
Caucasia - -	34,849	29,240
	303,729	251,580

As the Cossacks of the Euxine have very few women, and still retain many customs derived from their ancestors, the famous Zaporogian Cossacks, so called from *za*, *trans*, beyond, and *parogi*, cataracts, (the Cossacks beyond the cataracts,) the foregoing statement is probably correct. We learn from general Oppermann, that in the Turkish provinces conquered in 1774, 1783, and 1791, there were 214,318 individuals of both sexes. This small population, in a tract of country so immense, has increased undoubtedly, in consequence of a more regular administration; but not so much as would at first sight appear, because we must strike off the Cossacks of the Euxine, Caucasia, and the Russian and foreign colonies domiciliated in these regions. Besides, if we consider the incompleteness of a first enumeration, it is but reasonable to suppose that general Oppermann's estimate is too small.

Thus it appears that the population of the territories acquired since 1773 was, in 1804,

Little Russia - - - -	5,221,198
Swedish provinces - -	1,520,463
Polish provinces - - -	6,454,320
Turkish provinces - -	555,309
	13,751,290

According to the data above noticed, we are to subtract from the aggregate population of Russia, for the provinces acquired,

From 14,000,000 in 1722		
1,033,533	-	12,966,467
From 16,000,000 in 1742		
1,355,110	-	14,644,890
From 19,000,000 in 1762		
1,696,586	-	17,303,414
From 28,000,000 in 1782		
8,678,857	-	19,321,143
From 36,000,000 in 1796		
13,751,290	-	22,248,710
From 41,000,000 in 1806		
13,751,290	-	27,248,710

The last column gives us the rate at which the population of Russia proper has increased.

Whence it follows, that the population of Russia, exclusive of the conquests since the reign of Peter I., gained in 20 years, between 1722 and 1742, 1,678,423, or 83,921 annually. In the 20 years between 1742 and 1762, 2,658,524, or 132,926 annually; that is to say, 49,005 more annually than during the first period. In the 20 years between 1762 and 1782, 1,676,253, or 88,812 annually; less by 49,114 than during the second period. In the 14 years between 1782 and 1796, 2,927,567, or 146,378 annually; more by 62,566 than during the preceding period. In the 10 years between 1796 and 1806, 5,000,000, or 200,000 annually; more by 53,622 than during the antecedent period.

By the above table, it is obvious that the population of Old Russia has more than doubled, or that it is at present to what it was in 1722, as 2⅛th to 1. It is apparent also that the progress of population has not been uniform, that it has had accelerations and retardations, that the most favourable periods were during the reign of the empress Elizabeth, between 1741 and 1761, and the years of the peace of Catharine II. between 1782 and 1796. The population still advances in the later periods, but the rate is slower. What may be the cause of these phenomena?

The population of Russia has more than doubled during the last century, though Smith supposes that the population in civilized countries only doubles once in 500 years. It has doubled in consequence of a better regulated administration; of the security the government has afforded to the nation; of the capitals belonging to foreigners placed in the country, and which for a long time constituted the soul of the inland commerce; in consequence of the progress of national industry, which was the result; of the increase of knowledge, by new commercial connections with other countries of Europe, and by the means of instruction furnished by government to the other inhabitants of Russia; and, finally, in consequence of the removal of several obstacles which checked the progress of industry, as the abolition of the custom-houses of the interior, under the reigns of the empresses Elizabeth and Catharine II., the improvement of the roads, and the multiplication of canals.

What a dismal picture does Russia present to us in the fifteenth, sixteenth, and seventeenth centuries! Josafa Barbaro, in 1436, reports, that from Moscow to the frontiers of Poland, the whole country was one vast desart; the villages, burnt and abandoned, offered no other accommodation to strangers than a place to kindle a fire. Contarini confirms this statement in 1483. Meyerberg, in 1661, found between Viasma and Mosaisk, a distance of 130 versts, only a single village. The road between Smolensk and Moscow was dangerous, according to Lyseck, in 1675, on account of the wolves that attacked travellers. Ulfeldt, the Danish ambassador, in 1625, found the country between Moscow, Novgorod, and Pscove, laid entirely waste by the intestine wars under Ivan Vassillievitch II. Possevin, in 1581 and 1582, travelled whole days in the interior of Russia without meeting a single individual. The whole country between Kazan and Astrachan was a continued desart. Even the cities had greatly suffered. Possevin estimates the population of Moscow at 30,000; that of Novgorod was diminished by the plague to 3000; and Kief, in the time of Herberstein, in 1516, was almost in ruins. Besides the davastations committed by the domestic feuds and foreign invaders, the number of imposts, and the severity of the commissioners who levied them, depopulated the northern provinces which had not suffered from those disasters. We learn from Fletcher, that in the year 1588, 50 villages were abandoned between Vologda and Yaroslaf. At Ustiug bread was almost unknown, and the same destitution of that article of life was felt on the Dvina in the time of Herberstein. Famine and pestilence often committed their ravages among the melancholy remnants of this unfortunate population, as in 1525, in 1601, and in 1615. M. Meiner informs us, that the city of Novgorod lost in one winter no fewer than 18,000 individuals, constituting nearly the whole of its population.

It

It is neither to the mildneſs of the climate, nor to the fertility of the ſoil, that we are to aſcribe the rapid increaſe of population during the eighteenth century; but to a better organized adminiſtration, and the ſecurity which reſulted from it. An infant ſtate, ſuppoſing it tolerably well governed, and connected with countries long civilized, ought to make prodigious progreſs in improvement and population.

That period of the reign of Catharine II., in which ſhe took in hand the amelioration of the ſeveral governments, was particularly propitious to the progreſs of population. The organization of the governments in 1775 was the great political ſcheme that procured the ſubjects a greater degree of ſecurity and happineſs. The ukaſe of 1782, reſpecting the liberty of working the mines, the eſtabliſhment of normal ſchools in 1783, the rights granted to the nobility in 1785, the improvement of the high roads in 1786, and eſpecially the erection of the bank in the ſame year, were all calculated to promote the happineſs of the ſubject, as far as it depended on the government. The bank, from its very commencement, had a ſurpriſing effect upon the progreſs of agriculture. That patriotic ſovereign removed ſeveral obſtacles to the proſperity of her ſubjects, ſuch as the want of liberty to be induſtrious, the want of communications, the want of knowledge, and of a medium of circulation.

The population of Ruſſia has more than doubled during the eighteenth century. Have we reaſon to expect the ſame progreſs during the nineteenth?

If we conſider only the extent of the ſurface capable of cultivation, which is computed at 80,000,000 of ſquare miles, we muſt conclude that Ruſſia is capable of ſupporting 960,000,000 of inhabitants, or almoſt as many as at preſent exiſt on the earth. If we conſider the ſurplus of births as a total gain to the population, this ſurplus, amounting at leaſt to 500,000 annually, would in 32 years amount to 60,000,000, in 56, to 80,000,000, &c.

Experience, however, ſhews us that the progreſs of population does not depend ſolely upon the extent of ſoil capable of cultivation. There are ſpots left uncultivated in the countries where agriculture has made the greateſt advances, even in England, Flanders, and Lombardy. This progreſs depends ſtill leſs on the ſurplus of births. Every where the number of births exceeds that of deaths. The population is always proportionate to the ſtate of national wealth. The moſt deciſive proof, therefore, of the proſperity of a country, is the increaſe of the number of its inhabitants. In Ruſſia the population has more than doubled in 34 years. Whence we may infer, that its agriculture, the principal branch of its induſtry, has alſo doubled. The increaſe of Ruſſian commerce depends upon peace, and upon the augmentation of knowledge. On theſe accounts we cannot expect ſo rapid an increaſe of national riches, and conſequently of population, during the nineteenth century as obtained during the eighteenth.

Experience has demonſtrated the accuracy of this mode of reaſoning. The progreſs of the population has become ſlower ſince the fifth reviſion. The annual ſurplus of 60,000 has been reduced to 50,000 during the laſt ten years.

To eſtabliſh this fact, M. Hermann has compared the ſtatements reſpecting the population of the governments of Moſcow, Tula, Kaluga, Yaroſlaf, Orel, Kurſk, Vladimir, Riazan, Penza, Kazan, Tver, Smolenſk, Tambof, Nijegorod, Pſcove, Voronetch, Simbirſk, Koſtroma, Viætka, Novgorod, Saratof, Perm, Orenburg, Vologda, Olonetz. The ſtatements reſpecting the population of theſe 25 governments, according to the fourth reviſion of 1782, gives 9,939,790, males; that of the fifth reviſion of 1796, fourteen years after, 10,228,672; that of the enumeration of 1804, eight years after, 9,989,531. So that the population gained during the firſt period 867,873, and during the ſecond period loſt 239,141. In the firſt period there are only three governments whoſe population has diminiſhed; *viz.* Kaluga, Koſtroma, and Voronetch. All the others had increaſed. But during the ſecond period Moſcow alone gained conſiderably, namely, 100,000 males; Voronetch, which had loſt before, gained 150,000 males; and Viætka gained 37,000. Kurſk and Orel have gained a few thouſands; Tula, Yaroſlaf, and Perm, ſome hundreds. The other ſeventeen governments have loſt, and ſeveral of them conſiderably. In like manner, Tambof has loſt 88,000 men, Nijegorod 55,000, and Simbirſk 110,000 men in eight years!

It is worthy of obſervation, that thoſe governments which have been long in a high ſtate of cultivation, as Tula, Yaroſlaf, Kaluga, Tver, Pſcove, Koſtroma, Smolenſk, Vladimir, have neither loſt nor gained much. The population, and of courſe the induſtry, is ſtationary. The governments leſs improved, as Viætka and Voronetch, have gained conſpicuouſly; whereas the governments richeſt in corn, as Tambof, Nijegorod, Simbirſk, have loſt the moſt.

The rapid progreſs of population between the fourth and fifth reviſions is the natural effect of the ſenſible advances made by agriculture, in conſequence of the many recent beneficial inſtitutions, and eſpecially the eſtabliſhment of the bank. Theſe inſtitutions and new funds have already produced their effect. At preſent, the ancient ſources of national wealth flow leſs abundantly, and it is not eaſy to open new ones. It may be preſumed then, that the population of Ruſſia will remain a long time between 41,000,000 and 43,000,000. Unforeſeen circumſtances, however, may give a conſiderable population to the ſouth of Ruſſia. For inſtance, the aſtoniſhing commerce of grain at Odeſſa, between 1800 and 1805, increaſed the value of all the lands as far as Kief, and even the fertile ſteppes were brought into cultivation. Labourers were wanting; and even half the produce was offered to thoſe who would gather in the other half. The commerce of Taganrok likewiſe furniſhes ground for hope: and agriculture appears to be making ſome progreſs among the nomadic tribes.

A country is ſufficiently peopled when the generality of the inhabitants are in eaſy circumſtances. Such a population alone is deſirable, and uſeful to government. A country is not ſufficiently peopled when the demand for labourers, and the means of maintaining them, are exceſſive, as in ſome of the ſouthern provinces of Ruſſia. A country ſuffers from its population, when the thouſands of rich are obliged to maintain the millions of poor. Such a fallacious population muſt either periſh, or emigrate, or occaſion revolutions.

The nations inhabiting the Ruſſian empire are; Ruſſians, Coſſacks, of whom are four denominations, Samoyedes, Morduanes, Cheremiſſes, Chuvaſhes, Votiaks, Vogules, Permiaks, Sirianes, Oſtiaks, Barabinzes, Tunguſes, divided into the Connei Tunguſi, Olenni Tunguſi, and Sabatſhi Tunguſi, thus diſcriminated becauſe ſome Tunguſes travel with horſes, ſome with rein-deer, and others with large dogs, Kalmucks, Burats, Yakutes, Yukagiri, Korzaki, Kamtſhadales, Tartars, who are likewiſe divided into ſeveral kinds, Finns, Eſthonians, Lettes, Livonians, Armenians, Indians, beſides the Germans and other Europeans. To theſe might be added the Chuktſhi, Tſhalatſhi, the Kurilli, and perhaps yet others. Theſe different tribes and populations are of as various manners, tempers, and habits of life: to ſpecify them diſtinctly would engage us in too wide a field of of defcription. But of the principal nation, the Ruffians, it will be expected of us to make fome obfervations.

Characteriftics, &c. of the Inhabitants of Ruffia.—The Ruffians are defcribed as a moderate-fized, vigorous, and durable race of men. Their growth and longevity, however, are different in different diftricts; but upon the whole they are rather large than fmall, commonly well-built, and very feldom deformed. Their common or difcriminating features are, a fmall mouth, thin lips, white teeth, little eyes, low forehead, and nofe often fmall and turned upwards; the beard almoft always very bufhy, and the hair varying from dark-brown to red; but feldom quite black. Their countenance expreffes gravity and good nature or fagacity. Their fenfes of fight and hearing are very acute, and the gait or jeftures of the body indicate a peculiar and often impaffioned vivacity. As to the females, a delicate fkin and ruddy complexion are in the vulgar opinion regarded as the firft requifites of beauty. Young girls arrive at maturity in the 12th or 13th year, and this is afcribed to the frequent ufe of hot baths; but on the fame account married women feldom retain the frefh complexion and the peculiar charms of youth beyond the firft lying-in.

The character of the Ruffians is mixed, like that of moft other nations, as well as of individuals; the Ruffian character is, however, compofed of a very extraordinary mixture. The Ruffians are a people who, with a particular degree of pride, combine much fubmiffivenefs, levity, kindnefs, efpecially towards foreigners, prudence and cunning on one hand, but likewife fidelity and honefty on the other, a certain propenfity to fuperftition and ufury, and a great proportion of felfifhnefs. The Ruffian eafily runs from one extreme to the other. Prone as he is to fuperftition, fo apt is he to be carried into the contrary failing. He hefitates long before he engages in friendfhip; but being then generally firm in his attachment, he is revengeful when, in fpite of his caution, he is deceived in the choice of his friend: while he fcolds, threatens, and rages, no harm is to be apprehended; but if he makes no noife when he thinks himfelf offended, he is a dangerous enemy. He is greatly fwayed by felf-intereft, and furrenders himfelf entirely to the impetuofity of his paffions. Gaming and drinking have an irrefiftible authority over him. Among the lower fort it is generally the men who give themfelves up to thefe exceffes; though, indeed, a drunken woman ftaggering along the ftreets is no uncommon fight. The Ruffians are remarkable for their comelinefs of perfon, ftrength of body, courage and intrepidity in war, ingenuity, wit, and obedience to the commands of their fuperiors.

The infatiable greedinefs of the common people for fpiritous liquors, efpecially in the *maflanitza*, or carnival feafon, is in a great meafure afcribable to the rigorous fafts of the church, and the flender diet they live upon throughout the year. Their food chiefly confifts of turnips, cabbages, peafe, falt-cucumbers, onions, coarfe fifh, with oil and black bread. Their common beverage is quas, which is a kind of acidulated fmall beer.

The Ruffian women are exceffively fond of paint, and look upon ruddy cheeks as the very effence of beauty; fo that in the Ruffian language, red and beautiful are convertible terms. Even the village girls all over the country know how to prepare a particular herb to the purpofes of rouge.

Perfons of diftinction drefs after the German and French fafhion, and are paffionately addicted to ftate and fplendour. The drefs of the common people is coarfe and fimple, but they are neat and cleanly in their apparel. Both fexes wear a crucifix on their breafts, fufpended round the neck by a ftring, which is put on at their baptifm, and never afterwards put off; thofe of the peafants are of lead; but the better fort have them of filver or gold. The peafants let their beards grow to their full length. In Ruffia there are few peculiar difeafes. The common Ruffians ufe but few medicines, their place being fupplied by the fweating-bath; and indeed baths have been common in this country from time immemorial. In the bath-room the heat is ufually from 32° to 40° of Reaumur; and by throwing water every five minutes on the glowing hot ftones in the chamber of the oven the heat rifes to 44°. The vapour-bath is habitually ufed by the Ruffians once or twice a week; for which purpofe almoft every houfe has the neceffary apartment. They often fally forth naked from the bath, run about in the cold, and roll themfelves in the fnow, or in fummer plunge into the water, and then rufh again into the bath.

A particular air of grace and civility is obfervable in the falutations even of the common people to one another; but on entering a room, before they greet the company, the cuftom is to make repeatedly the fign of the crofs, at the fame time bowing as often to the picture of fome faint, which is fo placed in every room as to be feen immediately on coming in. In vifits of ceremony, it is ufual for both men and women to welcome each other with a kifs. Great deference, approaching to fervility, is fhewn to perfons of fuperior rank.

The nation confifts chiefly of the nobility and peafantry, to which we may add the burgeffes and the Kozaks or Coffacks. The nobility formerly confifted folely of knæfes or princes. Boyar is not a title of nobility, but anciently denoted the poffeffor of a poft or office, as a privy counfellor, &c. To the former, Peter the Great added the titles of count and baron. The knæfes are extremely numerous, and, therefore, unlefs very rich, or of illuftrious races, not greatly honoured. This great multitude of knæfes proceeded, among other caufes, from the cuftom of giving that title to the baptized Tartarian murzas, in the idea that murza, among the Tartars, was of nearly the fame import as knæs. Every knæs, as well as every count, even though no more than a common foldier, has, in virtue of his birth, the ftyle of *vafhe fiatelftvo*, which is commonly tranflated *your excellency*. The nobles may be proprietors of land and people, and hold the higheft offices in the civil and military departments. The "Dvorianini" are a kind of city-nobles, and the "Odnodvortzoi" are the loweft clafs of nobleffe. The burgher ftate, yeomanry, or commonalty, is compofed of the "Poffatfki" and "Rafnotfhintzi," who live in towns and villages, governed by their proper magiftrates, whether as merchants or tradefmen. They are excluded from offices and pofts of fervice of honour, and furnifh head-money and recruits, but cannot be vaffals. The peafants are vaffals of the great, attached to the foil, *glebæ adfcripti*, and groan under many oppreffions: far, however, from being dull and ftupid, they are remarkably ready witted, and are in no want of natural parts. Of the peafantry, fuch as belong to the crown and the monafteries pay taxes according to the laws of the land, and are liable to other duties impofed by the fame authority; but they may be transferred as donatives from the crown. They may purfue trade, in connection with their rural concerns, if they think it beneficial or convenient. Noble boors are the vaffals of their lord; from thefe recruits for the army are taken by lot. Coffacks form a particular clafs originating from the peafantry; they live exempt from taxes in villages, forts, and petty towns, on the produce of their fields and paftures, or the labour of their hands; they furnifh no recruits, and are not given away as ferfs, and they enjoy other privileges. But they all ferve as light-horfemen, as early and as long as as they are fit for it, providing themſelves with horſes, clothes, and accoutrements, and only receive pay when they are in actual ſervice. See Cossacks.

The intercourſe between the ſexes is more free than in other countries, which is owing to the contracted ſpace of their habitations and ſleeping rooms, their baths, the ſimplicity of their converſation, and their artleſs ſongs. The behaviour of huſbands towards their wives is, in compariſon with that of more poliſhed nations, rough and auſtere. The marriage contract is made with mercantile punctuality; the betrothing is performed with eccleſiaſtical rites, generally eight days previous to the marriage, and is indiſſoluble. The marriage is ſolemnized in the church before the altar, to which they proceed with the figure of ſome ſaint carried before them; and during the ceremony a crown is put on each of the heads of the married pair. The prieſt, with due forms, changes their rings, admoniſhes them of their reciprocal duties, gives them a cup to drink, in token of the union of their fortunes, and diſmiſſes them with his bleſſing.

The national diverſions of the Ruſſians on holidays, at weddings, and on other occaſions of feſtivity, are very various, and much reſemble thoſe that are cuſtomary with the Perſians, Arabians, and Egyptians. Their muſic is more uſually vocal than inſtrumental. Their ſongs are ſimple recitations, ancient or modern, on the ſubjects of love, nature, and tales of chivalry, giants, and heroes, frequently lewd; and their melodies are uniform and monotonous, but ſometimes ſufficiently pleaſing. The little groups of girls, ſitting together in an evening and ſinging, afford much amuſement. The moſt complete vocal muſic is that which is heard in their churches, on Sundays and holidays; which, as the church allows of no inſtrumental muſic in divine worſhip, is performed by ſingers expreſsly taught and moſtly brought from the Ukraine. The ſubſtance is Slavonian poetry; the notes are expreſſed by points, after the very old faſhion, for four voices. The preſent choral muſic is moſtly by mottete. The moſt common inſtrument of the nation is the Cow-horn, which is a kind of cornet, of from one to four feet in length, made of wood or tree-bark. For a deſcription of the balalaika, ſee Balalaika. The gudak is a miſerable violin with three ſtrings: the dutka conſiſts of two parallel reed-pipes, each with three holes, differing in their notes up to an octave, ſo that the hearer conceives that two are played on it. The rilek is a common village lyre; and the valinka a diminutive pair of bagpipes. The guſſi is a horizontal harp with wires, played on with the fingers, and capable of any kind of muſic: it is a pleaſing inſtrument and much uſed; and ſo is likewiſe the cornet among ſailors and boatmen: the ſailors alſo make a kind of jingling noiſe with two bunches of little bells, keeping time with their muſic. Dancing is a diverſion to which the Ruſſians are very much devoted; and they are no leſs attached to gymnaſtic paſtimes.

The dead are long and ſincerely lamented by their ſurviving relations; but, from a natural repugnance to the idea of death, they uſe little ceremony with the corpſe. They bring it to the grave in an open coffin, covered only with a pall, attended by prieſts, chanting hymns, and bearing croſſes and lighted tapers in their hands. At the place of interment they take leave of the body by a kiſs, then faſten up the coffin, and let it down into the grave. Perſons of the lower claſs bury their dead in their ordinary clothes. At the new year is annually held a feaſt of the dead, on which occaſion every body viſits the grave of his relations, lays ſome victuals upon it, and hears maſs, in payment for which the prieſts get the victuals.

The ancient orthodox Greek *religion* is univerſally acknowledged both in doctrine and diſcipline. (See *Greek* Church.) The churches and ſacerdotal veſtments are very magnificent. The people are ſtrict in the obſervance of the outward forms of religion; attendance on maſs, keeping the faſts (which take up one-third of the year), performance of domeſtic devotions, confeſſion, receiving the ſacrament, &c. Paſſion week is obſerved with great apparent ſolemnity; but Eaſter week is paſſed much as in other countries, in various diverſions, drunkenneſs, and debauchery. The Ruſſians are ſuperſtitious, both in their notions and practices, believing in ghoſts, apparitions, and hobgoblins. Some ſpecimens of their ſuperſtitions we ſhall here ſubjoin. On the Thurſday before Whitſuntide, the girls celebrate the feſtival of the Slavonian goddeſs Lada and her ſon Dida, with ſinging, dancing, and decorating a birch-buſh with garlands of ribbons; which they afterwards throw with much ſolemnity into a river, and infer, from the figures aſſumed by the ribbons in the current, to whom they ſhall be married, and their ſubſequent condition. On the fifth of January they go by night into a croſs-ſtreet, or into a cellar, which is called "To go hearing," and fancy they hear, in every ſound, the prediction of their deſtiny. The day after Chriſtmas is ſolemnized by the midwives, becauſe the Virgin Mary's midwife had a great hand in the redemption of the world: but it is needleſs to enlarge in this way.

The *clergy* in Ruſſia enjoy peculiar privileges: they cannot ſuffer corporal puniſhment without being previouſly deſecrated, and they are exempt from taxes. The empire comprehends, according to the uſual enumeration, 18,350 pariſh churches and cathedrals of the orthodox Greek religion. The number of Ruſſian clergy is computed at 67,900 perſons, without including their families. Some authors aſſert, that the whole empire contains 480 monaſteries and 74 nunneries; the former including 7300 monks and the latter 5300 nuns; but theſe numbers are ſuppoſed to be exaggerated: Mr. Coxe ſtates the nuns at only 1300, and this is ſaid to be a juſt eſtimate. The monaſteries all follow the rule of St. Baſil. By the laws of Ruſſia no eccleſiaſtic can be brought before a temporal judge, unleſs commiſſaries of the clerical order be likewiſe on the bench. For the boors of Ruſſia, ſee Boors.

Throughout the old provinces of Ruſſia not any beggars are to be ſeen. The inferior claſs of nobility, which is the moſt numerous, live at their eaſe in the country. They are the true Ruſſian farmers: their well-being depends on the progreſs of agriculture, and it proſpers in their hands. The peaſantry are very far from being unhappy. They are in general much more at their eaſe than the ſame order of men were in France, under the ancient government, when it was hardly poſſible for a carriage to ſtop, any where between Lyons and Paris for example, without being ſurrounded by a clamorous troop of beggars. Even the number of wealthy peaſants is by no means inconſiderable; and it muſt every day become greater, ſo long as they retain their ancient ſimplicity of manners. Their ſavings neceſſarily accumulate under the form of capitals, and theſe capitals by degrees become productive; for many peaſants have already abandoned agriculture, to engage in other branches of induſtry, as manufactures and trades, and even commerce. It is only in Finland and the Poliſh provinces that the peaſants are poor.

The power of a ſtate does not ſolely depend on the number of its inhabitants, but upon their wealth and activity. Ruſſia, in this reſpect, has no reaſon to complain. She is ſufficiently peopled for the actual ſtate of her national riches. What would not this empire become, if its population was more concentrated!

The Ruſſian *language* is an improved dialect of the Slavonian, which, with its characters, is ſtill uſed in the offices of religion. According to M. Schlœtzer, it is preferable to almoſt all the European languages. It is rich in words, ſoft, expreſſive, and requires great flexibility in the organs of utterance. It is, however, difficult of attainment by foreigners, on account of its innumerable peculiarities and anomalies. The Ruſſian grammarians themſelves are not agreed even concerning the number of letters contained in the alphabet. Some make it to be forty-one, and others thirty-one; whilſt Rodde, with greater propriety in the opinion of Mr. Tooke, fixes the number at thirty-eight. Some of theſe letters are merely notes of accent in pronunciation.

Government of the Ruſſian Empire.—As far as hiſtory reaches, Ruſſia has always been an hereditary empire. The throne was occupied by Rurik and his deſcendants, according to the uſual computation, from about the year 862 to 1598: and when Michael Feodor Romanow aſcended the throne in 1613, a charter was executed confirming it to him and all his poſterity, by which act Ruſſia was in a formal manner declared a real hereditary empire. His acceſſion to the throne was by unanimous election, "in a general aſſembly of the boyars and the other eſtates of the country," and partly by his relationſhip to the tzarian family now extinct in the male lineage, and alſo in virtue of nomination, by which his father had already been heir to the throne. On a vacancy the heir takes poſſeſſion of the throne, without any invitation or acts of homage. The oath of allegiance is uſually adminiſtered to all claſſes of ſubjects, though the ſovereign may diſpenſe with it. The coronation has for many centuries been cuſtomary in Ruſſia, and is ſtill continued, on which occaſion the ſovereign, who puts the crown on himſelf, is anointed with holy oil. Since the introduction of Chriſtianity, the ſovereigns have always profeſſed themſelves of the orthodox Greek church. As to the title of the ſovereign, we may obſerve, that Ivan Vaſſillievitch declared himſelf tzar in the year 1547, but it was expreſsly given to the ſovereigns of Ruſſia long before: this title in the Ruſſian Bible ſignifies a king. In 1721 Peter I. aſſumed the appellation of emperor; and this imperial title has been borne ever ſince by the ſovereigns of Ruſſia. The abridged title, uſual in ukaſes, ſentences, commands, petitions, &c. is "emperor and autocrator, or empreſs and autocratrix, of all Ruſſia, or of all the Ruſſias." It is beſide our purpoſe to diſcuſs the queſtion concerning the ancient origin, or even exiſtence of fundamental laws of the empire: it will be ſufficient to remark, that all the preſent laws of this kind may be reduced to two principal claſſes, as they aſcertain either the authority and prerogatives of the ſovereign, or the claims of the ſubjects. Thoſe that regard the ſovereign comprehend the hereditary ſucceſſion, the uncircumſcribed authority, including all the great and excluſive prerogatives of majeſty, and the principle that the ſovereign is an imperial majeſty and the dominion an empire: thoſe that regard the ſubjects include ſpecific obligations and rights, and they concern either the empire at large, or particular tribes, ranks, and claſſes; ſuch are ſecurity of perſon, of reputation, of property, the non-denial of juſtice, legal protection againſt violence and oppreſſion, unmoleſted enjoyment of all lawfully obtained immunities, privileges, and rights; the right, on the extinction of the reigning family, if no ſucceſſor be appointed, to elect one, &c. Accordingly, the nobility may juſtly demand the quiet enjoyment of all the privileges and immunities granted to them by letters of grace. The burghers may appeal to the privileges granted to them in the regulations for townſhips. The Don Coſſacks, and other nations of that kind, may juſtly expect that no invaſion be made on their diſtricts and poſſeſſions, or any infringement of their rights, &c.

The legiſlative authority is veſted ſolely in the monarch; neither the whole nation as a body, nor ſingle members or claſſes of it, can claim any part of it. The ſovereign is alſo the ſole diſpenſer of all ranks and dignities; to the higher he himſelf appoints the perſons, and ſigns with his own hand the inſtrument or patent. The inferior degrees are beſtowed in his name by the proper commiſſioners or boards, *e. g.* in the civil department by the ſenate, in the military by the college of war, in the navy by the admiralty, in the church by the ſynod, in the medical department by the college of medicine, &c. Formerly there were ſeveral monopolies of the crown; but the late empreſs, to the manifeſt advantage of her ſubjects, aboliſhed the greater part of them, reſerving only two, *viz.* ſalt and brandy. As to landed property in general, it belongs either to the crown, or to private owners, and that again either to individuals, or in common to a whole tribe. Another prerogative that adheres to the throne is that the ſovereign can appoint a regency during the minority of his ſucceſſor, and fix the period of his arriving at majority. The form of government in Ruſſia is unlimited monarchy; however, the free-born Ruſſian ſubjects are always treated as ſuch; and in general, it is permitted the ſubjects to utter their complaints and to make a repreſentation of them. From ſeveral ukaſes it appears, that the next ſucceſſor, his conſort, and all their children, are ſtyled grand dukes and grand ducheſſes, and that they all bear the title of imperial highneſs; that it is conferred upon them always by a ſigned decree of the monarch, and that, reſpecting the grand-daughters, the terms grand ducheſs and grand ducal princeſs are ſometimes ſynonimous. The rights of the grand duke, as heir apparent, do not ſeem to have been accurately defined; he is the firſt ſubject, but he has properly no functions ariſing from his high birth and appointment, theſe depending on the good pleaſure of the ſovereign. The princes and princeſſes of the reigning family have no ſettled eſtabliſhment; their houſehold depending on the pleaſure of the ſovereign. The annual allowance to the grand duke, it is ſaid, is uſually 220,000 rubles, and ſometimes more, to which are added many great preſents.

The arms in the middle ages were borrowed from Moſcow, at that time the imperial reſidence, and conſiſted of St. George on horſeback, killing a dragon with a ſpear. Ivan Vaſſillievitch made choice of a black ſpread eagle, with a crown on each head, a larger crown between them, in a golden field, and holding in one claw a ſceptre, and in the other an imperial mound, with the arms of Moſcow on the breaſt. Sometimes it is ſurrounded with a collar compoſed of the arms of ſome of the countries belonging to the Ruſſian empire, as Aſtrachan, Kazan, Siberia, &c. This is accordingly the imperial ſeal, and when the late empreſs uſed it for letters, it had an imperial mantle, and over it an imperial crown. The court is compoſed of the great officers of ſtate, of ſenators, actual privy-counſellors, princes, counts, barons, &c. On court-days acceſs is open to every ſubject. Six orders of knighthood form a part of the ſplendour of the court, with their peculiar inſignia. The firſt three were conſtituted by Peter I.; the two next by the late empreſs Catharine II., and the ſixth proceeds from Sleſwick-Holſtein. Of the former five the monarch is always grand-maſter; but of the ſixth, the grand duke, as duke of Sleſwick-Holſtein. To the fourth and fifth, penſions are annexed to a ſelect number of the eldeſt knights. Theſe orders take precedence according to the ſeniority of their

their inſtitution. They are as follow, St. Andrew, St. Catharine, St. Alexander Neffsky, St. George, Vladimir, St. Anne of Holſtein. See each reſpectively.

Of the imperial colleges, inſtituted for the government of the Ruſſian empire, our limits will allow our mention only of the two principal and ſupreme, viz. the "Directing Senate," and the "Holy Synod." The former was conſtituted by Peter I., who raiſed it to the rank of the ſupreme or higheſt college of the empire. In 1763 the late empreſs new-modelled it, cauſing it to conſiſt of ſix departments, four at Peterſburg and two at Moſcow. This ſupreme imperial college, ſtyled by the empreſs the ſanctuary of the laws, can iſſue orders to any other imperial college, and receive reports from them (the ſynod excepted); it publiſhes the laws and edicts received from the monarch, and provides for their execution; returns a deciſive anſwer to the queſtions ſent in by the courts or governors in doubtful caſes; appoints to many conſiderable poſts in the viceroyalties; advances, in the name of the ſovereign, meritorious civil officers to higher rank, and is the higheſt tribunal to which appeal can be made, for none can either appeal from its decrees nor complain of them; but any one who is diſſatisfied with its ſentence has no other reſource than to preſent his petition to the cabinet. The ſecond ſupreme college is the "Holy Directing Synod," which is the higheſt ſpiritual court of the Ruſſo-Greek church. In 1789 this college conſiſted of one metropolitan, one archbiſhop, one biſhop, one proto-pope (the imperial confeſſor), one archimandrite, one proto-pope (of the ſeculars), one upper procureur, one chief ſecretary, one executor, three ſecretaries, one protocoliſt, and one ſtaff-ſurgeon; the abſent members were one metropolitan, two archbiſhops, and one biſhop. At the ſynodal comptoir at Moſcow, at that time, were one metropolitan, one arch-prieſt of the ſecular clergy, one procureur, and one ſecretary. In the ſpiritual commiſſion, one metropolitan, one archbiſhop, one privy-counſellor, and one ſecretary, have their ſeats. Under the authority of the ſynod are all prelates, conſiſtories, eccleſiaſtics, churches, religious books, &c. For the other ſubordinate imperial colleges, we refer to Mr. Tooke's account of them; as well as for other particulars relating to the laws, the conſtitution of the Ruſſian government, and the condition of the Ruſſian ſubjects. On this latter topic we ſhall ſelect and ſubjoin a few particulars.

The nobleman, generally ſpeaking, pays no tax for any part of his land which he occupies himſelf, nor even for his moveable property. If he poſſeſs no male vaſſals, his fields, foreſts, mines, mills, fiſheries, &c. which he occupies with free or hired labourers, are as exempt from taxation as his perſon; but, on the other hand, the nobleman who has vaſſals muſt furniſh recruits out of them. The clergy, in regard to their perſons, are likewiſe exempt from taxes. Their ſtipends, which conſiſt in money, and in the country of corn and pieces of land, are raiſed by them free of all deductions. Placemen, and officers of the crown, &c. pay no annual tax on their ſalaries. Literary men, who are not enrolled in any guild, and who, beſides their learned profeſſion, as phyſicians, lawyers, &c. are not engaged in trade, are entirely exempt from taxes; and this is alſo the caſe with artiſts, &c. People who live ſolely on the intereſt of their capital, and do not inſcribe themſelves in any guild, however large their income may be, pay no tax upon it whatever. All inhabitants of towns poſſeſs their immoveable property free of all taxation. As for the great body of the yeomanry or country-folk, their real neceſſaries are ſubject to no taxes, becauſe in all Ruſſia there is no ſuch thing as exciſe; and in general the taxes are not oppreſſive. That both the nobility and burghers live in affluence is manifeſt from the luxury that every where prevails. The Ruſſian boor, even the vaſſal of the nobleman, lives very decently in his houſe, has a ſufficiency of wholeſome food, is neatly dreſſed, puts commonly two or three diſhes on his table, and even accumulates a trifling capital, though, as it is not ſecured to him, and may be taken from him, he frequently buries it in the ground. In ſome villages the boors diſplay even an opulence. Among the very numerous nobility many poſſeſs fortunes of 100,000 or 500,000 rubles, and ſometimes more; and the generality may have a fortune of between 30,000 and 100,000 rubles. In no country are the learned profeſſions ſo well provided for as in ſome provinces of Ruſſia, particularly Livonia and Eſthonia. The preacher, even in the ſmalleſt country-paſtorate, lives on a footing no leſs brilliant than the general ſuperintendant in many of the provinces of Germany. Although his ſtipend is ſmall, yet his preſents for the diſcharge of his official duties from noblemen and burghers are numerous and large. His daily table is ſupplied with ſeveral diſhes; he has men ſervants and maid ſervants; he is commonly the friend and confidant of the noblemen of his pariſh, and his houſe is the place of their uſual reſort. The caſe is ſimilar with regard to law-advocates, phyſicians, ſurgeons, and private tutors. On account of the flouriſhing ſtate of commerce in the maritime towns, there are many merchants who poſſeſs capitals of ſome hundred thouſands of rubles. The condition of the boors is far from being contemptible and wretched. The Coſſacks generally enjoy not only the neceſſaries but the accommodations and comforts of life. In the parts about the Don, eaſe and affluence are every where ſeen; and the Coſſacks of the Ural paſs their time in idleneſs and yet in plenty from the riches obtained by means of the productive fiſheries on that river. Upon the whole, the writer now cited obſerves, that the moderate taxes, the cheap living, the excellent and numerous products, the contentedneſs of the people, and the good regulations adopted through the empire, afford to every one who conducts himſelf well in his ſtate of life, ſufficient means for acquiring a competency. The majority of the Ruſſian ſubjects fare better in their way than the great multitudes in France, Germany, Sweden, and ſeveral other countries.

The ſocial ſtate of the inhabitants of the Ruſſian empire is capable of great melioration, and productive of much actual comfort, from the opportunities that are afforded them for active and induſtrious exertions. The objects of the *chace*, in the moſt northern and eaſtern parts of Ruſſia, and particularly on the iſlands between Kamtſchatka and America, and alſo in the governments of Tobolſk, Perm, Ufa, Viætka, Archangel, Olonetz, Vologda, and ſome others, afford both an amuſing and lucrative employment. The chace, for the ſake of furs, is of primary importance in its relation to foreign commerce. The moſt valuable of all the animals that are ſought for their ſkin is the "ſable," the ſkin ſerving as a ſtandard to the tribute, which is paid to the crown by the Siberian nation of hunters. This animal is found in Aſiatic Ruſſia, from the Aleutan iſlands and from Kamtſchatka to the diſtricts of the Petſchora and of the Kama. The fineſt ſables come from Yakutſk and Nertſchinſk; and among theſe are likewiſe, though rarely, yellow, and very ſeldom, white ſables. The Kamtſchatka ſables are the largeſt of all. As the ſable is become ſcarce, the crown accepts of the ſkins of foxes, martens, ſquirrels, and fiſh-otters, from the inhabitants of Siberia, inſtead of the ſable. Eaſtern Siberia, and particularly Kamtſchatka, abound moſt in beautiful foxes. To the other objects of chace for the furs, we muſt add the bear, the wolf, the lynx,

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the glutton, the ferret, the pole-cat, &c. which, generally ſpeaking, are ſpread over the whole of North Ruſſia; and vaſt quantities of their ſkins are either conſumed at home or ſent abroad. But we have not room to enumerate all the animals that are profitable objects of chace to the Ruſſians. We ſhall obſerve in general, that peltry of all kinds may be conſidered as a remarkable and lucrative product of the Ruſſian empire. The principal ſpecies are: ſables, beavers, blue and white foxes, wolves, hyænas, lynxes, ermines, peſtzui or muſcovite dogs, ſquirrels, martens, hares, ſheep, wild cats, panthers, tigers, and bears. The Ruſſians have the art of dyeing the furs ſo ingeniouſly, that the Chineſe, and therefore others who are not good judges, are eaſily cheated.

Beavers are chiefly found in Kamtſchatka; they are principally uſed in trimming the caps and peliſſes of women of quality.

Foxes are every where met with in Ruſſia proper, in the conquered provinces, and in Siberia. Thoſe of Siberia are the beſt. Beſides the common croſs-blue fox, they have very dark, called black, and even white foxes, which laſt, however, are extremely rare, and, like the black, fetch a higher price than ſables. The ermine is a ſort of rat, and is employed for trimming peliſſes. All minever is ſquirrel-ſkin. The Siberian is incomparably darker, thicker, and more laſting, and accordingly much dearer than the ordinary Ruſſian. The Ruſſian hare-ſkin is of the hare peculiar to this country, which in winter becomes white. The ruſſaki cannot be uſed as fur, as they never change their colour. Common coarſe ſheep-ſkin affords a warm and durable peliſſe for the lower order of people; the finer is worn even by perſons of diſtinction. The Kalmuck and Bucharian ſheep-furs are rather ſcarce and dear, ſtill more ſo are the Kalmuck furs of unborn lambs. The genuine Bucharian ſheep-ſkins are watered, and the Kalmuckian by nature criſp and curly. But here likewiſe great frauds are practiſed, as the Ruſſians frequently curl the fine ſkins of the common ſort, in order to impoſe upon the unwary.

Bear-ſkins and tiger-ſkins are uſed only for covers to ſledges, and trappings for horſes, or, inſtead of beds, for ſervants to lie on. Boots are lined with the ordinary Ruſſian cat-ſkin; but the blue Siberian cats yield a very beautiful fur.

All theſe ſkins are ſold either by the piece or ſackwiſe. Two hundred ſkins of Ruſſian, and a hundred ſkins of Siberian minever, compoſe a ſack, and two hundred hare-ſkins are alſo reckoned a ſack. The Ruſſians are ſingularly induſtrious and ingenious in aſſorting their furs. Of one ſort of ſkin they make ſeveral deſcriptions of furs; as, for example, a particular fur is prepared of the ſmall dark ſtripe on the backs of ſquirrels, another of the ſides, again another of the bellies; and in like manner with the ſkins of other animals.

Beſides the chace, which has always been the excluſive occupation of particular nations of the Ruſſian empire, there are alſo tribes who maintain themſelves principally or wholly by the *fiſhery*, and with whom even the eſtabliſhment of this trade forms a part of their civil conſtitution. Some follow it for their own ſupport, while others, as the Coſſacks of the Don and the Ural, and the tribes on the ſhores of the Volga, carry on a lucrative traffic with the products of their fiſhery. The Frozen ocean, together with its bays and rivers, affords various ſpecies of ſea-animals, that are ſought after by ſeveral nations. To the inhabitants of the governments of Archangel and Olonetz the iſlands of Spitzbergen and Novaya Zemlia afford the chief ſcene of fiſhery at the proper ſeaſon. The animals that principally engage their attention are whales and morſes. Accordingly, every year a ſhip goes from Archangel to winter at Spitzbergen, and at leaſt one, frequently more, to Novaya Zemlia. The inhabitants of Meſen navigate theſe coaſts only in ſummer. From the morſe fiſhery the chief commercial products are the blubber and the ſkin; the blubber for its oil, and the ſkins, when dried, for horſe traces, and when cut, as ſize for the paper-manufactories. The teeth of the morſe likewiſe are tranſported to Peterſburg, Meſen, and Archangel, and are wrought up into the various works for which ivory can be uſed. The Frozen ocean alſo teems with the narwhal, the pott-fiſh, from whoſe brain ſpermaceti is prepared, the ſea-dog, dolphin, ſea-hog (delphinus phocæna), hay-fiſh (ſqualus carcharias), ſea-cow (trichecus manatus), the ſea-bear (phoca urſina), the ſea-lion (phoca leonina jubata), the ſea-otter (lutra marina), and many others, which are caught either for their ſkin or their blubber. Among the principal objects of the fiſhery on the coaſts of the White ſea, which ſkirt the government of Archangel, are the cod, the navaga (gadus callarias), plaiſe, ſoals, ſtock-fiſh, and herrings. The Dvina and the Petſhora abound in that excellent fiſh called by the Ruſſians ſighi and ſalmons, the latter being reckoned the fatteſt and beſt flavoured of all Northern Ruſſia, and they are therefore frozen or ſalted, in order to be tranſported to a great diſtance round the country. The Oby alſo affords an ample ſupply of ſturgeons, ſterlet, white ſalmon, pikes, muræna, quobbe or quappe (gadus lota), and a multitude of other fiſh. The Oby fiſhery is chiefly carried on by Oſtiaks and Samoyedes. The Irtiſch alſo contains almoſt all the fiſh that are found in the Oby; and here the fiſhery is very conſiderable. The Yeniſſei and Lena, and moſt of the rivers that fall into them, furniſh great variety and abundance of fiſh. The whale fiſhery we ſhall have occaſion to mention under another article. The Eaſtern ocean furniſhes, beſides the whale, the ſea-bear, ſea-lion, ſea-cow, and ſea-otter, which we ſhall elſewhere deſcribe. In a commercial view, there is not any of theſe marine animals ſo important as the ſea-otter, the beautiful fur of which is in high eſtimation. See Fur.

The fiſhery on the Caſpian, as Pallas obſerves, is in ſome reſpects as important to Ruſſia, as the herring, the cod, and the whale fiſhery to other maritime powers of Europe. Of the fiſh of the Volga, the ſeveral kinds of ſturgeon and the white ſalmon are the beſt. The Kamma, which falls into the Volga, alſo abounds with fiſh, which is held to be the beſt flavoured of any in Ruſſia, at leaſt its ſturgeon, ſterlet, and white ſalmon, are preferable to thoſe of the Volga. Beſides theſe three kinds, a principal fiſh of the Kamma is a ſmall ſalmon called in Ruſs kraſnaya reba, red or beautiful fiſh (ſalmo eriox, or ſalmo alpinus). For an account of the means for catching fiſh on the Volga, and on the confines of Aſtrachan, ſee Utsching. The fiſhery on the Ural is not leſs conſiderable than that of the Volga; and being under good regulation, it forms the principal ſupport and occupation of the Uralian Coſſacks. See Ural.

The fiſhery of the Euxine and the ſea of Azof, though neither ſo important nor extenſive as that of the Caſpian, affords numerous ſorts of ſturgeon. The whole northern coaſt of the ſea of Azof, from the Don to Perekop, is laid out in fiſheries, for which theſe diſtricts are extremely favourable. The moſt conſiderable fiſheries on the peninſula of Taurida are at Kertſh and Yenicaly, where the capture uſually begins in May, and continues till ſome time in October. On the coaſts of the Baltic, alſo, a conſiderable fiſhery is carried on. The gulfs of Riga and of Finland contain generally the ſame kinds of fiſh. In the waters of Livonia, ſays a naturaliſt of that country, are forty-nine different ſpecies of fiſh, among which the ſalmon, ſtreamlings, pike, and lampreys,

preys, for exportation if not for home consumption, are the most important. One species of fish peculiar to these waters is the kyllo streamling, caught in great numbers in autumn, near Revel and Roggervyk. They are pickled, and form a good substitute for anchovies and sardelles, and thus prepared, they are sent abroad to various parts. The potted lampreys from Narva are no less exquisite. The greatest store of the gulf of Finland consists of sterlets, salmon, and carp. Sturgeon are found in the gulf of Cronstadt, and likewise at times in the Neva. In winter, the transport of frozen fish from the remoter parts of the empire to St. Petersburg is very considerable. In Russia there are several lakes that afford an abundant supply of fish. The chief of these is the *Baikal*, which see. The Tschan, a Siberian lake, is particularly prolific in fish; and in this respect among the European lakes the Ladoga is the most remarkable. The Peipus and the Ilmen also yield a great variety of fish, and the smaller European lakes are proportionally productive. According to the calculations of Hermann, the whole value of the fishery in one year, may be estimated at 15,000,000 of rubles.

Another branch of productive industry in the Russian empire is the *breeding of cattle*. The nations of herdsmen in this empire are the Kirghises, the Kalmucks, the Baschkirs, the Burats, and several others less numerous: the breeding of cattle is a principal trade with the Cossacks of the Don, the Nogayans, the Barabinzes, and some others; with most of the nations of hunters it is a considerable means of profit, and as a profitable branch of trade it flourishes in many districts of proper Russia. The breeding of cattle affords to the inhabitants many, and in some districts all the means of subsistence, and yields besides to commerce a multitude of articles for exportation. Two of these are hides and tallow: of the latter, in the year 1793, 1,035,000 poods were exported; and the value of that quantity amounted to 4,279,000 rubles, not including the tallow candles, the exportation of which amounted in value to 170,000 rubles. Yufts and leather were in the same year shipped off to the amount of 2,249,000 rubles, and the other exports in the products arising from the breeding of horned cattle, made a sum of more than 163,000 rubles. The whole value of all these articles in one year was upwards of 6,862,000 rubles. The breeding of sheep is also an article of importance in the Russian empire. The Nomades are richer in sheep than in any other article, and even the boors and Cossacks in Southern Russia and Siberia possess flocks of hundreds and thousands. Through the whole country this branch of productive industry might be very much improved. Goats and hogs are also animals that yield to the Russian empire considerable profit, and with due attention might be rendered much more lucrative. Hog's bristles constitute an important article of exportation; in the year 1793, these, to the value of 742,000 rubles, were shipped off. The horse, the ass, the camel, the rein-deer, and the dog, are animals which are capable of being rendered profitable to this country in a much greater degree than they now are; though at present they are not unworthy of attention.

Another branch of productive industry in the Russian empire is *agriculture*. In Russia, agriculture is less the business of the peasantry than in other countries. Throughout the empire every village has its proper territory, and every estate its allotted inclosures and commons. In Siberia every man takes as much ground from the open steppes as he can manage; and when such a portion of ground is exhausted, he proceeds to another, &c. so that these little slips of land lie scattered at twenty, fifty, and even eighty versts distance from the village. In Russia and Siberia they cultivate winter rye and summer rye, winter wheat only in Russia as far as the Kama, summer wheat both in Russia and Siberia; barley, spelt-barley, or bear-barley plentifully in Russia; oats in Russia and Siberia; few pease, and still fewer vetches and beans; a great deal of buck-wheat; in Siberia, Tartarian buck-wheat, millet, and the grain called panicum germanicum, only in Russia. The villagers have hay-fields on the banks of lakes and rivers, in brakes and fens of the forests. The old withered grass, weeds, twigs, and light stuff they set on fire, and this occasions an appearance which at night is tremendous. Besides corn, they grow flax in large quantities, chiefly on the Volga, but most of all in the government of Yaroslaf, and also in the governments of Moscow and Kazan. Hemp is indigenous in all the south and middle of Russia and Siberia, and is propagated in great abundance, both for the material of linen, sail-cloth, &c. and for the oil expressed from its seed, of which a very great quantity is consumed for food during the fasts, and which, as well as the hemp, is exported annually to a great amount. Woad likewise grows wild in Southern Russia and Siberia; it is gathered in the Ukraine, and employed in staining and dyeing. It is also cultivated in the government of Penza, and about the Don. Tobacco is planted almost solely, but in great abundance, in the Ukraine. Hops are propagated by the villagers only, in small quantities, in the governments of Kazan, Nishnei-Novgorod, &c.; and in Siberia, in the province of Irkutsk, the wild sort is plentiful. Orchards are of little account, except in the chief towns. No fruit-trees thrive in Siberia. Water-melons are much cultivated in the south-eastern parts of Russia, from the Don to the Ural, especially on the Volga. In the breeding of cattle, the countryman is directed by climate and pasturage. In the south of Siberia a person often possesses 300 horses, as many sheep, about half the number of horned cattle, always a few swine, and much poultry, sometimes geese and ducks. The Russian horses are of a middling size, with large heads, long flabby ears, not very handsome, but spirited, strong, and hardy. The horned cattle are small and brisk: the cows give little milk, which is poor and thin. In Little Russia the oxen are used for draught. About Archangel there is a fine breed of large cows, originally brought from Holland, and they do not degenerate. The true Russian sheep are distinguished from the common sort by a short tail, about the length of seven inches. Hogs, dogs, and cats are of the ordinary kinds. The poultry are housed all the winter in the cottage, under the hearth and the sleeping benches, for the sake of having Easter eggs. The culture of bees is the principal concern of the Baschkirs in the Ural, and is also an object of attention in Southern Russia. In the northern districts of Russia and Siberia the chace is pursued as a trade, particularly for those animals whose skins are used as furs, especially sables and grey squirrels, for the wear of the Russian gentry in town and country. The carrier's trade is a source of great profit. The towns at the distance of from 500 to 1000 versts, serve as stations for changing the drivers and carriages, *e. g.* from Kiachta, Irkutsk, Krasnoiarsk, Tomsk, Tara, Ekaterinenburg, &c. The country market-towns and hamlets are commonly open, and mostly built in irregular streets, with little kitchen-gardens and large yards to the houses; they are situated on the banks of rivers, for the convenience of obtaining water. They contain many churches; and the monasteries in or near them, from their strong walls, massy gates, and numerous church towers, have the appearance of castles. The fortresses dispersed about the country have seldom earth-ramparts, but are mostly built like their houses, with a low palisade round them. The cannons stand on the gates and on the angles of the ramparts,

or

or batteries on wooden carriages. These are designed to keep the tributary tribes in awe, and the neighbouring Nomades from the borders. Ostrogs, or houses surrounded with a palisade of upright pointed bauks, are situated either in towns, where they serve as prisons for criminals, or solitarily, in various parts of the country, for the same purposes as the fortresses. The parishes, or church villages, are sometimes very extensive; containing 500 or even 1000 and more farms, and from three to seven churches, many of them brick buildings, markets, and trafficking places. Large villages are frequently called slobodes, but many slobodes are less than church villages; the houses are ranged in straight streets, and the streets mostly laid with timbers.

Of the nations, says Mr. Tooke, who have followed agriculture from time immemorial, though in various ways, and with different success, the principal are the Russians, the Poles, the Lithuanians, the Lettes, the Finns, and Esthonians. The state of agriculture in all countries must depend on the nature of the soil and climate, as well as on the industry of the inhabitants. With this view of Russia, the most northern and eastern districts of the empire, of the former, particularly in Siberia, are totally unfit for every kind of economical culture. The 60th degree of latitude may be regarded as the boundary beyond which no agriculture is practicable. The repeated attempts that have been made about Okhotsk (between 59° and 60° N. lat. and 160° E. long.), and Udskoy-ostrog (55° 20′ N. lat. and 150° 40′ E. long.), in the government of Irkutsk, shew, that the culture of corn will never be introduced to effect; and even in Kamtschatka, where the southernmost cape runs out to 51° N. lat. similar trials have been made with very poor and precarious effects. Admitting, therefore, the 60th degree of latitude to be the general boundary of the soil susceptible of culture to the north, we may infer, that the Russian empire contains about 162,000 square geographical miles of land totally unserviceable to the purposes of agriculture. Accordingly the circles in the governments of Olonetz and Archangel have no agriculture, and even in some districts of Vyborg, St. Petersburg, Novgorod, Vologda, Perm, and Viætka, it is attended with almost insuperable, or at least deterring difficulties. In some also of the southern districts of Caucasus, Saratof, Ufa, Kolyvan, Ekaterinoslaf, and Taurida, the soil is so poor, that the natural impediments can perhaps never be entirely surmounted. To the fertile regions belong most of the governments of the middle, and several of the northern tracts; but the best and most productive soils are chiefly found in Little Russia, Kazan, Simbirsk, Kharkof, Kursk, Orel, Nishnei-Novgorod, in the southern part of Taurida and Caucasus, in the newly-acquired portion of the Polish Ukraine, and particularly also in some of the Siberian provinces. The great fertility of the districts bordering on the Volga, the Kama, the Dnieper, the Terek, and the parts about the Euxine, has been long experienced. Moreover, in the territory of Krasnoiarsk, a circle-town of the government of Kolyvan, between the 55th and 56th degrees of N. lat., the fertility of the soil is such, that no instance has occurred of a general failure, and that it is a very ordinary harvest, when the summer rye yields 10-fold, the winter corn 8-fold, and the barley 12-fold. It is usual for the wheat only in bad years to yield the sixth grain, and the oats give an increase rarely short of 20-fold. In consequence of this exuberance, provisions are here in great plenty, and probably in no province of the empire at so low a price. When Pallas was at Krasnoiarsk, a pood of rye-meal sold for 2 or 3, and a pood of wheaten flour for $4\frac{1}{2}$ or 5 kopeeks; a whole ox was bought for $1\frac{1}{2}$ ruble, a cow for a ruble, and a good serviceable horse for 2 or 3 rubles at most; sheep and hogs fetched from 30 to 50 kopeeks a-piece. And though in 25 years that have elapsed since that period an alteration has taken place, yet this country is still one of the cheapest, as well as one of the richest and most plentiful of all.

The implements of husbandry, without which no great progress in the culture of the soil can be expected, are the most simple and artless that can be well imagined.

In such a state, and with such instruments, we need not wonder that agriculture is negligently and badly conducted, and yet we may well be surprised, that the country so managed should yield so considerable a produce; the bounty of nature supplying the work of skill in most of the provinces of middle and southern Russia. Moreover, in the provinces lying in the Baltic, in the White-Russian governments, in the Polish Ukraine, and even in proper Russia, on the estates of noblemen who carry on the farming business with some degree of care, much greater pains are bestowed, and in general more ingenious implements are used. It would lead us too far to give an account of the practice of husbandry either in the northern or southern provinces of Russia; yet, in spite of all the defects of Russian agriculture, its products are so numerous and important, that they not only supply the home consumption, but constitute by far the most considerable article of exportation. The corn most generally cultivated in Russia, and in those tracts of land that do not lie farther north than the 60th degree of latitude, is rye: wheat is more cultivated in the middle and southern governments; in the government of Ekaterinoslaf is cultivated the "Arnautan" wheat, which yields a yellowish flour, and which produces in good years 15 corns above the sowing. Turkish wheat, or maize, is raised on the confines of the Terek and in Taurida. Barley is also a considerable produce of governments in which wheat succeeds, and oats also are cultivated for the consumption of the people in meal for porridge.

Of the four kinds of corn now enumerated, Russia annually exports a considerable quantity, especially from the Livonian ports. The Livonian corn is said to keep longer than that of other countries, not to need such frequent turning, and likewise to yield more flour. In 1793 these exports amounted, in corn and meal, to the value in wheat, of 1,490,000; in rye, of 1,379,000; in barley, of 236,000; and in oats, of 17,000 rubles. The other corns cultivated for home consumption, but not for exportation, are millet, spelt or bear-barley, buck-wheat, manna, or festuca fluitans, growing almost every where in Russia, on meadow-grounds that are overflowed, particularly in the governments of Riga, Pscove, Polotsk, Novgorod, Tver, Smolensk, &c. and rice. Potatoes are cultivated only in a few governments, and chiefly among foreign colonists. Grasses, and fodder of all kinds, every where abound in the Russian empire; and vegetables, for the use of manufactures and commerce, are very abundant, such as hemp, of the produce of which the export, in 1793, amounted to upwards of 8,808,000 rubles; without including the hemp-oil. Flax of the best kind, and most in quantity, is cultivated in the governments of Vologda, Pscove, Novgorod, Riga, Mohilef, Tver, Polotsk, Viætka, the confines of the middle Volga, and in the parts about the Oka and Kama. Both the common and the Siberian flax are often found wild, the former in the steppes, about the northern Ural, the latter on the shores of the Volga, near Tzaritzin, and in other places. Among the plants growing wild, and yielding fibres like flax or hemp, is also the common and the Siberian stinging-nettle (urtica dioica and cannabina), which are found plentiful on the Uralian mountains.

mountains. The Baſchkirs, the Koibals, the Sagayan Tartars, &c. prepare yarn and weave linen of them. Of flax, in feeds and other products, excluſively of the oil, the exportation in 1793 amounted to 7,220,000 rubles. Cotton has hitherto been little cultivated; ſome attempts have been made about Aſtrachan and Kitzliar, on the Terek; but there are other climates and ſoils that would ſuit it. Some wild-growing ſilk-plants, yielding a material ſimilar to cotton, known among botaniſts by the name of "cynanchum acutum," and "apocynum maritimum," grow wild in the worſt ſoils, and might be cultivated and manufactured to advantage. There are alſo other plants of a ſimilar kind that might become objects of profitable attention. Ruſſia alſo furniſhes a variety of plants that would afford, if duly regarded, abundance of dyeing materials; ſuch as madder, which grows wild on the banks of the Oka, near Riazan and Arſamas, on the borders of the Volga, in the confines of Syſran and Saratof, and in great quantities, and of ſuperior quality, about the Samara, in Taurida, on the Terek, and in ſeveral diſtricts of the government of Caucaſus; woad (iſatis tinctoria), and a variety of it (iſatis luſitanica), which are ſeen wild in ſeveral of the ſouthern governments; ſaffron, which grows wild about the Terek, in the governments of Voronetch and Ekaterinoſlaf, in Taurida, and eſpecially in the Caucaſian mountains, around Moſdok; and ſafflower (carthamus tinctorius), which thrives perfectly well in the gardens at Toropetz, Moſcow, Tzaritzin, Poltava, and other places. Among the vegetables for fabrication and trade, we might enumerate hops and tobacco; the former grows wild in moſt diſtricts of Ruſſia and Siberia, and the latter is cultivated in the Malo-Ruſſian governments, and alſo about the Volga and the Samara, and particularly by the Coſſacks on the Orenburg and Siberian lines.

In 1793 the exportation from Ruſſia of hemp-oil and flax-oil exceeded in value 697,000 rubles.

Of medicinal plants of all kinds, Ruſſia poſſeſſes a great ſtore; ſuch are the rhubarb (rheum compactum), and the rhapontic, or Siberian rhubarb (rheum undulatum). Saſſafras (ſaxifraga craſſifolia) grows abundantly in the ſouthern and lofty ſnow-mountains of Kolyvan; and the polypodium fragrans, a beautiful and odoriferous fern, is gathered by the Buræts on the ſummits of rocks, and is taken as a wholeſome tea againſt ſcorbutic and colicky complaints. The culinary vegetables that are cultivated in Ruſſia are ſo numerous and various, that it is needleſs to mention them. Beſides thoſe ſhrubs and berries known to us, ſuch as raſpberries, currants, ſtrawberries, which grow in ſurpriſing quantities, gooſeberries, &c. Ruſſia produces in great abundance ſeveral which are here very rarely or never ſeen. Of theſe, for inſtance, are the berries called *pianitza*. In appearance they are much like the bilberry, but have a very different, exceedingly agreeable taſte, and intoxicate if taken in quantities. Hence it is they have their appellation, from *pian*, drunk. Muſhrooms are found in great plenty, and are very generally eaten, excepting the champignon, which, for what reaſon it is not eaſy to diſcover, is carefully avoided by the common people. Of the Ruſſian muſhrooms, the riſchicki or ritzgen are moſt famous. This ſort of muſhroom is likewiſe found in Courland and Pruſſia. Their name, riſchicki, is derived from their reddiſh-yellow hue; and they are eaten either raw, boiled or broiled, or pickled. We ſhall further ſelect ſome other vegetables that have engaged more than ordinary attention: ſuch are aſparagus, which in the government of Moſcow, and ſome others, is made an article of trade; ſuch are berries of various kinds, ſome of which are peculiar to the north of Ruſſia, as well as to the whole of Siberia; the hazle-buſh, found over all Ruſſia as far as the Kamma, and ſo plentiful in the regions between Simbirſk and Kazan, as to give riſe to a branch of conſiderable trade, as a great part of Ruſſia and all Siberia are hence ſupplied with a ſweet-meat in very general uſe, eaten in the faſts with nut-oil; ſugar-melons and water-melons, which thrive in the open air to the 52d degree of latitude; the common orchard fruits, which ſucceed every where in the middle and ſouthern parts of Ruſſia. Of all the ſpecies of fruit produced in the Ruſſian empire, apples and pears are the moſt abundant. All the villages on the Oka and Volga have their orchards, or more properly apple-gardens, ſo that many boors live here without huſbandry, merely by horticulture, in good circumſtances. Cherries are very frequently produced in orchards, but in Southern Ruſſia there are even whole foreſts of cherry-trees. Apricots and peaches ſucceed in moſt parts of Taurida and Caucaſus, and in the ſouthern circles of Kief, Ekaterinoſlaf, Voſneſenſk, and ſome other governments, without much attention. The quince-tree grows wild and plentifully in the foreſts about the Terek: cheſnut-trees are only found ſingly in Taurida, Kief, and Voronetch: walnut-trees are ſeen in moſt diſtricts of Southern Ruſſia, and in great abundance; but the almond-tree grows only in the provinces that lie moſt to the ſouth: figs and pomegranate-trees are ſeen ſingly near Kitzliar and in Taurida; but lemons and orange-trees are every where raiſed only in hot-houſes, though Pallas aſſures us, that they would very well bear the winter in Taurida with more attention. The culture of the vine is at preſent carried on in the governments of Caucaſus, Taurida, Ekaterinoſlaf, and Voſneſenſk, and the country of the Don Coſſacks. The whole region of the Ruſſian empire, from the ſouthernmoſt borders to the 48th degree of latitude, conſtitutes a ſuperficies of more than 12,000 ſquare geographical miles; but of this large tract, ſcarcely one-fourth part is proper for the culture of the vine.

The foreſts of Ruſſia amount to a ſuperfluous abundance in the governments of Archangel, Olonetz, Tobolſk, and Irkutſk: the governments of Perm, Kazan, Smolenſk, Mohilef, Minſk, Tchernigof, Voronetch, Ufa, Tula, Simbirſk, Orel, Kaluga, &c. are richly furniſhed with them, not only ſupplying moſt of the forges and metal founderies, but alſo ſending excellent ſhip-timber to the yards. Moſt of the other provinces have a ſufficiency for their own conſumption; but ſome few of the ſouthern governments, as Kief, Kharkof, Kurſk, Ekaterinoſlaf, and Taurida, are but ſcantily provided. Of trees, thoſe that have narrow-pointed leaves are chiefly indigenous in Northern Ruſſia, forming foreſts of prodigious extent, among which the fir, the pine, and the black pine, are the moſt common and moſt widely diffuſed. The Siberian cedar (pinus cembra) is found particularly in the Uralian mountains; the larch-tree grows in the north of European Ruſſia, and in moſt of the Siberian mountains. Among the umbrageous trees the birch is the moſt common, and its bark and wood are applied to various purpoſes. Next to the birch is the linden, from which Ruſſia derives great advantage. The oak is indigenous only in the European part: it is moſt frequently found in the governments of Kazan and Voronetch, where it is chiefly employed in ſhip-building; but alſo in Little and White Ruſſia it forms conſiderable foreſts. The aſh and the willow grow almoſt every where: but beech, elms, the maple, and the poplar, are chiefly the growth of the ſouthern regions. The foreſts ſupply an extraordinary number of products for home conſumption, and alſo very conſiderable articles of export. In 1793 the value of the latter in ſpecie amounted to upwards of $2\frac{1}{2}$ millions of rubles, when Ruſſia ſhipped off to the value of 1,744,000 rubles in maſts, balks, and deals; 394,000 in pot-aſhes and or batteries on wooden carriages. These are designed to keep the tributary tribes in awe, and the neighbouring Nomades from the borders. Ostrogs, or houses surrounded with a palisade of upright pointed bauks, are situated either in towns, where they serve as prisons for criminals, or solitarily, in various parts of the country, for the same purposes as the fortresses. The parishes, or church villages, are sometimes very extensive; containing 500 or even 1000 and more farms, and from three to seven churches, many of them brick buildings, markets, and trafficking places. Large villages are frequently called slobodes, but many slobodes are less than church villages; the houses are ranged in straight streets, and the streets mostly laid with timbers.

Of the nations, says Mr. Tooke, who have followed agriculture from time immemorial, though in various ways, and with different success, the principal are the Russians, the Poles, the Lithuanians, the Lettes, the Finns, and Esthonians. The state of agriculture in all countries must depend on the nature of the soil and climate, as well as on the industry of the inhabitants. With this view of Russia, the most northern and eastern districts of the empire, of the former, particularly in Siberia, are totally unfit for every kind of economical culture. The 60th degree of latitude may be regarded as the boundary beyond which no agriculture is practicable. The repeated attempts that have been made about Okhotsk (between 59° and 60° N. lat. and 160° E. long.), and Udskoy-ostrog (55° 20′ N. lat. and 150° 40′ E. long.), in the government of Irkutsk, shew, that the culture of corn will never be introduced to effect; and even in Kamtschatka, where the southernmost cape runs out to 51° N. lat. similar trials have been made with very poor and precarious effects. Admitting, therefore, the 60th degree of latitude to be the general boundary of the soil susceptible of culture to the north, we may infer, that the Russian empire contains about 162,000 square geographical miles of land totally unserviceable to the purposes of agriculture. Accordingly the circles in the governments of Olonetz and Archangel have no agriculture, and even in some districts of Vyborg, St. Petersburg, Novgorod, Vologda, Perm, and Viætka, it is attended with almost insuperable, or at least deterring difficulties. In some also of the southern districts of Caucasus, Saratof, Ufa, Kolyvan, Ekaterinoslaf, and Taurida, the soil is so poor, that the natural impediments can perhaps never be entirely surmounted. To the fertile regions belong most of the governments of the middle, and several of the northern tracts; but the best and most productive soils are chiefly found in Little Russia, Kazan, Simbirsk, Kharkof, Kursk, Orel, Nishnei-Novgorod, in the southern part of Taurida and Caucasus, in the newly-acquired portion of the Polish Ukraine, and particularly also in some of the Siberian provinces. The great fertility of the districts bordering on the Volga, the Kama, the Dnieper, the Terek, and the parts about the Euxine, has been long experienced. Moreover, in the territory of Krasnoiarsk, a circle-town of the government of Kolyvan, between the 55th and 56th degrees of N. lat., the fertility of the soil is such, that no instance has occurred of a general failure, and that it is a very ordinary harvest, when the summer rye yields 10-fold, the winter corn 8-fold, and the barley 12-fold. It is usual for the wheat only in bad years to yield the sixth grain, and the oats give an increase rarely short of 20-fold. In consequence of this exuberance, provisions are here in great plenty, and probably in no province of the empire at so low a price. When Pallas was at Krasnoiarsk, a pood of rye-meal sold for 2 or 3, and a pood of wheaten flour for 4½ or 5 kopeeks; a whole ox was bought for 1½ ruble, a cow for a ruble, and a good serviceable horse for 2 or 3 rubles at most; sheep and hogs fetched from 30 to 50 kopeeks a-piece. And though in 25 years that have elapsed since that period an alteration has taken place, yet this country is still one of the cheapest, as well as one of the richest and most plentiful of all.

The implements of husbandry, without which no great progress in the culture of the soil can be expected, are the most simple and artless that can be well imagined.

In such a state, and with such instruments, we need not wonder that agriculture is negligently and badly conducted, and yet we may well be surprised, that the country so managed should yield so considerable a produce; the bounty of nature supplying the work of skill in most of the provinces of middle and southern Russia. Moreover, in the provinces lying in the Baltic, in the White-Russian governments, in the Polish Ukraine, and even in proper Russia, on the estates of noblemen who carry on the farming business with some degree of care, much greater pains are bestowed, and in general more ingenious implements are used. It would lead us too far to give an account of the practice of husbandry either in the northern or southern provinces of Russia; yet, in spite of all the defects of Russian agriculture, its products are so numerous and important, that they not only supply the home consumption, but constitute by far the most considerable article of exportation. The corn most generally cultivated in Russia, and in those tracts of land that do not lie farther north than the 60th degree of latitude, is rye: wheat is more cultivated in the middle and southern governments; in the government of Ekaterinoslaf is cultivated the "Arnautan" wheat, which yields a yellowish flour, and which produces in good years 15 corns above the sowing. Turkish wheat, or maize, is raised on the confines of the Terek and in Taurida. Barley is also a considerable produce of governments in which wheat succeeds, and oats also are cultivated for the consumption of the people in meal for porridge.

Of the four kinds of corn now enumerated, Russia annually exports a considerable quantity, especially from the Livonian ports. The Livonian corn is said to keep longer than that of other countries, not to need such frequent turning, and likewise to yield more flour. In 1793 these exports amounted, in corn and meal, to the value in wheat, of 1,490,000; in rye, of 1,379,000; in barley, of 236,000; and in oats, of 17,000 rubles. The other corns cultivated for home consumption, but not for exportation, are millet, spelt or bear-barley, buck-wheat, manna, or festuca fluitans, growing almost every where in Russia, on meadow-grounds that are overflowed, particularly in the governments of Riga, Pscove, Polotsk, Novgorod, Tver, Smolensk, &c. and rice. Potatoes are cultivated only in a few governments, and chiefly among foreign colonists. Grasses, and fodder of all kinds, every where abound in the Russian empire; and vegetables, for the use of manufactures and commerce, are very abundant, such as hemp, of the produce of which the export, in 1793, amounted to upwards of 8,808,000 rubles; without including the hemp-oil. Flax of the best kind, and most in quantity, is cultivated in the governments of Vologda, Pscove, Novgorod, Riga, Mohilef, Tver, Polotsk, Viætka, the confines of the middle Volga, and in the parts about the Oka and Kama. Both the common and the Siberian flax are often found wild, the former in the steppes, about the northern Ural, the latter on the shores of the Volga, near Tzaritzin, and in other places. Among the plants growing wild, and yielding fibres like flax or hemp, is also the common and the Siberian stinging-nettle (urtica dioica and cannabina), which are found plentiful on the Uralian mountains.

mountains. The Bafchkirs, the Koibals, the Sagayan Tartars, &c. prepare yarn and weave linen of them. Of flax, in feeds and other products, exclufively of the oil, the exportation in 1793 amounted to 7,220,000 rubles. Cotton has hitherto been little cultivated; fome attempts have been made about Aftrachan and Kitzliar, on the Terek; but there are other climates and foils that would fuit it. Some wild-growing filk-plants, yielding a material fimilar to cotton, known among botanifts by the name of "cynanchum acutum," and "apocynum maritimum," grow wild in the worft foils, and might be cultivated and manufactured to advantage. There are alfo other plants of a fimilar kind that might become objects of profitable attention. Ruffia alfo furnifhes a variety of plants that would afford, if duly regarded, abundance of dyeing materials; fuch as madder, which grows wild on the banks of the Oka, near Riazan and Arfamas, on the borders of the Volga, in the confines of Syfran and Saratof, and in great quantities, and of fuperior quality, about the Samara, in Taurida, on the Terek, and in feveral diftricts of the government of Caucafus; woad (ifatis tinctoria), and a variety of it (ifatis lufitanica), which are feen wild in feveral of the fouthern governments; faffron, which grows wild about the Terek, in the governments of Voronetch and Ekaterinoflaf, in Taurida, and efpecially in the Caucafian mountains, around Mofdok; and fafflower (carthamus tinctorius), which thrives perfectly well in the gardens at Toropetz, Mofcow, Tzaritzin, Poltava, and other places. Among the vegetables for fabrication and trade, we might enumerate hops and tobacco; the former grows wild in moft diftricts of Ruffia and Siberia, and the latter is cultivated in the Malo-Ruffian governments, and alfo about the Volga and the Samara, and particularly by the Coffacks on the Orenburg and Siberian lines.

In 1793 the exportation from Ruffia of hemp-oil and flax-oil exceeded in value 697,000 rubles.

Of medicinal plants of all kinds, Ruffia poffeffes a great ftore; fuch are the rhubarb (rheum compactum), and the rhapontic, or Siberian rhubarb (rheum undulatum). Saffafras (faxifraga craffifolia) grows abundantly in the fouthern and lofty fnow-mountains of Kolyvan; and the polypodium fragrans, a beautiful and odoriferous fern, is gathered by the Buræts on the fummits of rocks, and is taken as a wholefome tea againft fcorbutic and colicky complaints. The culinary vegetables that are cultivated in Ruffia are fo numerous and various, that it is needlefs to mention them. Befides thofe fhrubs and berries known to us, fuch as rafpberries, currants, ftrawberries, which grow in furprifing quantities, goofeberries, &c. Ruffia produces in great abundance feveral which are here very rarely or never feen. Of thefe, for inftance, are the berries called *pianitza*. In appearance they are much like the bilberry, but have a very different, exceedingly agreeable tafte, and intoxicate if taken in quantities. Hence it is they have their appellation, from *pian*, drunk. Mufhrooms are found in great plenty, and are very generally eaten, excepting the champignon, which, for what reafon it is not eafy to difcover, is carefully avoided by the common people. Of the Ruffian mufhrooms, the rifchicki or ritzgen are moft famous. This fort of mufhroom is likewife found in Courland and Pruffia. Their name, rifchicki, is derived from their reddifh-yellow hue; and they are eaten either raw, boiled or broiled, or pickled. We fhall further felect fome other vegetables that have engaged more than ordinary attention: fuch are afparagus, which in the government of Mofcow, and fome others, is made an article of trade; fuch are berries of various kinds, fome of which are peculiar to the north of Ruffia, as well as to the whole of Siberia; the hazle-bufh, found over all Ruffia as far as the Kamma, and fo plentiful in the regions between Simbirfk and Kazan, as to give rife to a branch of confiderable trade, as a great part of Ruffia and all Siberia are hence fupplied with a fweet-meat in very general ufe, eaten in the fafts with nut-oil; fugar-melons and water-melons, which thrive in the open air to the 52d degree of latitude; the common orchard fruits, which fucceed every where in the middle and fouthern parts of Ruffia. Of all the fpecies of fruit produced in the Ruffian empire, apples and pears are the moft abundant. All the villages on the Oka and Volga have their orchards, or more properly apple-gardens, fo that many boors live here without hufbandry, merely by horticulture, in good circumftances. Cherries are very frequently produced in orchards, but in Southern Ruffia there are even whole forefts of cherry-trees. Apricots and peaches fucceed in moft parts of Taurida and Caucafus, and in the fouthern circles of Kief, Ekaterinoflaf, Vofnefenfk, and fome other governments, without much attention. The quince-tree grows wild and plentifully in the forefts about the Terek: chefnut-trees are only found fingly in Taurida, Kief, and Voronetch: walnut-trees are feen in moft diftricts of Southern Ruffia, and in great abundance; but the almond-tree grows only in the provinces that lie moft to the fouth: figs and pomegranate-trees are feen fingly near Kitzliar and in Taurida; but lemons and orange-trees are every where raifed only in hot-houfes, though Pallas affures us, that they would very well bear the winter in Taurida with more attention. The culture of the vine is at prefent carried on in the governments of Caucafus, Taurida, Ekaterinoflaf, and Vofnefenfk, and the country of the Don Coffacks. The whole region of the Ruffian empire, from the fouthernmoft borders to the 48th degree of latitude, conftitutes a fuperficies of more than 12,000 fquare geographical miles; but of this large tract, fcarcely one-fourth part is proper for the culture of the vine.

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barilla; 249,000 rubles in mats, and 150,000 rubles in pitch, tar, and resin.

The Russian woods consist of limes, firs, pines, birch and larch-trees (larix), to which may be added some cedars. The beech and the oak are rarely seen, excepting in Kazan, where the oaks appear pretty plentifully. For ship-building the larch-tree is generally used, though some vessels are constructed of oak, which is brought at an almost incredible expence from the territory of Kazan to the yard of St. Petersburg. The larch, which in other countries is classed among the evergreens, is deciduous in Siberia. Besides the astonishing quantity of wood that is consumed as fuel, Russia has ample supplies of timber for construction. For, throughout the whole empire, excepting St. Petersburg, and a very few other places, the houses and churches are almost all of timber. And even at St. Petersburg great numbers of them are still seen, though, in pursuance of an express imperial edict, no new ones are to be built. These timber houses are extremely well adapted to the Russian climate, as being much warmer than those constructed of brick and stone. Both in towns and villages the same mode of building is uniformly practised. One balk is laid upon another to the height intended. The roof is formed either of boards or oak shingles; and the interstices between the balks are crammed with moss. The Russian carpenters, in the whole construction of a house, employ no other tool than an axe, and a sharp circular iron, with which they shave off the bark from the timber. With the axe alone they carve the ornamental comb or crest (*greben*), which is frequently wrought with exquisite ingenuity, and carried along the ridge of the roof. It appears strange to the foreigner that they never work without gloves, yet always, even in winter, go bareheaded. The generality of houses are only of one story; if they have another, as is occasionally seen in towns, the staircase is usually run up on the outside. In the houses of the boors, as well as those of the citizens, unless they are in good circumstances, are square holes instead of windows, provided with a wooden shutter. Sometimes these apertures are furnished with a hog's bladder, through which the light enters. Only boors of property have windows of isinglass. The boors' houses regularly consist of one room; which is at the same time kitchen, cellar, hog-stye, and the habitation of the whole family; together with the tutelary saints, who have their tabernacle in one corner of the upper part of the apartment, commonly however so encrusted with smoke as hardly to be cognizable. The boor, with all his inmates, customarily during the winter lodges on the shelves fastened to the walls about the stove which heats his room, and which serves also as an oven for dressing his victuals. Here they constantly sleep, winter and summer, without beds or other accommodations. In all the boor-houses the door of the room is uncommonly low. On account of the abundance of timber, and the cheapness of provisions, and consequently the moderate price of labour, building in Russia is not expensive. For five hundred rubles the burgher builds himself a house of five rooms, with an ice-cellar, stable, a bathing-room, and the necessary offices. The burgher-houses have withinside a somewhat better appearance than the houses of the boors; the walls within, and frequently without, being chipped smooth and whitened over with a sort of wash used for smearing their stoves, and which dries much faster than mortar. Houses in Russia are reckoned among the moveables, and in every town there is a house-market, where a man bargains for a house, packs it upon sledges, and sets it up wherever he chuses. Such a house will last thirty years, and often longer. Convenient, however, as these timber edifices are in several respects, they are hazardous in another point of view; since they may be considered as the occasion of such frequent conflagrations as happen in no other country; for, notwithstanding that in towns the houses stand pretty distant from each other, yet there never passes a year in which a very considerable number is not a prey to the flames. This is the less surprising on being informed that the common people generally stick a fir lath (luchine) into the wall, lighted at the projecting extremity, as a substitute for a candle, and that the precautions against fires, in the Russian provinces, are none of the best. Mr. Tooke says, that he has himself seen, more than once, in a provincial town, on a calm day at high noon, above 130, and at one time, upwards of 200 houses on fire. The number would certainly have been much smaller, if the houses had not been of wood, and proper precautions had been taken.

Besides the important advantages that Russia obtains from its wood, in regard of fuel and building, this product is profitable in several other ways, particularly in the preparation of potash. The rind of the numerous lindens that grow in the districts of Kazan and Astrachan is usefully employed in the manufacture of basket-work of all kinds; of which, as well as of masts and deals, Russia annually exports to a great amount.

As the mines constitute an object of great importance in the Russian empire, we shall here subjoin, from the work cited at the close of this article, an abridged account of them. The largest works of this kind are at present carried on in the Uralian, the Altayan, and Nertschinskian mineral mountains; the iron and copper mines of Olonetz, and those in several other parts of the empire, being of comparatively less importance. In the Uralian mountains are gold, iron, and copper mines, which latter are some of the most important in the empire. The Altayan mountains contain the richest gold and silver shafts, also veins of lead, copper, and iron, impregnated with gold and silver. But in the Nertschinskian mountains are very rich mines of lead, containing gold and silver. The discovery of these shafts, as well as the origin of the proper mine-working in Russia, is of no older date than the beginning of the last century. The art of mining, which had its rise in the reign of Peter the Great, was protected and encouraged in the year 1716 by a manifesto; and in 1719 he instituted the college of mines. In the reign of the empress Anna, and under the empress Elizabeth, the Russian mines acquired increasing importance and value; but their most brilliant era was the reign of Catharine II. The gold mines belonging to the Russian empire are properly two; *viz.* that of Beresof near Ekaterinenburg, on the Ural, which is by far the most material, and the Voytzer gold mines in the mountains of Olonetz. The most important silver mines are those of Kolyvan, in the mineral mountains of Altay. The silver, or rather the auriferous and argentiferous lead mines of Nertschinsk, have been wrought ever since the discovery of them in 1704.

From statements, which we cannot here detail, it appears that in the interval between 1704 and 1788, there were gained at all the gold and silver mines about 1000 pood of gold, and about 36,000 pood of silver, amounting together in value to upwards of 45,000,000 of rubles, on which the expences were not more than 15,000,000 of rubles.

The most important copper mines are principally in the Uralian, Altayan, and Olonetzian mountains. The entire annual amount of the copper obtained from them is about 200,000 pood; the value of which in money, reckoning the pood only at 10 rubles, makes a sum of 2,000,000 of rubles.

The iron mines form, next to the salt-works, the greatest portion

portion of all Ruſſia's mineral wealth: the moſt numerous and rich of theſe are found in the Uralian mountains; and beſides theſe there are two ſmelting-houſes in the Altayan and Sayane mountains, and ſeveral in the governments of Olonetz, Vologda, Niſhnei-Novgorod, Koſtroma, Kurſk, Tula, Tambof, &c. We may allow for the whole empire about 100 forges, and 800 hammers. In the whole empire about 5,000,000 pood of iron are annually produced, which in ſpecie amounts at leaſt to 4,500,000 of rubles.

By the preſent conſtitution, the mines belong either to the crown, to public inſtitutions, or to private individuals. The firſt poſſeſſes all the before-mentioned gold and ſilver mines: the ſhare it has in the copper and iron mines is not accurately aſcertained, but, according to authentic ſtatements, concluded to be about $\frac{1}{6}$th of the former, and $\frac{1}{8}$th part of the latter. The crown mines, which were formerly under the ſuperintendance of the mine college, have, ſince the abolition of that college in 1784, belonged either to the cabinet or to the ſenate. The gold and ſilver mines of Kolyvan and Nertſchinſk are under the direction of the former, and the reſt of the crown mines are dependant on the ſenate. The only public inſtitution hitherto in poſſeſſion of mines is the "Imperial Aſſignation Bank," which purchaſed the copper and iron works in the government of Perm. The private mines have received ſo many grants by law, that it is not eaſy to aſſign to individuals their reſpective rights and immunities. The private owners of mines are moſtly nobles, but ſome are burghers and merchants. The works at the mines of the crown, as well as thoſe belonging to private perſons, are partly carried on by maſter-workmen, partly by inrolled boors, partly by vaſſals, and partly alſo by free workmen. From theſe mines Ruſſia obtains annually of gold about 40, and of ſilver about 1300 pood, amounting, according to the prices in 1789, to the value of 1,729,000 rubles. Theſe metals are brought to St. Peterſburg, and there moſtly coined, having been previouſly ſeparated at the imperial office for that purpoſe, and brought to the perfect ſtandard. Of copper are annually gained about 200,000 pood, eſtimated in value at about 2,000,000 of rubles. The copper which the crown receives from its mines, as well as from the taxes of private proprietors, is wholly coined. The export of this metal is inconſiderable; as in 1793 it amounted, from all the ſea-ports of the empire, only to 187 pood, equal in value to 2910 rubles. Of iron, about 5,000,000 of pood are obtained, the value of which, on account of the fluctuating price, cannot be accurately aſcertained. Ruſſia exports every year ſo great a quantity of this metal, that, next to hemp, it forms the moſt important article of exportation. In 1793 the export in bar and ſort-iron, as well as in caſt-iron goods, amounted to 3,033,249 pood, or in value of money by the cuſtom-houſe books, to 5,204,125 rubles. Lead is found in all the mines, particularly in thoſe of the Nertſchinſk and the Altay; but Ruſſia deriving little advantage from it, imported in 1793 at the port of St. Peterſburg 36,000 pood, valued at 125,000 rubles. Tin has not as yet been diſcovered, nor have the ſemi-metals in general been produced. Ruſſia has ample ſtores of noble, precious, and durable kinds of ſtone, which we ſhall not now record. Turf and coals are found in ſome parts, the argillaceous earths in great quantities, ſulphur ſufficient to prevent the neceſſity of importation, of ſalts ineſtimable ſtores, and of curious petrifactions and mineral waters, Ruſſia has a ſufficient quantity.

The ſalt-works of Ruſſia are numerous, rich, and productive. The ſalt is obtained partly from ſalt-mines, partly from ſalt-lakes, in which it cryſtallizes ſpontaneouſly, and partly from ſalt-ſprings, by boiling the brine, and evaporation. But notwithſtanding its inexhauſtible ſources of ſalt, Ruſſia has not ſufficient for the ſupply of all the provinces without importation. According to the facts above tranſiently ſtated, it may be admitted that there is produced annually in the Ruſſian empire, of gold about 40 pood, of ſilver 1300, of lead 30,000, of copper 200,000, of iron 5,000,000, and of ſalt 12,000,000; the value of all which in money may be eſtimated, by the moſt moderate computation, at 13,000,000 rubles; and if we allow for the advance in the price of mineral products ſince 1788, and conſider their preſent value, the ſaid ſum may be fixed, without exaggeration, at 15,000,000 rubles. According to the liſts of exports in 1793, the total capital with which the productive induſtry of the Ruſſian empire enriched it in that year amounted to 30,823,000 rubles; and this, it is ſaid, is rated too low.

Manufactures and Trade of the Ruſſian Empire.—Manufactories of wool, cotton, ſilk, flax, metals, &c. paper-mills, wax-bleacheries, ſalt-petre and glaſs-houſes, tapeſtry and porcelain fabrics, with many ſimilar eſtabliſhments, belonging partly to the crown and partly to individuals, and eſpecially the working of mines, employ an immenſe number of people, as well artiſts as tradeſmen, both in town and country. Oils of various kinds, iſinglaſs, cavear, ſoap, tallow-candles, beer and other liquors, brandy and ſpirits, vinegar, aqua-fortis and aqua-regia, potaſh, ſalt-petre, alum, vitriol, bitter ſalt, ſugar, colours for dye-houſes, dyeing, tobacco, paper, paper-hanging, play-cards, printing, ſail-cloth and cordage, linen, cotton, ſilk, gold and ſilver lace, cloth and ſtuff, carpet, hat, Ruſſia leather, or red and black yufts, which for colour, ſmell, and ſoftneſs, cannot be equalled in any other part of the world, (ſee YUFTS,) ſhagreen, wax, cabinet and coach-making, glaſs, plate-glaſs, ſtone-cutting, earthenware and porcelain, feathers, pitch-drawing, charcoal, ſulphur, powder, iron in various ways, and for various purpoſes, copper and braſs, cannon, gold and ſilver, clocks, mammots' bones, the beſt of which are found about the rivers Katanga and Indighirka, &c. &c. are the ſubjects of manufacture, and of the operation of artiſts in the Ruſſian empire. Siberia produces alſo a foſſil which has the properties of aſbeſtus. It is ſoaked, like hemp, in water, the threads are then drawn out, of which a linen is made which reſiſts the action of fire.

The commerce of Ruſſia is naturally divided into foreign and domeſtic: and theſe again into the maritime commerce on the Baltic and the White ſea, on the Euxine and the Caſpian; and the commerce by land with Poland, &c. with Perſia, with the Kirghiſes, and with China. The inland commerce is ſmall, and is moſtly conducted by ſhop-keepers and monopolizers; and the chief tranſport of goods by land is by caravans. The petty merchants carry on their trade by travelling from place to place about the country, and this kind of traffic ſupports and even enriches many families. Formerly all traffic was confined to the annual fairs; but for a long time every city and town, and many villages, have a regular market, beſides the annual fairs. Until about the cloſe of the 15th century, the foreign commerce was trifling, and almoſt wholly confined to Novgorod. But ſince the time of Peter the Great, commerce has revived. With the merchants of Ruſſia it is a general practice to be paid half the price before-hand of the inland commodities which they buy up and deliver to foreigners, according to contract, for exportation; but to take foreign goods upon a year's credit. The moſt conſiderable maritime commerce is at St. Peterſburg and Riga, by way of the Baltic at Archangel, on the Northern ocean, &c., at Taganrok on the Euxine, at Aſtrachan on the Caſpian, and at Kamtſchatka on the Eaſtern ocean. The principal ſeats of the foreign commerce by land are the Ukraine, whence the

Ruſſian merchants viſit the markets of Poland, and the fairs of Germany; Orenburg, where a conſiderable trade is carried on with ſeveral Aſiatic nations; and Kiachta in Daouria, where a great mercantile intercourſe is held with China.

Hermann ſtates the Ruſſian commerce, in all the ports, which may generally be termed the Baltic trade, as amounting, in 1790, to a ſum of 35,750,000 rubles, of which the exports make 21,200,000, and the imports 14,550,000 rubles. From all the ports belonging to Ruſſia in the Euxine or Black ſea, the exportation is reckoned at about one million, and the importation at one million and a quarter. The principal articles that find a vent here are, cannon, furs, ſalted beef, butter, cordage, ſail-cloth, caviar, corn, and a variety of Ruſſian manufactures, eſpecially iron, linen, cotton ſtuffs, &c. The imports are, wine, fruit, coffee, ſilks, rice, and all kinds of Turkiſh commodities. The exports over the Caſpian are ſtated to be about 1,200,000, and the imports 1,000,000 rubles. The articles of exportation are nearly the ſame with thoſe that find purchaſers on the Euxine, and in return ſcarcely any thing is taken but ſilk. See CASPIAN.

The commerce by land with the Poles, Pruſſians, &c. is conſiderable. From theſe countries Ruſſia takes commodities for about 2,000,000 of rubles, and carries to them for ſcarcely 500,000. The principal objects of importation are ſcythes, cloths, linens, hemp, flax, &c. the two laſt of which products are ſent off again from Riga. The commerce by land with Perſia paſſes over Kitzliar and Moſdok, and Ruſſia receives principally, by the ſame courſe, ſilk. The exports amount to about 100,000, and the imports to 200,000 rubles. The commerce with the Kirghiſes is moſtly carried on in the way of barter, and chiefly in the Siberian fortreſſes of Orenburg, Troitzk, Peterpavlovſk, Yamiſheva, Semipalat, and Uſtkamenogorſk. Goods to about 1,500,000 of rubles are exported, and imported to the ſame amount. The Kirghiſes bring principally horſes, horn-cattle, ſheep, and very coſtly ſheep-ſkins, receiving in return from Ruſſia woollen cloths, iron, and a great quantity of houſehold goods and other European commodities. The Chineſe commerce is merely a barter, but very conſiderable. Ruſſia, it is ſaid, has of late years received thence articles for 2,000,000 of rubles, and returned them for nearly as much. The chief articles that come to Ruſſia from China are, tea, ſilk, and kitaika (nankeen), and of thoſe that are carried thither, the valuable Siberian furs. The total aggregate of the commerce of Ruſſia by land is ſtated at near 9,800,000 rubles, which gives a balance of about 1,600,000 rubles againſt the empire.

In 1790 the trade of Peterſburg and Riga amounted to as much as the trade of the whole empire in the year 1762, which was then more than twice as much. According to Hermann, the aggregate of the commerce of the empire then amounted to about 50,000,000 of rubles, by which Ruſſia gained near 5,000,000 annually. The returns thus made by the Ruſſian ſubjects, reckoning exports and imports together, amounted to 15,000,000, among which thoſe commodities are to be underſtood, which are imported and exported in ſhips either built or bought in Ruſſia. The ſubjects have accordingly a ſhare of nearly one-third. The total of the imports and exports of Kiachta may be fairly ſtated at 4,000,000 of rubles.

In an empire that has 30,000,000 of inhabitants, the *internal* trade muſt be much more important and valuable than the external commerce. The Siberian commerce, that is, the commerce of the governments of Irkutſk, Kolyvan, Toboſk, Perm, and Ufa, is of great conſequence. All the products of theſe parts, not conſumed in the country, or not diſpoſed of to China, or to the Kirghiſes, go by the interior diſtricts and ports of Ruſſia. The major part at leaſt of the heavy commodities is brought almoſt entirely from the eaſtern regions of Siberia to St. Peterſburg. Moſt of the return or barter of European commodities againſt Siberian furs, and againſt Chineſe commodities, is carried on in the town of Irbit, in the government of Perm, where a famous fair is held in the months of January and February. The products carried every year from Siberia to Ruſſia are eſtimated at 12,000,000 of rubles, which are thus drawn annually by Ruſſia from Siberia; ſo that Siberia has not unjuſtly been called the Ruſſian Peru. The interior commerce of the Ruſſian provinces with one another, and their traffic in the ports and frontier places of the empire, are of ſtill greater importance. This kind of lucrative intercourſe is facilitated by the many large rivers with which the whole empire abounds. Several conſiderable fairs that are held in various towns and cities of the empire, contribute in a very great degree to aid the proſecution of traffic. The moſt conſiderable of theſe fairs is that at Makarief, a monaſtery and city in the government of Niſhnei-Novgorod, at which the Siberian and Ruſſian merchants aſſemble from all parts of the country. Among the trading cities of greateſt note, the principal are St. Peterſburg, Riga, and Moſcow. The latter is the central point at which all the affairs of the interior commerce of the empire flow together and unite, and it contains a numerous and opulent body of mercantile men. Mr. Tooke eſtimates the aggregate national wealth of Ruſſia in the following manner: 30,000,000 of inhabitants of both ſexes, making about 6,000,000 of families, each family conſiſting of five perſons, conſume monthly at leaſt 48,000,000, in the whole therefore 576,000,000 of poods of all kinds of meal, grits, &c. each pood, on an average, at 25 kopeeks, makes a ſum of

	Rubles.
	144,000,000
Conſumption of brandy, 5,000,000 of eymers, each at 3 rubles - - - - -	15,000,000
Salt, 12,000,000 of poods, at 35 kopeeks -	4,200,000
Gold, ſilver, lead, copper, iron, &c. - -	8,750,000
Fine and coarſe furs - - - - -	5,000,000
Hemp, flax, tobacco, linens, hemp-oil, linſeed-oil, &c. - - - - - -	30,000,000
Fire-wood, timber, charcoal, ſhip-timber, tar, pitch, &c. - - - - - -	20,000,000
Cattle, leather, wool, milk, pulſe, garden vegetables, &c. - - - - -	58,050,000
Product of the fiſheries - - - -	15,000,000
Total -	300,000,000

Of this capital, there comes to the annual ſhare of each individual 10 rubles.

By commerce, the annual exports of this capital are,

	Rubles.
In metal wares about - - - - -	3,000,000
In hemp, flax, and articles prepared from them - - - - - - -	10,000,000
In leather, tallow, furs, and all other products from the animal kingdom - - -	8,000,000
In corn, wood, and other petty articles -	4,500,000
Total -	25,500,000
To this add the tranſport at - - -	2,000,000
which together make out - - -	27,500,000

The

The quantity of money circulating in the empire in 1788, is ftated as follows:

	Rubles.
In gold and filver coin - - - - -	76,000,000
Copper coin - - - - - - -	54,000,000
Paper money - - - - - -	100,000,000
Total -	230,000,000

Add together this fum, and the progreffive value of the product, and there appears an annual political revenue of 530,000,000, or, to confine ourfelves to the loweft, of at leaft 500,000,000 of rubles. The quantity of fpecie, from the above-mentioned period, is faid to be every year increafed:

	Rubles.
By money ftruck of Siberian gold and filver, about - - - - - - -	1,700,000
By foreign coinage of various forts - -	1,300,000
By copper money - - - - - -	2,000,000
Total -	5,000,000

Forces of the Ruffian Empire.—The Ruffian army confifts partly of regular infantry and cavalry, and partly of irregular troops. To the latter clafs belong the Kozaks or Coffacks, who anfwer all the purpofes of regular huffars, and have acquired great military reputation. The moft ferviceable of this clafs of warriors are divided into thofe of Ekaterinoflaf and thofe of the Euxine. It is impoffible, from any documents before us, to afcertain the precife number of the Ruffian military; but from a ftatement given by Mr. Tooke from the college of war in the year 1791, they amounted to about 600,000 men, of whom might be reckoned at leaft 500,000 effective foldiers in actual fervice. Some authors have degraded the value of the Ruffian foldiers, but from fome late memorable exploits their character muft have rifen in general eftimation. A circumftance that diftinguifhes them is the fmall pay, on which they are able to fubfift. Frederic II. pronounced them to be excellent foldiers. Accordingly it is faid, that the Ruffian foldiers will not fall back one ftep, while his commander bravely keeps his ground; he contents himfelf with an extremely little pay, and with very flender diet, and is always cheerful; hungry and thirfty he traverfes the heavy fands of the defarts under the load of his accoutrements, without murmur or complaint; executes every command; reckons nothing impoffible or too difficult; does every thing that he is ordered to do without fhunning any danger; and is inventive of a thoufand means for accomplifhing his defign. What may not be performed with fuch an army when led on by experienced and valiant generals, in whom they have confidence. Let the foldier but fee that he is fpared as much as poffible, he attaches himfelf with all his foul to his commander, and performs almoft miracles. Well might the emprefs denominate the Ruffians an obedient, brave, intrepid, enterprifing, and powerful people.

In general, it may be affirmed, that no army in Europe cofts fo little as the Ruffian, and that no foldiers in Europe can fubfift on fo little pay as the Ruffian. For, what other European foldiers will fubfift on an annual pay not amounting to more than feven or eight rubles, or, when in garrifon, only half that fum, and the allowance of grits and flour weighed out to him with the utmoft nicety?

Concerning the pay of the officers, &c. it muft be obferved, that the officers of the garrifon regiments in the towns of the Baltic, have double the pay of other garrifon regiments; that the officers of all marching regiments have three times the pay of the officers of the regiments in the provinces; and that the private men in the guards have double the pay of thofe in the marching regiments. A general field-marfhal is allowed, *per annum*, 7000 rubles, 200 rations, valued at 1140 rubles, and 16 denfhiks or fervants.

	Rubles.	Rations.		Rubles.	Denfh.
A general in chief	3600	80	=	456	12
A lieutenant-general	2160	50	=	285	10
A major-general	1800	40	=	228	8
A brigadier -	840	20	=	171	7

In the marching regiments a colonel is allowed yearly 600 rubles, for rations 96 rubles 90 kopeeks, and 6 denfhiks or fervants.

	Rubles.		Rub.	Kop.	Denfh.
A lieutenant-colonel	360	For rations	62	70	4
A major - -	300	——	62	70	3
A captain - -	180	——	28	50	2
A lieutenant -	120	——	22	80	1
A fecond lieutenant	84	——	17	10	1
An enfign - -	84	——	17	10	1
A quarter-mafter of a regiment	84	——	22	80	1
An adjutant -	120	——	22	80	1

A private man is allowed yearly 10 rubles 98 kopeeks, befides three barrels of meal, a certain quantity of grift or coarfe oatmeal, 24 pounds of falt, and flefh to the value of 72 kopeeks, all which articles are computed at 5 rubles 74 kopeeks. But 6 rubles 35 kopeeks are deducted from the pay of every private man for clothing, medicines, flefh, cartridges, and repairing of fire-locks. His whole clothing from head to foot cofts near 12 rubles.

The navy of Ruffia confifts of two fleets, diftinct from each other. The creator of the Ruffian fleet was the emperor Peter I. Before his reign armed veffels, much lefs fhips of war, were not known in Ruffia; but in confequence of travelling into foreign countries, for the fake of informing himfelf concerning the beft method of building fhips, and with a view of introducing it into his empire, he raifed a maritime force, and caufed a fet of regulations to be printed for the eftablifhment of a navy. The admiralty is at Peterfburg, with a high admiral at the head of it. According to the regulation of Peter I., the high admiral has the rank and pay of a general field-marfhal in the army; an admiral thofe of a general-in-chief; a vice-admiral thofe of a lieutenant-general; and a contre-admiral thofe of a major-general. The captains in the navy were divided by Peter I. into three claffes. At prefent, the captain-commander has the rank of a brigadier in the army; the captain of the firft clafs the rank of a colonel, and the captain of the fecond clafs that of a lieutenant-colonel; the captain-lieutenant that of a premier-major; the lieutenant that of a captain in the army, and the midfhipman that of a lieutenant. The pay of the high admiral *per annum* is 7000 rubles; that of an admiral, 3600; of a vice-admiral, 2160; of a contre-admiral, 1800; of a captain-commander, 840; of a lieutenant 200, and of a midfhipman 120 rubles. Officers are allowed denfhiks or fervants, *viz.* a lieutenant two, and the reft in proportion. When they are at fea, the officers are allowed table-money, *viz.* in the Baltic, each officer monthly has feven rubles, and the captain fomewhat more. On long voyages this allowance is increafed. The failors are divided into two claffes: to the firft belong the experienced, at 18 rubles *per annum* each; but thofe of the fecond clafs have only 12. Moreover, they are fed while at

fea;

sea; but when on shore, each receives his ordinary provision, as in the land service. To a ship of 100 guns the crew is usually reckoned at 1000 men.

Russia had formerly no more than two dock-yards, those of Petersburg and Archangel, to which have been added those of Kherson, Cronstadt, and Taurida. At Petersburg and Cronstadt the men of war are constructed of oak, transported thither at a great expence from Kazan. At Archangel the ships are built of the wood of the larch-tree.

Revenues of the Russian Empire.—Mr. Coxe estimates the national revenue of Russia at 41,830,910 rubles, which is below the just amount. Mr. Tooke professes to give a more accurate statement: and he begins with enumerating the sources from which the national revenue is derived. The *first* of these sources is the "head-money," paid only by male heads, including babes and old men, and supposing 12,000,000 of taxable persons, and averaging them at 72 kopeeks each, the amount will be very considerable. The *second* source is the "tax upon the capital of merchants," or, as it is sometimes called, the *per centage*. Every one pays yearly one *per cent.*, in return for which he and his children are exempt from the poll-tax. The *third* source of revenue is the "domain lands," the income of which is very various. 4. The "sea-duties," which are liable to great fluctuations. 5. The "land-tolls." 6. The duties on "law-proceedings," commonly called "poschlin," to which may be referred the passport money. 7. "Stamped-paper," which brings in a considerable sum *per annum*. 8. The duty on the "sale of immoveable property," including not only houses and lands but also vassals; fixed by the late empress in 1787 at five *per cent.* 9. The "kabaks," or tipling-houses, or the sale of corn spirits. 10. The "salt-trade." 11. The "mines." 12. The "mint." 13. "Natural products." 14. The share of "excise and recognition duties" in towns. 15. The "posts." 16. All kinds of "rent" for places, shops, mills, parcels of ground, bee-hives in forests, bathing-houses, fisheries, public inns, &c. 17. "Recruit money" from merchants, from which foreign merchants are exempt. 18. Various "pecuniary penalties." The amount of the receipts from the several towns is upwards of 46,000,000 of rubles, which it has been thought may be rated at 48,000,000.

Coins, Measures, and Weights of the Russian Empire.—We are informed by Mr. Tooke (ubi infra), that previous to the 10th century neither foreign nor domestic coin was known in Russia; but that instead of it, small pieces of marten and squirrel skins, stamped, were the only currency. From that period frequent mention is made in the chronicles of Grecian and other sorts of money. It is said by some persons, that the first coins were introduced by the Tartars into Russia, and that the Russian word for money, "denghi," is derived from the Tartarian term "tanga," which signifies a token; but, when coins were impressed with the arms of Moscow, *viz.* a St. George and his spear, the name "kopeeka" arose from kopæ, or kopeitzo, a spear. Towards the middle of the 16th century, though coins had been struck in several places before, the tzar Ivan Vassillievitch instituted the first regular coinage, set up a mint at Moscow, and caused three rubles to be struck out of one "grivenka," denoting probably a certain weight of silver. However, at this time, and long afterwards, the ruble was only an imaginary coin. The first actual rubles were struck during the reign of tzar Alexey Mikhailovitch, in the year 1654, though history makes mention of the ruble about the year 1317. The first ruble of 1654 is still extant, and it is easily discernible to have been previously a Spanish cross-dollar; Russian rubles having been recoined from dollars. A foreign dollar then passed for 50 kopeeks. But afterwards, in consequence of the war with Poland, the coin suffered a diminution; and for some time, kopeeks and altines were struck of copper. The intrinsic value, however, of the ruble remained unaltered at 100 kopeeks. Various alterations were made in the coinage by Peter I. By an edict of 1724, he ordered that no more silver kopeeks should be coined, and in lieu of them he caused to be struck one and two-kopeek pieces of copper, having on one side the St. George, and on the other within the initial of the emperor's name П, the value of the coin. All mints were abolished except those at Moscow; and in process of time a mint was set up at St. Petersburg, which is at present the only one where gold and silver coins are struck. Although the mint of Moscow still exists, it is confined to the coinage of copper money. At this time Russia has one mint for silver and six for copper coin.

After the battle of Pultava, Peter caused to be coined pieces called sun-rubles, now very scarce, having on the reverse a sun in the centre, and in the area the initial in Russ П. Besides the ruble, there were coined at the same time half and quarter-rubles (poltiniki and polpoltiniki, or poltins and polpoltins), bearing his likeness and the imperial eagle. The grieven, or tenth part of a ruble, had 10 dots, with the inscription "Grievenik" on one side, and the eagle on the other. The altins, or three kopeeks (copecks), had on one side the eagle, and on the other the date of the year and the word "Altinik." These were all the silver coins under Peter I. The empress Elizabeth for a short time caused five-kopeek pieces to be coined, which have long since ceased. The gold coins in Russia have been always struck in larger sorts than those of silver. Nevertheless most of the gold coins, of ancient times, still subsisting, consist of very small sorts. There are some that are called "golden kopeeks." A Russian ducat was formerly equal to two rubles silver, whence probably arose the denomination of golden ruble, as well as the quarter-ruble, now shewn as curiosities. Under Peter I. the gold coins were either two-ruble pieces, with the apostle Andrew on the reverse, which are very rare; or ducats with a Latin inscription. On one side is the bust of Peter with a crown of laurels, on the other the Russian imperial eagle, with the St. George on its breast. Both sides have round them "Petrus Alexii I. D. G. Russ. Imp. M. Dux Moscoviæ 1716." The empress Elizabeth first caused imperials, half-imperials, golden rubles, and half-rubles, to be struck. At the accession of Peter I. the copper coins were half-kopeeks (denuschka or denga), kopeeks, and five-kopeek pieces. On the first, stands on one side "Denga," and on the other 1706. The kopeeks have on one side the St. George, and on the other "Kopeika." The five-kopeek pieces have undergone several alterations. The copper five-kopeek pieces that had been struck by Elizabeth were fixed by Peter III. at 10, but Catharine II. reduced them again to five kopeeks. For the accommodation of the provinces of Esthonia and Livonia, the empress Elizabeth, in 1757, caused to be struck the livoneses of whole, half, and quarter pieces; the whole piece being in value 96 kopeeks; but the coinage of these soon ceased.

In Russia, accounts are kept in rubles of 100 kopeeks or copecks. The ruble is divided into 10 grievens, $33\frac{1}{3}$ altins, or 50 groschen; and the kopeek or copeck is divided into 2 denuschkas, or 4 poluschkas. The coins now in circulation are, of gold, the imperial, and half-imperial of 10 and 5 rubles; double and single ducats, which were formerly worth $4\frac{1}{2}$ rubles and $2\frac{1}{4}$ rubles; but their value was raised, in 1764, that of the double ducat to 5 rubles 60 copecks, and the single to 2 rubles 80 copecks. The silver coins are, rubles of 100 copecks; poltins, or half-rubles, of

50

50 copecks; polpoltins, or quarter-rubles, of 25 copecks; double and single grieven, of 20 and 10 copecks; and pieces of 5 altins or 15 copecks; payte-copecks of 5 copecks each, and altins of three copecks, the two latter of which are now nearly out of circulation. The copper coins are pieces of 10 copecks, called grieven or grievnik, of 5 copecks or pataki, which are the most common, of two copecks or grosch, of 1 kopeek; also denuschkas or half-copecks, and poluschkas or quarter-copecks. The following table shews their mutual relation as to value:

Ruble.	Grievnik.	Altine.	Copecks.	Denuschkas.	Poluschkas.
1	10	$33\frac{1}{3}$	100	200	400
	1	$3\frac{1}{3}$	10	20	40
		1	3	6	12
			1	2	4
				1	2

Dutch ducats are worth $2\frac{3}{4}$ rubles, more or less; Dutch and Danish rixdollars pass for 1 ruble 40 copecks; or 14 rixdollars, weighing a Russian pound, (1 lb. 1 oz. 3 dwt. 2 gr. troy,) are worth 19 rubles 6 copecks.

The fineness both of gold and silver is expressed in solotniks, the pound or other weight being divided into 96 such parts. The solotnik is also the $\frac{1}{96}$th part of a Russian pound weight. By the ukase, or edict, of 1763, the imperial was to weigh $3\frac{5}{11}$ solotniks, the half-imperial $1\frac{8}{11}$ solotniks; and the gold to be 88 solotniks, or 22 carats fine. Also, 118 ducats were to weigh a Russian pound, 93 solotniks fine, or $23\frac{1}{4}$ carats. By the same edict, silver of 72 solotniks, or 9 oz. fine, was coined into rubles and half-rubles, at the rate of 17 rubles $6\frac{2}{3}$ copecks *per* lb.; into quarter-rubles and 20-copeck pieces, at the rate of 17 rubles $15\frac{40}{96}$ copecks *per* lb.; and into grievens and 15-copeck pieces, at the rate of 17 rubles $25\frac{40}{96}$ copecks *per* lb. Copper was coined at the rate of 16 rubles *per* pood of 40 Russian pounds. New regulations were established by an edict of the emperor Alexander, in 1801; according to which, $22\frac{1}{4}$ rubles are to contain a Russian pound of fine silver; and they are to be $83\frac{1}{3}$ solotniks (11 oz. 8 dwt.) fine; and thus each ruble should weigh $320\frac{1}{4}$ English grains, and contain $277\frac{1}{2}$ grains of fine silver. It was also declared, that no gold coin should hereafter be struck in Russia, except the imperial and half-imperial, the standard of which was raised to $94\frac{1}{2}$ solotniks, or $23\frac{5}{8}$ carats; and the weight of the imperial reduced to $2\frac{17}{36}$ solotniks, or $188\frac{1}{4}$ English grains; by which the value is nearly the same as before.

According to these mint regulations,

	£	s.	d.	
The imperial is worth	1	12	$9\frac{1}{2}$	valued in English gold.
The ducat - - - -	0	9	1	
The ruble of 1763 -	0	3	3	valued in English silver.
The ruble of 1801 -	0	3	$2\frac{1}{2}$	

The following is the report of an assay lately made on a number of rubles at the London mint, by order of the Bank of England. Rubles of 1763, weight from 14 dwt. 21 gr. to 15 dwt. 20 gr.; average 15 dwt. $8\frac{1}{2}$ gr.; fineness 44 dwt. worse than English, that is, 8 oz. 18 dwt. Rubles of 1801, weight from 13 dwt. 2 gr. to 13 dwt. 12 gr.; average 13 dwt. 7 gr.; fineness 14 dwt. worse than English, that is, 10 oz. 8 dwt. Hence we have the value of the old ruble, 3*s.* 2*d.* sterling; and of the new, 3*s.* $2\frac{1}{2}$*d.*

Besides the hard coin, "paper money" constitutes the chief circulating medium or money of Russia, under the denomination of "bank-assignations." Until the year 1787, these notes of 100, 50, and 25 rubles in circulation were estimated at the amount of 50 millions of rubles. They were so readily taken through the whole empire, instead of copper money, that, in many places, 1, 2, and as far as 5 *per cent.* agio must be given to get paper money for copper. In 1787 the old notes were liquidated, and a fresh issue was made to the amount of 100 millions. They are at a *per cent.* of 100, 50, 25, 10, and 5 rubles. By the ukase of August 3, 1788, it was ordered, that there should be never more than 100 millions in circulation. It was customary to convert them into copper money on demand at the assignation-banks; but they fluctuate considerably in value, and with respect to gold and silver they are mostly at a discount; and even on copper there is sometimes an agio against them, as they are not always paid off in this metal, when the sum is considerable. The ruble of exchange is subject to a similar depreciation. In 1770 this ruble and the paper ruble were at par with the silver ruble; in 1790 they were 20 *per cent.* worse; in 1799 the paper ruble was 60 *per cent.* below par, and the ruble of exchange 50 *per cent.*; in 1803 the paper ruble was 20 *per cent.*, and the ruble of exchange 10 *per cent.* below par; and in 1808 they were 100 *per cent.* worse, that is, 1 silver ruble was worth 2 rubles of exchange, or 2 of bank paper.

Bills of exchange are paid in copper, or bank notes; but this chiefly regards inland bills, as foreign merchants scarcely ever draw on Russia. The commercial debts here are usually settled by drawing and remitting bills on foreign countries.

Petersburg, Archangel, Moscow, &c. draw on the following places, and give Amsterdam 1 ruble for 37 stivers current, more or less, at 65 days' date; Hamburgh, 1 ruble for 34 schillings or sols banco, more or less, at 65 days' date; London, 1 ruble for 38*d.* sterling, more or less, at 3 months' date.

The ruble here mentioned is not the silver ruble, but the ruble of exchange, which, as we have just stated, is subject to great fluctuations.

Bills drawn in Russia, payable after date, are allowed 10 days' grace; but if payable at sight, 3 days only; but bills payable at so many days after sight are not allowed any days of grace.

During the reign of the empress Catharine, three different banks were established at Petersburg, *viz.* the Loan-bank, the Assignation-bank, and the Loan-bank for the nobility and towns; and during the reign of the emperor Paul, the Aid-bank and Discount-office were established.

The "Loan-bank, or Lombard," lends money on gold, silver, jewels, &c. A year's interest is taken in advance, which, according to the legal rate, is 5 *per cent.* No interest is paid for money drawn out, on giving two days' notice; but if a declaration be made, that the money will be left there a year, and that a notice of three months shall be given of the intention to draw it out, the legal interest is allowed, payable in the same kind of money in which the deposit was made. The property of this bank belongs to the Foundling-hospital at Petersburg.

The "Assignation-bank" was opened in Petersburg and Moscow in the year 1770, and branches of it have been extended to Yaroslaf, Smolensk, Veliki-Ustiug, Astrachan, Nishnei-Novgorod, Vischnevolotschok, Novgorod, Pscove, Tver, Neschna, Kief, Kursk, Kharkof, Tambof, Orel, Tula, Kazan, Kherson, Archangel, Riga, and Revel. This bank issues notes for 5, 10, 25, 50, and 100 rubles. In 1786 it was converted into an imperial establishment, when all the old notes were called in, and exchanged for new ones. It is engaged that these notes are to be reimbursed on demand in copper money, and that the total amount should not exceed 100 millions of rubles; but the

number

number now in circulation is supposed to be greatly beyond this limitation.

The "Loan-bank for the nobility and towns" was established in 1786, for the purpose of advancing money to the nobility on landed property or on male peasants, and to the cities or towns on the security of stone and brick houses. The annual interest charged is 5 *per cent.*; besides which, 3 *per cent.* must be paid annually, towards diminishing the capital, or redeeming part of the mortgage, till the whole be repaid. The loans are made in assignation-notes. This bank is also empowered to insure houses, buildings, and other property, on which it has advanced money, at the annual premium of $1\frac{1}{2}$ *per cent.* It is also allowed to coin money of gold, silver, and copper, according to the mint regulations; and it has the liberty of discounting bills at $\frac{1}{2}$ *per cent. per* month.

The "Aid-bank" was established in 1797, for affording relief to noblemen, whose estates are mortgaged, or burdened with debts; and also for advancing money to those who wish to improve their estates, to establish works or manufactures, &c. The property is valued according to the number of male peasants on the estates, who, in different provinces, are valued at 40, 50, 65, and 75 rubles *per* man. The money is advanced in tickets secured on the estates, which are transferrable, and are to be taken as legal money in all the departments of government. These tickets may remain in circulation for 25 years, reckoning from the time of opening the bank. The annual interest is 6 *per cent.* for the first five years, and 5 *per cent.* for the following years; and a part of the debt is to be discharged annually, till the whole be repaid, which must be done within 25 years from the opening of the bank. If the interest is not regularly paid, a fine is imposed, which increases at the rate of 1 *per cent. per* month, till the third month; and if the interest is not then paid, together with part of the capital, the management of the estate is taken from the owner, and given to noblemen who live nearest to it, and they are to receive the produce, and remit it to the bank, till the debt is entirely paid. The payment must be made in copper money, or notes of the Assignation-bank.

The "Discount-office" was established in 1797, for advancing money on bills and on goods of Russian produce, and also for insuring the goods on which such advances have been made. The holder of the bills or owner of the goods must be a Russian subject; but money is advanced to foreigners, and all sorts of people, on gold and silver.

The Russian weights are as follow: the berquet or berkowitz = 10 poods; the pood = 40 lb.; the lb. = 32 loths or lotes; and the loth = 3 solotniks. The Russian lb. = 28 loths, Cologne weight, or 6314 troy grains; so that 500 lb. Russian = 451 lb. avoirdupois. Among merchants, the ordinary computation is, that 36 lb. avoirdupois = the Russian pood, and that 63 poods = 1 ton avoirdupois. Hemp, flax, and cotton, are sold by the berquet; copper, iron, cordage, horse-hair and tails, linseed and hempseed oil, isinglass, morocco leather, potash, wax, bristles, and tobacco, are sold by the pood.

The measures of Russia are, for corn, the chetwert or cool = 2 osmins = 4 pajacks = 8 chetwericks = 64 garnitzy. A cool of flour = 9 poods, and a sack = 5 poods. The chetwerick is $13\frac{1}{2}$ English inches in diameter, and $11\frac{1}{2}$ in depth; so that it measures 1555.92 cubic inches, and contains $5\frac{3}{4}$ Winchester gallons nearly. In business the computation is, that 100 chetwerts = 72 quarters, and 1 chetwert = $5\frac{3}{4}$ bushels, Winchester measure. For wine, the cask, sarokowoi, or pipe, contains 40 vedros; the vedro = 8 osmuchki or krushkas, and the krushka = 11 tscharkays or cups. In Petersburg the vedro contains 621 French, or 752 English cubic inches: hence 1 vedro = $3\frac{1}{4}$ English wine gallons; and 3 krushkas = 1 English ale gallon. The long measures are an arsheen or arshine, which is divided into 16 werschocks or vershoks = 28 English inches; so that 9 arsheens = 7 English yards, and 4 werschocks = 7 English inches; a saze, sashe, sajène, or fathom = 3 arsheens, or 7 English feet; a werst, verst, or Russian mile = 500 sajènes = 1500 arsheens = 3500 English feet: 20 wersts = 3 German miles, and 264 wersts = 175 English miles; so that a werst is nearly two-thirds of an English mile; and a degree of the meridian is reckoned to be about 104 wersts. The Russian foot is 155 French lines = $13\frac{3}{4}$ English inches; and the Moscow foot = $148\frac{1}{4}$ French lines = $13\frac{1}{6}$ English inches; but the English foot, as well as the Rhineland foot, is generally used in Petersburg. The superficial measure, called dessetina or desættine, contains 2400 Russian square fathoms, or 21,600 square arsheens = $13,066\frac{2}{3}$ English square yards, or 2 acres 2 roods 32 perches: hence 10 dessetinas correspond to 27 English acres nearly.

In Russia the Julian calendar, or old style, is still retained, which (since the year 1800) is 12 days later than the new style; so that a Russian bill, dated the first day of any month, must be reckoned from the 13th day of the same month in England, and in every other place where the Gregorian calendar, or new style, is used.

Having availed ourselves of the materials which are furnished by Mr. Coxe, in his "Travels" and "Russian Discoveries," and by Mr. Tooke in his comprehensive and very interesting "View of the Russian Empire," in the compilation of this article, we shall close it with observing, that the immense territory of the Russian empire naturally forms itself into two great divisions, by the vast Ural chain of mountains, that intersect it from north to south; but these divisions are very unequal and dissimilar, both as to dimension and quality. That on the westward is *Proper* or *European* Russia; and that lying to the east side, *Asiatic* Russia, or *Siberia*.

European Russia extends, by the final partition of Poland, from the river Dneister to the Uralian mountains, the grand chain which, as we have just said, divides Europe from Asia; in length about 1600 miles, and in breadth above 1000 English miles. The extent is computed at about 1,200,000 square miles. For a further account of *Asiatic* Russia, see SIBERIA.

RUSSIA *Company*. See COMPANY.

RUSSIAN MUSIC, *in the Church*. See GREEK *Church*.

RUSSIAN *Secular Music*. The only instruments known in Russia till the time of Peter the Great, were such as the peasants still use in the provinces, which are described in the Gotha Almanac, and in Guthrie's Dissertations, with drawings. Peter had at first only such military instruments as he had seen in Germany. But the first good music that was heard in Russia, was brought thither by duke Charles Frederic of Holstein-Gottorp, at Petersburg. This prince, destined to marry the princess Anne Petrowna, daughter of Peter, had a complete band, or chapel, as the Germans call it, in his suite, composed of twelve good German musicians: the concerts by this band were new and acceptable to all the great Russian nobility, who had never heard any other music than that of the natives, which was coarse and barbarous. The emperor himself used to frequent these concerts, and established two regular performances in his palace each week, employing the German musicians to teach the boys about the court, and in the army.

All

All the fucceffors of Peter have followed his example as a model in this inftance, as in all others.

The emprefs Anne, the niece and fucceffor of the great Peter in 1730, who died in 1740, early in her reign firft regaled Peterfburg with an Italian opera compofed by Araja, a native of Italy, of fome eminence, whom fhe appointed her maeftro di cappella; and who likewife compofed intermezzi to Italian words, and in the mufical ftyle of his country. Concerts twice a-week, which had been eftablifhed at court, have been continued ever fince. All the grandees of Ruffia imitated this example, had private concerts in their manfions, and many of them became dilettante performers themfelves in a high form of excellence.

The emprefs Elizabeth, daughter of Peter, began her reign in 1741, by a revolution which fet afide the czar Ivan as incapable of reigning. She had been affianced, in 1747, to the duke of Holftein-Gottorp; but that prince dying before the marriage took place, fhe paffed the reft of her days in a fingle ftate. This princefs, on whom nature had beftowed a nice difcriminating ear, with a paffion for mufic and all the fine arts, by her patronage caufed them to flourifh in her dominions, in a way fuperior to moft of the other ftates of Europe. She built an opera-houfe at Mofcow, capable of containing 5000 people. At her coronation, "La Clemenza di Tito," written by Metaftafio, and fet by Haffe, was performed by the beft Italian fingers of the time; and a prologue to this drama, entitled "La Ruffia afflitta e confolata," was fet by Araja, maeftro di cappella to the court of Peterfburg. Soon after this, Peterfburg firft heard an opera in the Slavonian language, fet likewife by Araja.

Such was the progrefs which mufic had made in Ruffia, when Peter Federowitz, confort to the emprefs Catharine, was called to the throne as prefumptive heir. The paffion which this prince had for mufic contributed confiderably to its further advancement into favour in his dominions. He performed himfelf on the violin fufficiently to bear a part in a fymphony. If he now and then played a wrong note, or miffed a difficult paffage, the Italian muficians were too polite to notice it; on the contrary, they perfuaded his imperial majefty that he had a particular talent for mufic, and that his performance on the violin was perfect. Mufic became his favourite, and almoft fole amufement, even to a degree of enthufiafm. He became alfo a great connoiffeur in violins; and, in a fhort time, purchafed a great collection of thofe made by the moft celebrated artifts, particularly thofe of Cremona, by Amati, Straduarius, Guarnerio, &c. and by Steiner and Albani, Germans. He was never more happy than when at the head of his band in his concerts. He intended affembling at his court all the great muficians in Europe, and he would doubtlefs have fucceeded, if his reign had been more durable; but aiming at more important revolutions in his ftate (which, happily for his country, were ftopt), a termination was put at once to his mufical and political projects.

Catharine II. mounted the throne, attended not only by all the fciences and fine arts, but by the genius of legiflators and victory. The ftate, the church, public order, induftry, commerce, maritime force, and the ftate of her army, had her firft attention.

After having provided for the faftey and power of her empire, fhe attended to its embellifhment by means of the fine arts; and erected a temple to painting, fculpture, architecture, and formed an imperial academy of fciences and beaux arts at Peterfburg.

After this latter eftablifhment, which has fince become fo illuftrious, fhe turned her thoughts to mufic, and called to her court from Venice the celebrated Baldaffar Galuppi, detto Il Buranello, the moft fertile and fpirited compofer of his time. His "Didone abbandonata," in which the Gabrielle performed the part of Dido, had fuch prodigious fuccefs, that, after the firft reprefentation, the emprefs, with her own hands, prefented the compofer with a magnificent box filled with pieces of gold: telling him that "the unfortunate Dido, when fhe expired, bequeathed it as a legacy to the illuftrious Buranello."

Thofe who recollect the turn which this princefs gave to her munificence in the purchafe of Diderot's library, will be lefs furprifed at her liberality to Buranello. Diderot, in his latter years, being conftrained to offer his library to fale, unfuccefsfully, to the principal fovereigns in Europe, in order to enable him to educate his only daughter, when his wifh was communicated to the emprefs Catharine, fhe faid, "fhe would willingly purchafe his library of him at his own price, upon condition that he would be fo obliging as to take care of it as long as he lived; and in order to improve it, and to keep pace with the times, fhe hoped that he would take the trouble to lay out for her 2000 rubles a-year in the purchafe of new books."

Buranello was fucceeded at Peterfburg by Traetta, an excellent compofer; and the compofitions of thefe great mafters, fung by the fineft voices of Italy, and accompanied by the beft inftrumental performers with which the orcheftra could be fupplied, together with the tafte and magnificence of the decorations, and the fplendour of the dances, rendered the opera at Peterfburg the moft brilliant and renowned fpectacle in Europe.

When the emprefs and her fon, the grand duke, had fo happily recovered of the fmall-pox, by the inoculation of baron Dimfdale, the agreeable French comic opera of "Annette and Lubin" was performed by the principal nobility of the court; however, too good a tafte in finging and in dramatic mufic was formed at Peterfburg now, for the vocal performers of France to captivate much, even with the compofitions of Duni, Monfigni, Philidor, and Gretry, which were tried for one feafon.

It is to facred mufic that the lyric theatre at Peterfburg is obliged for the great effects of its choruffes. In the opera of "Ifigenia in Tauride," fet by Galuppi, he was allowed to make ufe of the choral fingers of the imperial chapel. Of which permiffion that great mafter availing himfelf, compofed choruffes for ten choirs, in four parts each, which had a moft furprifing effect. See CHACE.

After the period defcribed by the Gotha Almanac for 1772, the opera of Peterfburg had Paefiello and Sarti to compofe. Paefiello, after three years refidence in Ruffia, where his compofitions and perfonal merits were perfectly underftood, and treated with great admiration and regard, was fucceeded by Sarti, who went to Peterfburg in 1784, for three years, but remained in Ruffia till 1790; during which time he eftablifhed a concert fpirituel, or oratorio, for which he compofed mufic *à cappella*, in which he introduced inftruments which are not allowed in the Greek church. He likewife compofed a Te Deum for the victory obtained over the Turks by the Ruffians at Ockzakow, and eftablifhed a confervatorio for the education of young muficians in the Neapolitan manner, of which he was appointed director. With his opera of "Armida" the emprefs was fo pleafed, that fhe gave him a golden vafe, and a ring of great value. See SARTI.

Mufic is ftill patronized in Ruffia; concerts and operas are fupported in the ufual magnificent manner (1805); and the Italian tafte, befides its prevalence at the opera and court concerts

concerts to Italian words, is propagated in the church and provinces by national compofers, who had been fent to Italy by the emprefs Catharine to ftudy compofition, and who, when they returned, fet hymns, motets, and fongs in the Slavonian language, which is faid to be nearly as foft and capable of receiving melody as the Italian. Palcha, Lolli, Giornovichi, Bortnianiki, Dietz, &c. contributed to refine inftrumental mufic in Ruffia.

RUSSING, in *Geography*, a town of Auftria; 6 miles E. of St. Polten.

RUSSWEIL, a town of Switzerland, in the canton of Lucerne; 6 miles W. of Lucerne.

RUST, FREDERIC WILLIAM, in *Biography*, born in 1739, mufic-director at Deffau. His firft inftrument was the violin, then the harpfichord; but he feems to have played and written for all kinds of inftruments, though chiefly for the harpfichord. He publifhed at Leipfic fix fonatas for that inftrument, and twenty-four variations to a German fong, at Deffau, 1782; with many detached fongs and odes for periodical works.

RUST, in *Geography*, a town of Hungary, the inhabitants of which carry on a confiderable trade in wine, made nearly as ftrong as Tokay; 4 miles E.N.E. of Edenburg.—Alfo, a fmall ifland in the North fea, about 60 miles from the coaft of Norway. N. lat. 67° 5'.

RUST, in *Rural Economy*, a diftemper incident to corn, and generally called mildew. (See MILDEW. See alfo BLIGHT, and SMUT.) The ancients generally thought that it came from heaven, being ignorant of its true caufe. Virgil gives this up as an incurable diftemper, and tells the farmer, that if his corn is blighted he muft live upon acorns, not fuppofing that any remedy could be devifed for fuch a diftemper. Thefe people in general, having no true knowledge of the theory of hufbandry, had recourfe to magic, and ufed what they thought fpells and enchantments on all occafions. Cato, Varro, and even Columella, are full of thefe ridiculous devices. A better knowledge in the real nature of hufbandry has taught us to underftand this matter in a very different manner, and to apply more efficacious remedies to it.

Wheat is blighted at feafons, firft in the bloffom, and then its generation is prevented, many of the hufks being empty in the ear, and the rudiments of the grains not impregnated; fecondly, wheat is blighted when the grains are brought to maturity; and in this cafe they become light, and are of little value for making of bread, having fcarcely any flour in them.

Under this term of ruft may, perhaps, moft properly be arranged, and included, that fort of deftructive affection of grain, which is caufed by the fungufes and parafitical plants, which fix themfelves on, and attach themfelves to, the ftems or other parts of it, fo as to diminifh, intercept, or deftroy its nutritive properties and qualities. The injury done in this way is often more dreadful than that from any of the other caufes, as whole fields have been known to be utterly deftroyed, fo as not to contain a fingle grain of wheat in the ear, and, at the fame time, the ftraw rendered totally unfit for fodder, as being little better than a *caput mortuum*, poffeffing neither ftrength nor fubftance in it. The evidence of different places fully confirm the exiftence of fungi, as injurious in this manner; as from fome it is ftated, that, as the wet weather continued, the ruft or fungus made a rapid progrefs from the ear downwards, until, in many inftances, it covered the ftem from the ear, as far as it was unfheathed. From others it is faid, that the ruft or fungus prevented thofe grains which the maggot had not deftroyed from being perfected, in a greater or lefs degree. From ftill others it is afferted, that thefe parafitical plants multiplied fo much upon the ftraw, and on the hufk and chaff of the ears, that, in many cafes, whole fields put on an univerfal blackened, rufty appearance. From different other perfons, various other circumftances of this nature are alfo related to be met with.

The beft means of preventing and removing affections of this nature in this fort of grain crop, are fuppofed to be thofe of cultivating only the forts of wheat which are the hardieft in point of quality, and the leaft liable to difeafe; the fowing of the wheat earlier than ufual in the feafon; the introduction of earlier varieties of it; the giving of a fufficient quantity of feed; the draining of the land where it is inclined to be wet; the rolling and treading of the land by live-ftock immediately after fowing; the ufe of fowing different forts of faline fubftances as a manure; the proper regulation and improvement of the courfe of crops; the change of feed, by bringing it frefh from other countries; the extirpation of the difeafed ftems, ftalks, or blades early in the feafon; and the inftantly cutting down of the crop when it is decidedly affected. See ROTATION *of Crops*, SALINE *Manure*, TREADING, and WHEAT.

It is fuppofed, that, by means of one or other of thefe methods, when properly improved and applied by ingenious naturalifts and farmers, there can be no doubt but that this, as well as the other difeafes in wheat crops, may, in a great meafure, be either wholly remedied, or their effects be fo far reduced as to be of little national confequence. Sir John Sinclair's Inquiry into the Blight, Ruft, and Mildew in Wheat.

The ruft or mildew alfo attacks, and is highly injurious to many forts of garden vegetables as well as fruit-trees, fuch as thofe of late peas, &c. and peach-trees, &c.

On the fuppofition of the difeafe, in thefe cafes, arifing from the feeds of fungi, and to be promoted immediately afterwards, and in continuance, by the want of a fufficient fupply of moifture from the foil or ground, with an excefs of humidity in the air, particularly when the plants are expofed to a temperature below that to which they have been accuftomed; the prefident of the Horticultural Society of London was led to purfue the following mode of cultivation with the late autumnal crops of the pea, by which the table may be as abundantly fupplied during the month of September and that which fucceeds it, as in thofe of June and July; and the plants be nearly as free from the difeafe. The ground is firft dug up in the ufual manner, and the fpaces which are to be occupied by the future rows of peas then well foaked with water. After which, the mould upon each fide is collected together, fo as to form ridges feven or eight inches above the previous level of the furface of the ground, which are alfo well watered. The feed-peas are then fown, in fingle rows, along the tops of the ridges. The plants quickly fhew themfelves above the furface of the land, and grow with much vigour, on account of the great depth of ftirred mould, and the abundant moifture. There is water given in rather a profufe manner, once in the courfe of every week or nine days, even when the weather proves fhowery, but if the ground fhould be thoroughly drenched with the water of the autumnal rains, there will be no further trouble neceffary. The plants, under this mode of management, continue perfectly green and luxuriant, until their bloffoms and young feed-veffels become deftroyed by the frofts; and their produce will retain its proper flavour, which is conftantly deftroyed by this difeafe.

The pea, which has conftantly been cultivated in this intention and manner, is a very large kind, the feeds of which are

are greatly ſhrivelled, and grow very high: it is now become common in the ſeed ſhops of the metropolis under the title of knight's pea. This variety is preferred on account of its more ſaccharine quality, and the retention of its flavour more perfectly in the autumnal ſeaſon; however, it is not improbable but that any other late tall-growing variety may ſucceed equally well. It is the practice to ſow a ſmall quantity every ten days until about midſummer, which afford good ſupplies for the table until the end of October, though the ſevere froſts, which ſometimes happen in the early part of that month, prove deſtructive of the more late crops.

The ſame, or ſimilar means, it is ſuppoſed, may be equally effectual in preventing this diſeaſe in the peach-tree. As it is found, that when the roots of it, which ſtrike to the greateſt depth in the ſoil, and which are conſequently the beſt ſuited to ſupply the tree with moiſture during the ſummer, are deſtroyed by a hurtful under ſoil, or by an exceſs of moiſture in the winter ſeaſon, the diſeaſe, on many varieties of the peach-tree, becomes extremely formidable. But that where, on the contrary, a deep, fertile, dry loam permits the roots to extend to their proper depth; and where the ſituation is not ſo low as to be much infeſted with fogs, little of this diſeaſe is met with: alſo in a forcing-houſe it has been found equally eaſy, by appropriate management, to introduce or prevent the appearance of it. When the mould has been kept very dry, and the air in the houſe damp and unchanged, the plants have ſoon become diſeaſed; but when the mould has been regularly, and rather abundantly watered, not a ſingle veſtige of the diſeaſe has ſhewn itſelf.

Rust, in *Gardening*, a diſeaſe of the blight or mildew kind, which affects many ſorts of crops, as well as ſome fruit-trees. All the later pea, bean, kidney-bean, and ſeveral other ſimilar ſorts of crops, are liable to be attacked, and greatly injured, or wholly deſtroyed in this way. Some kinds of the peach and other ſorts of the finer fruit-trees are alſo much expoſed to its ravages and deſtructive effects. See the preceding article.

Rust *of a metal*, the flowers or calx thereof, procured by corroding and diſſolving its ſuperficial parts by ſome menſtruous fluid: or the earth of the metal decompoſed by the action of a proper menſtruum.

Water is the great inſtrument or agent in producing ruſt; the air apparently ruſts bodies, but it is only in virtue of the water it contains.

Hence, in a dry air, metals remain a long time without contracting ruſt; and hence oils, and other fatty bodies, ſecure metals from ruſt, or from being oxydated; water being no menſtruum to oil, &c. and therefore not able to make its way through it. See Iron.

All metals are liable to ruſt; even gold itſelf, though generally held incapable of it, grows ruſty, if expoſed to the fumes of ſea-ſalt.

The reaſon why gold is ſo rarely found to ruſt is, that ſea-ſalt, which is the only ſalt that will prey upon it, is of a very fixed nature; and therefore little of its effluvia, or exhalations, are found floating in the air.

Ruſt is uſually ſuppoſed to be a corruption of the metal, but without much foundation: it is the very metal itſelf, only under another form; and accordingly we find, that ruſt of copper may again be turned into copper.

The ruſt of copper, called *ærugo*, makes what we call *verdigris*. Ceruſs is made of lead converted into ruſt by vinegar. Iron, in time, turns wholly into ruſt, unleſs preſerved from the air by paint or varniſh.

Citizen Conté has adopted a method, which he finds effectual, for preventing the oxydation of iron and ſteel; or, in popular terms, to prevent iron and ſteel from ruſting. It conſiſts in mixing with fat oil varniſh, at leaſt half, or at moſt four-fifths of its quantity of highly rectified ſpirits of turpentine. This varniſh muſt be lightly and evenly applied with a ſponge; after which the article is left to dry in ſome ſituation not expoſed to duſt. He affirms that articles thus varniſhed retain their metallic luſtre, and do not contract any ſpots of ruſt. This varniſh may alſo be applied to copper, of which it preſerves the poliſh, and heightens the colour. It may be employed with particular advantage to preſerve philoſophical inſtruments from any change, in experiments where, by being placed in contact with water, they are ſubject to loſe that poliſh and preciſion of form, which conſtituted part of their value. Nicholſon's Journal, vol. vi. p. 142.

Plumbago protects iron from ruſt, and on that account is rubbed on various ornamental caſt-iron works, ſuch as the fronts of grates, &c.

RUSTAN, in *Geography*, a town of Perſia, in the province of Schirvan; 14 miles N. of Derbend.

RUSTANGUNGE, a town of Hindooſtan, in Bahar; 13 miles S.W. of Patna.

RUSTBURN, in *Farming*, a term provincially uſed to ſignify the troubleſome weed reſt-harrow.

RUSTENBURG, in *Geography*, a town of Weſtphalia, in the territory of Eichsfeld, with a caſtle; nine miles W. of Heiligenſtadt.

RUSTGADEN, a town of Sweden, in Dalecarlia; 23 miles S.S.W. of Fahlun.

RUSTI, or Rust, in *Biography*, born in 1744, was maeſtro di cappella, at Barcelona, in 1767. He ſtudied in the conſervatorio of La Pietà at Naples, and afterwards under Rinaldo di Capua. His firſt opera, "La Contadina in Corte," was compoſed for Venice in 1764. He went from Venice to Barcelona, where he compoſed "l'Idolo Cineſe," in 1774, "Amor Bizzazzo" in 1775, and "Aleſſandro nell' Indie," the ſame year. "Il Baron di terra aſciutta," 1776; "Il Socrate Immaginario," 1776; "Il Giove Immaginario;" "Il due protetti," 1777. His operas were much eſteemed in Italy.

RUSTIC Gods, *Dii Ruſtici*, in *Antiquity*, were the gods of the country, or thoſe who preſided over agriculture, &c. Varro invokes the twelve *dii conſentes*, as the principal among the ruſtic gods; *viz.* Jupiter, Tellus, the Sun, Moon, Ceres, Bacchus, Rubigus, Flora, Minerva, Venus, Lympha, and Good Luck. Beſides theſe twelve arch-ruſtic gods, there was an infinity of leſſer ones; as Pales, Vertumnus, Tutelina, Fulgor, Sterculius, Mellona, Jugatinus, Collinus, Vallonia, Terminus, Sylvanus, and Priapus. Struvius adds the Satyrs, Fauns, Sileni, Nymphs, and even Tritons; and gives the empire over all the ruſtic gods to the god Pan.

Rustic, in *Architecture*, expreſſes a manner of building in imitation of ſimple or coarſe nature, rather than according to the rules of art.

Rustic *Faſti*. See Fasti.

Rustic *Fountain*. See Fountain.

Rustic *Freeze*. See Freeze.

Rustic *Quoins*, by Vitruvius called *lapides minantes*. See *Ruſtic* Quoin.

Rustic *Services*. See Service.

Rustic *Work* is where the ſtones in the face, &c. of a building, inſtead of being ſmooth, are hatched or picked with the point of an inſtrument.

Rustics, *Regular*, are thoſe in which the ſtones are chamfered off at the edges, and form angular or ſquare receſſes ceffes of about an inch deep at their jointings, or beds, and ends.

Rustic *Order*, is an order decorated with ruftic quoins, ruftic work, &c.

Felibien fays, it is properly where the feveral parts of the five orders are not exactly obferved; but this confounds ruftic with Gothic.

RUSTICI, Francesco, in *Biography*, a native of Sienna, born about 1595, was a difciple of Francefco Vanni. His tafte led him afterwards to adopt the ftyle and fubjects of Caravaggio. A dying Magdalen in the gallery at Florence, and a Sebaftian in the Borghefe palace at Rome, are in that manner, though with more felection of form. He ftudied at Rome the works of a Caracci and Guido, not, however, to the lofs of his own peculiar ftyle. His moft renowned work is the Annunciation, at Sienna. He died in the prime of life, in 1625.

RUSTICIANA, in *Ancient Geography*, a town of Hifpania, in Lufitania, on the left bank of the Tagus, to the E. of Norba-Cæfarea, and W. of Augufto-Briga.

RUSTICOLA, in *Ornithology*, a fpecies of *Scolopax;* which fee.—Alfo, a fpecies of tringa. See Tringa *Calidris.*

RUSTICULA, a name by which Aldrovand, and fome other authors, have called the godwit, more commonly known by the name *ægocephalus*. See Scolopax *Ægocephala.*

Rusticula *Brafilienfis*, the name given by Mr. Ray, and fome others, to the guarauna, a water-bird of the Brafils, of the fize of our fnipe. See Scolopax *Guarauna.*

RUSTONIUM, in *Ancient Geography*, a town of Africa, on the coaft of Mauritania Cæfarienfis, between the river Savus and the town of Ruficibar, according to Ptolemy. It is called Rufconia Colonia by Pliny; Rungoniæ Coloniæ by Antonine; and according to Livy, the Africans called it Rufcinona.

RUSTRE, in *Heraldry*, a bearing of a diamond fhape, pierced through in the middle with a round hole.

RUSUBESER, Tacksibt, in *Ancient Geography*, a town of Africa, upon the coaft of Mauritania Cæfarienfis, according to Ptolemy, fituated to the E. of Rufucurium, between Iomnyum and Rufazus.

RUT, in *Hunting*, &c. a term ufed for the venery or copulation of deer.

For the terms which obtain in refpect of this and other beafts of game, with the noife they make during the acts, fee Hunting.

The rutting-time with the hart begins about the middle of September; and holds two months: the older they are the better, and the more beloved they are by the hinds, and the earlier do they go to rut. At this time they will turn head, and furioufly make at any living creature. It is eafy killing them at this time; their whole bufinefs being to fcent and purfue the track of the females; fcarcely feeding at all. The young herd are forced to fly with great precipitancy, when the hart comes in fight of his mate. If there be any other of bulk, they will difpute it very hotly with their horns. As the feafon expires, they withdraw, and dig themfelves holes in which to lie to affuage the ftrong fervour of their luft: when become a little fweet, they return to their pafture, and live in herds.

The rutting or tourning time of the roe-buck begins in October, and lafts only twelve or fifteen days. When this is paft, he cafts his horns.

After the hind is filled, fhe keeps no more company with the male till fhe be delivered. But the doe always accompanies her paramour till her time approaches, when fhe retires, for the fafety of her young, which he would otherwife kill.

Rut, in *Rural Economy*, a track or narrow opening formed in a road by the wheel of a cart or other carriage, which has but little breadth. Ruts of this fort are often dangerous and troublefome, when they become of any confiderable depth; therefore they frequently ftand in need of being filled in and rendered even with the other furface. In order to do this with the beft effect, the infides of them require to be well loofened with the point of a pick, that a firm bed may be given to the frefh ftones which are put in, and at the fame time, the protuberances about them, if there fhould happen to be any, may be chipped off and removed. And ftill further to prevent the frefh ftones from being difplaced, it is neceffary that they fhould be covered in with part of the loofened or other materials, and the whole firmly rammed down, or otherwife driven in, fo as to give the part, thus put in order, not only the evennefs of furface, but, as much as poffible, the firmnefs of the reft of the road. This fort of accuracy may be readily attained by a little practice and experience.

All the minor ruts, depreffions, and dimples or hollows in roads which are of any confequence, fhould always be made up and fecured in the fame manner, as no water fhould ever be fuffered to ftand on any part of the furface of them.

An implement of the three-pointed pick kind is often found extremely ufeful and convenient in trimming and filling in ruts in this way, as well as for rendering the furface even and regular. See Pick.

Rut *of the Sea*, is where it dafhes againft any thing.

RUTA, in *Botany*, an ancient Latin name, *ῥυτη* of the Greeks, which lexicographers derive from *ῥυω*, *to flow*, in allufion to fome reputed expelling qualities of the plant. The word is rather perhaps, as De Theis obferves, not capable of explanation, being nearly the fame in all the moft ancient European languages; *ruz* in Runic; *rude*, *ruta*, or *rutu*, in Anglo-Saxon; *rutiza* in Sclavonian. Hence it is *rue* in Englifh and French; *ruta* in Italian; *ruda* in Spanifh and Portuguefe; *raute* in German; *rhy'w* in Welfh. Πηγανον, a Greek fynonym of *ῥυτη*, is derived from πηγνυω, *to congeal* or *reprefs;* and fuppofed to refer to a quality in the plant, oppofite, in fome refpects, to the above-mentioned. This latter name is ufed by Linnæus for a genus nearly akin to *Ruta;* fee Peganum. If etymology were a fure guide to the virtues of plants, rue might be taken by monks, who wifh to keep their vows, and by nuns, who have broken theirs. But we believe its efficacy, in either cafe, as uncertain, as the object is unworthy of confideration.—Linn. Gen. 210. Schreb. 286. Willd. Sp. Pl. v. 2. 542. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 34. Sm. Prodr. Fl. Græc. Sibth. v. 1. 271. Juff. 297. Tourn. t. 133. Lamarck Illuftr. t. 345. Gærtn. t. 111.—Clafs and order, *Decandria Monogynia*. Nat. Ord. *Multifiliquæ*, Linn. *Rutaceæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, in five deep fegments, fhort and permanent. *Cor.* Petals five, fpreading, nearly ovate, concave, with narrow claws. *Stam.* Filaments ten, awl-fhaped, fpreading varioufly, the length of the corolla, broadifh at the bafe; anthers incumbent, fimple, very fhort. *Pift.* Germen gibbous, cut croffwife, furrounded with ten melliferous pores at the bafe, and raifed on a *receptacle* pierced with as many fimilar pores; ftyle central, erect, awl-fhaped; ftigma fimple. *Peric.* Capfule gibbous, five-lobed half way down, of five cells, burfting elaftically at the fummit of each lobe. *Seeds* numerous, rough, angular, fomewhat kidney-fhaped.

Obf.

Obſ. R. *graveolens*, and ſome others, in all except the primary flowers, exclude one-fifth of every part of the fructification. In *R. chalepenſis* the petals are fringed at the baſe.

Eſſ. Ch. Calyx in five deep ſegments. Petals concave, Receptacle ſurrounded with ten honey-bearing pores. Capſule lobed. Seeds numerous. Anthers ſimple.

1. R. *graveolens*. Common Rue. Linn. Sp. Pl. 548. Willd. n. 1. Ait. n. 1. Bulliard Herb. t. 85. (Ruta; Matth. Valgr. v. 2. 95. R. hortenſis, et montana; Ger. Em. 1255.)—Leaves repeatedly compound; leaflets oblong; the terminal one obovate. Petals entire.—Native of the ſouth of Europe. Frequent in the iſlands of the Archipelago. A hardy ſhrub, cultivated, time out of mind, in our gardens, where it flowers from June to September, and propagates itſelf ſpontaneouſly by ſeed. The *ſtem* is buſhy, riſing to the height of ſeveral feet, round, ſmooth, branched. *Leaves* alternate, ſtalked, twice or thrice compound, ſmooth, of a deep blueiſh glaucous hue; their leaflets oblong or obovate, entire, tapering at the baſe. *Stipulas* none. *Flowers* of a rather dull yellow, copious, in terminal corymboſe *panicles*; the terminal ones only having the full number of each of the parts of fructification, while the reſt are octandrous and four-cleft. *Petals* jagged at the extremity; angular, but not fringed, at the baſe. The *ſtamens* of this, and perhaps all the other ſpecies, are remarkable for their progreſſive approach to the *ſtigma*, over which they in turn drop their pollen and retire. Every part of the plant when rubbed, or touched, has a peculiar acrid pungent ſmell, too ſtrong to be agreeable. The bruiſed leaves excoriate the lips and noſtrils, if incautiouſly applied, as they often are, to counteract bad ſmells; rue being ſuppoſed powerfully to prevent contagion. Its internal uſe is unſafe; yet we have known it eaten with bread and butter in no ſmall quantity; not altogether with impunity. Botaniſts diſtinguiſh two varieties; the wild, which has more oblong leaflets, or ſegments, and the garden rue, which has rounder ones. Gerarde has tranſpoſed the cuts of theſe, borrowed from Dodonæus.

2. R. *montana*. Mountain Rue. Ait. n. 2. Willd. n. 2. (R. legitima; Jacq. Ic. Rar. t. 76. R. ſylveſtris; Camer. Epit. 495. R. ſylveſtris minima; Ger. Em. 1255.)—Leaves repeatedly compound; leaflets all linear. Branches of the panicle racemoſe. Petals entire.—Native of dry hilly ſituations in the ſouth of Europe. Dr. Sibthorp found this ſpecies in various parts of Greece, and the neighbouring countries, and juſtly conſidered it as the πηγανον ορεινον, or Mountain Rue of Dioſcorides, for which moſt of the commentators of that old writer have miſtaken the wild, or narrower-leaved, *R. graveolens*. This is a hardy perennial herb, rather than a ſhrub, flowering in autumn in our gardens, where, however, though cultivated by Gerarde, it is now rarely to be ſeen. The plant is known by its more humble ſtature, and eſpecially by the very narrow *leaflets*. The radical *leaves* are crowded into a denſe tuft. Moſt of the *flowers* are four-cleft, as in the former. The branches of the *panicle* are racemoſe, and elongated. *Capſule* not half ſo big as in the Common Rue.

3. R. *chalepenſis*. African Rue. Linn. Mant. 69. Willd. n. 3. Ait. n. 3. Sm. Fl. Græc. Sibth. t. 368. (R. tenuifolia, florum petalis villis ſcatentibus; Moriſ. ſect. 5. t. 35.)—Leaves repeatedly compound; leaflets oblong or obovate. Petals with fringe-like teeth.—Native of Africa, as well as of Zante, and the iſles of the Archipelago. A common greenhouſe ſhrub, flowering at various ſeaſons, and chiefly diſtinguiſhed from the Common Rue by its larger *flowers*, whoſe *petals* are copiouſly fringed with taper teeth. Many of the *flowers* are four-cleft, and the *foliage* varies in breadth, as in that ſpecies.

4. R. *pinnata*. Wing-leaved Rue. Linn. Suppl. 232. Willd. n. 4. Ait. n. 4.—Leaves ſimply pinnate; leaflets lanceolate, tapering at the baſe, bluntly ſerrated. Petals ſomewhat notched.—Native of rocks in the Canary iſlands, from whence it was brought by Mr. Maſſon to Kew, in 1780. This is a greenhouſe ſhrub, flowering in ſpring and ſummer. It is very diſtinct from all the foregoing, reſembling the firſt in ſize and *infloreſcence*, but the *flowers* are ſmaller, with crenate, or ſlightly toothed, petals. The *leaves* are very different, compoſed of two or three pair of oppoſite *leaflets*, above an inch long, various in breadth, more or leſs obtuſe, with unequal blunt ſerratures; the odd one rather the largeſt, on a long ſtalk.

5. R. *patavina*. Three-leaved Rue. Linn. Sp. Pl. 549. Willd. n. 5. Sm. Fl. Græc. Sibth. t. 369, unpubliſhed. (Pſeudo-ruta patavina trifolia, floribus luteis umbellatis; Mich. Gen. 22. t. 19.)—Leaves ternate, ſeſſile. Stamens hairy. Germen creſted.—Originally diſcovered by Micheli on a hill near Arqua, not far from Padua. Dr. Sibthorp met with it on mount Parnaſſus. Linnæus had no ſpecimen, nor is the plant known in our gardens, ſo that it ſeems not to have fallen in the way of many botaniſts. The *root* is woody and perennial. *Stems* ſeveral, a foot high, erect, round, downy, leafy, branched at the baſe only. *Leaves* numerous, downy, of a light, rather glaucous green, alternate, ſeſſile, each compoſed of three, nearly equal, narrow, obtuſe, entire, ſlightly revolute *leaflets*, about an inch long. *Flowers* five-cleft, in a terminal, denſe, cymoſe *panicle*. *Calyx* hairy, ſpreading. *Petals* ovate, obtuſe, entire, of a pale dull yellow, with a green central rib. *Stamens* ten, not ſo long as the petals; their filaments hairy half way up. *Germen* five-lobed, covered with glandular tubercles, and crowned with numerous oblong, notched, creſt-like, leafy ſcales.

6. R. *linifolia*. Broad Flax-leaved Rue. Linn. Sp. Pl. 549. Willd. n. 6. Ait. n. 5. Andr. Repoſ. t. 565. Sm. Fl. Græc. Sibth. t. 370, unpubliſhed. (R. ſylveſtris linifolia hiſpanica; Bocc. Muſ. v. 1. 82. t. 73. f. 3. Barrel. Ic. t. 1186. R. montana, foliis integris ſubrotundis; Buxb. Cent. 2. 30. t. 28. f. 2.)—Leaves ſimple, obovate. Stamens hairy. Germen without a creſt.—Native of Spain, Cyprus, and various parts of Greece. The plant of Buxbaum, gathered by him in fields, after harveſt, near Rodoſtro, in Thrace, as far as can be diſcerned from his imperfect figure, does not deſerve to be conſidered as even a variety. This agrees with the laſt in general habit, but is more robuſt, the *flowers* more numerous, and of a deeper yellow. *Leaves* much broader, leſs glaucous, and all ſimple and ſolitary. *Stamens* much dilated, and very hairy, in their lower part. *Germen* roundiſh, five-lobed, ten-furrowed, rough with ſmall granulations, but entirely deſtitute of the leafy creſt, which, though ſo remarkable in *R. patavina*, is not expreſſed by the generally exact Micheli. The name of *linifolia*, uſually alluding to the Common Flax, is not well adapted to the plant we have been deſcribing, except we underſtand it as referring to ſome of the broad-leaved yellow ſpecies of *Linum*, between which and this *Ruta* there exiſt indeed many points of reſemblance.

7. R. *fruticuloſa*. Narrow Flax-leaved Rue. Labillard. Syr. faſc. 1. 13. t. 4. Willd. n. 7. (R. orientalis, linariæ folio, flore parvo; Tourn. Cor. 19. Buxb. Cent. 2. 30. t. 28. f. 1.)—Leaves ſimple, ovato-lanceolate. Cluſters corymboſe, of few flowers. Stamens hairy at the baſe. Germen hairy, without a creſt.—Gathered in Syria, near Damaſcus, by our worthy friend M. Labillardiere, to whom

ceffes of about an inch deep at their jointings, or beds, and ends.

RUSTIC *Order*, is an order decorated with ruftic quoins, ruftic work, &c.

Felibien fays, it is properly where the feveral parts of the five orders are not exactly obferved; but this confounds ruftic with Gothic.

RUSTICI, FRANCESCO, in *Biography*, a native of Sienna, born about 1595, was a difciple of Francefco Vanni. His tafte led him afterwards to adopt the ftyle and fubjects of Caravaggio. A dying Magdalen in the gallery at Florence, and a Sebaftian in the Borghefe palace at Rome, are in that manner, though with more felection of form. He ftudied at Rome the works of a Caracci and Guido, not, however, to the lofs of his own peculiar ftyle. His moft renowned work is the Annunciation, at Sienna. He died in the prime of life, in 1625.

RUSTICIANA, in *Ancient Geography*, a town of Hifpania, in Lufitania, on the left bank of the Tagus, to the E. of Norba-Cæfarea, and W. of Augufto-Briga.

RUSTICOLA, in *Ornithology*, a fpecies of *Scolopax;* which fee.—Alfo, a fpecies of tringa. See TRINGA *Calidris*.

RUSTICULA, a name by which Aldrovand, and fome other authors, have called the godwit, more commonly known by the name *ægocephalus*. See SCOLOPAX *Ægocephala*.

RUSTICULA *Brafilienfis*, the name given by Mr. Ray, and fome others, to the guarauna, a water-bird of the Brafils, of the fize of our fnipe. See SCOLOPAX *Guarauna*.

RUSTONIUM, in *Ancient Geography*, a town of Africa, on the coaft of Mauritania Cæfarienfis, between the river Savus and the town of Rufícibar, according to Ptolemy. It is called Rufconia Colonia by Pliny; Rungoniæ Coloniæ by Antonine; and according to Livy, the Africans called it Rufcinona.

RUSTRE, in *Heraldry*, a bearing of a diamond fhape, pierced through in the middle with a round hole.

RUSUBESER, TACKSIBT, in *Ancient Geography*, a town of Africa, upon the coaft of Mauritania Cæfarienfis, according to Ptolemy, fituated to the E. of Rufucurium, between Iomnyum and Rufazus.

RUT, in *Hunting*, &c. a term ufed for the venery or copulation of deer.

For the terms which obtain in refpect of this and other beafts of game, with the noife they make during the acts, fee HUNTING.

The rutting-time with the hart begins about the middle of September; and holds two months: the older they are the better, and the more beloved they are by the hinds, and the earlier do they go to rut. At this time they will turn head, and furioufly make at any living creature. It is eafy killing them at this time; their whole bufinefs being to fcent and purfue the track of the females; fcarcely feeding at all. The young herd are forced to fly with great precipitancy, when the hart comes in fight of his mate. If there be any other of bulk, they will difpute it very hotly with their horns. As the feafon expires, they withdraw, and dig themfelves holes in which to lie to affuage the ftrong fervour of their luft: when become a little fweet, they return to their pafture, and live in herds.

The rutting or tourning time of the roe-buck begins in October, and lafts only twelve or fifteen days. When this is paft, he cafts his horns.

After the hind is filled, fhe keeps no more company with the male till fhe be delivered. But the doe always accompanies her paramour till her time approaches, when fhe retires, for the fafety of her young, which he would otherwife kill.

RUT, in *Rural Economy*, a track or narrow opening formed in a road by the wheel of a cart or other carriage, which has but little breadth. Ruts of this fort are often dangerous and troublefome, when they become of any confiderable depth; therefore they frequently ftand in need of being filled in and rendered even with the other furface. In order to do this with the beft effect, the infides of them require to be well loofened with the point of a pick, that a firm bed may be given to the frefh ftones which are put in, and at the fame time, the protuberances about them, if there fhould happen to be any, may be chipped off and removed. And ftill further to prevent the frefh ftones from being difplaced, it is neceffary that they fhould be covered in with part of the loofened or other materials, and the whole firmly rammed down, or otherwife driven in, fo as to give the part, thus put in order, not only the evennefs of furface, but, as much as poffible, the firmnefs of the reft of the road. This fort of accuracy may be readily attained by a little practice and experience.

All the minor ruts, depreffions, and dimples or hollows in roads which are of any confequence, fhould always be made up and fecured in the fame manner, as no water fhould ever be fuffered to ftand on any part of the furface of them.

An implement of the three-pointed pick kind is often found extremely ufeful and convenient in trimming and filling in ruts in this way, as well as for rendering the furface even and regular. See PICK.

RUT *of the Sea*, is where it dafhes againft any thing.

RUTA, in *Botany*, an ancient Latin name, ῥυτη of the Greeks, which lexicographers derive from ῥυω, *to flow*, in allufion to fome reputed expelling qualities of the plant. The word is rather perhaps, as De Theis obferves, not capable of explanation, being nearly the fame in all the moft ancient European languages; *ruz* in Runic; *rude*, *ruta*, or *rutu*, in Anglo-Saxon; *rutiza* in Sclavonian. Hence it is *rue* in Englifh and French; *ruta* in Italian; *ruda* in Spanifh and Portuguefe; *raute* in German; *rhy'w* in Welfh. Πηγανον, a Greek fynonym of ῥυτη, is derived from πηγνυω, *to congeal* or *reprefs;* and fuppofed to refer to a quality in the plant, oppofite, in fome refpects, to the above-mentioned. This latter name is ufed by Linnæus for a genus nearly akin to *Ruta;* fee PEGANUM. If etymology were a fure guide to the virtues of plants, rue might be taken by monks, who wifh to keep their vows, and by nuns, who have broken theirs. But we believe its efficacy, in either cafe, as uncertain, as the object is unworthy of confideration.—Linn. Gen. 210. Schreb. 286. Willd. Sp. Pl. v. 2. 542. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 34. Sm. Prodr. Fl. Græc. Sibth. v. 1. 271. Juff. 297. Tourn. t. 133. Lamarck Illuftr. t. 345. Gærtn. t. 111.—Clafs and order, *Decandria Monogynia*. Nat. Ord. *Multifiliquæ*, Linn. *Rutaceæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, in five deep fegments, fhort and permanent. *Cor.* Petals five, fpreading, nearly ovate, concave, with narrow claws. *Stam.* Filaments ten, awl-fhaped, fpreading varioufly, the length of the corolla, broadifh at the bafe; anthers incumbent, fimple, very fhort. *Pift.* Germen gibbous, cut croffwife, furrounded with ten melliferous pores at the bafe, and raifed on a *receptacle* pierced with as many fimilar pores; ftyle central, erect, awl-fhaped; ftigma fimple. *Peric.* Capfule gibbous, five-lobed half way down, of five cells, burfting elaftically at the fummit of each lobe. *Seeds* numerous, rough, angular, fomewhat kidney-fhaped.

Obf.

Obſ. R. *graveolens*, and ſome others, in all except the primary flowers, exclude one-fifth of every part of the fructification. In *R. chalepenſis* the petals are fringed at the baſe.

Eſſ. Ch. Calyx in five deep ſegments. Petals concave, Receptacle ſurrounded with ten honey-bearing pores. Capſule lobed. Seeds numerous. Anthers ſimple.

1. R. *graveolens*. Common Rue. Linn. Sp. Pl. 548. Willd. n. 1. Ait. n. 1. Bulliard Herb. t. 85. (Ruta; Matth. Valgr. v. 2. 95. R. hortenſis, et montana; Ger. Em. 1255.)—Leaves repeatedly compound; leaflets oblong; the terminal one obovate. Petals entire.—Native of the ſouth of Europe. Frequent in the iſlands of the Archipelago. A hardy ſhrub, cultivated, time out of mind, in our gardens, where it flowers from June to September, and propagates itſelf ſpontaneouſly by ſeed. The *ſtem* is buſhy, riſing to the height of ſeveral feet, round, ſmooth, branched. *Leaves* alternate, ſtalked, twice or thrice compound, ſmooth, of a deep blueiſh glaucous hue; their leaflets oblong or obovate, entire, tapering at the baſe. *Stipulas* none. *Flowers* of a rather dull yellow, copious, in terminal corymboſe *panicles;* the terminal ones only having the full number of each of the parts of fructification, while the reſt are octandrous and four-cleft. *Petals* jagged at the extremity; angular, but not fringed, at the baſe. The *ſtamens* of this, and perhaps all the other ſpecies, are remarkable for their progreſſive approach to the *ſtigma*, over which they in turn drop their pollen and retire. Every part of the plant when rubbed, or touched, has a peculiar acrid pungent ſmell, too ſtrong to be agreeable. The bruiſed leaves excoriate the lips and noſtrils, if incautiouſly applied, as they often are, to counteract bad ſmells; rue being ſuppoſed powerfully to prevent contagion. Its internal uſe is unſafe; yet we have known it eaten with bread and butter in no ſmall quantity; not altogether with impunity. Botaniſts diſtinguiſh two varieties; the wild, which has more oblong leaflets, or ſegments, and the garden rue, which has rounder ones. Gerarde has tranſpoſed the cuts of theſe, borrowed from Dodonæus.

2. R. *montana*. Mountain Rue. Ait. n. 2. Willd. n. 2. (R. legitima; Jacq. Ic. Rar. t. 76. R. ſylveſtris; Camer. Epit. 495. R. ſylveſtris minima; Ger. Em. 1255.)—Leaves repeatedly compound; leaflets all linear. Branches of the panicle racemoſe. Petals entire.—Native of dry hilly ſituations in the ſouth of Europe. Dr. Sibthorp found this ſpecies in various parts of Greece, and the neighbouring countries, and juſtly conſidered it as the πηγανον ορεινον, or Mountain Rue of Dioſcorides, for which moſt of the commentators of that old writer have miſtaken the wild, or narrower-leaved, *R. graveolens*. This is a hardy perennial herb, rather than a ſhrub, flowering in autumn in our gardens, where, however, though cultivated by Gérarde, it is now rarely to be ſeen. The plant is known by its more humble ſtature, and eſpecially by the very narrow *leaflets*. The radical *leaves* are crowded into a denſe tuft. Moſt of the *flowers* are four-cleft, as in the former. The branches of the *panicle* are racemoſe, and elongated. *Capſule* not half ſo big as in the Common Rue.

3. R. *chalepenſis*. African Rue. Linn. Mant. 69. Willd. n. 3. Ait. n. 3. Sm. Fl. Græc. Sibth. t. 368. (R. tenuifolia, florum petalis villis ſcatentibus; Moriſ. ſect. 5. t. 35.)—Leaves repeatedly compound; leaflets oblong or obovate. Petals with fringe-like teeth.—Native of Africa, as well as of Zante, and the iſles of the Archipelago. A common greenhouſe ſhrub, flowering at various ſeaſons, and chiefly diſtinguiſhed from the Common Rue by its larger *flowers*, whoſe *petals* are copiouſly fringed with taper teeth. Many of the *flowers* are four-cleft, and the *foliage* varies in breadth, as in that ſpecies.

4. R. *pinnata*. Wing-leaved Rue. Linn. Suppl. 232. Willd. n. 4. Ait. n. 4.—Leaves ſimply pinnate; leaflets lanceolate, tapering at the baſe, bluntly ſerrated. Petals ſomewhat notched.—Native of rocks in the Canary iſlands, from whence it was brought by Mr. Maſſon to Kew, in 1780. This is a greenhouſe ſhrub, flowering in ſpring and ſummer. It is very diſtinct from all the foregoing, reſembling the firſt in ſize and *infloreſcence*, but the *flowers* are ſmaller, with crenate, or ſlightly toothed, petals. The *leaves* are very different, compoſed of two or three pair of oppoſite *leaflets*, above an inch long, various in breadth, more or leſs obtuſe, with unequal blunt ſerratures; the odd one rather the largeſt, on a long ſtalk.

5. R. *patavina*. Three-leaved Rue. Linn. Sp. Pl. 549. Willd. n. 5. Sm. Fl. Græc. Sibth. t. 369, unpubliſhed. (Pſeudo-ruta patavina trifolia, floribus luteis umbellatis; Mich. Gen. 22. t. 19.)—Leaves ternate, ſeſſile. Stamens hairy. Germen creſted.—Originally diſcovered by Micheli on a hill near Arqua, not far from Padua. Dr. Sibthorp met with it on mount Parnaſſus. Linnæus had no ſpecimen, nor is the plant known in our gardens, ſo that it ſeems not to have fallen in the way of many botaniſts. The *root* is woody and perennial. *Stems* ſeveral, a foot high, erect, round, downy, leafy, branched at the baſe only. *Leaves* numerous, downy, of a light, rather glaucous green, alternate, ſeſſile, each compoſed of three, nearly equal, narrow, obtuſe, entire, ſlightly revolute *leaflets*, about an inch long. *Flowers* five-cleft, in a terminal, denſe, cymoſe *panicle*. *Calyx* hairy, ſpreading. *Petals* ovate, obtuſe, entire, of a pale dull yellow, with a green central rib. *Stamens* ten, not ſo long as the petals; their filaments hairy half way up. *Germen* five-lobed, covered with glandular tubercles, and crowned with numerous oblong, notched, creſt-like, leafy ſcales.

6. R. *linifolia*. Broad Flax-leaved Rue. Linn. Sp. Pl. 549. Willd. n. 6. Ait. n. 5. Andr. Repoſ. t. 565. Sm. Fl. Græc. Sibth. t. 370, unpubliſhed. (R. ſylveſtris linifolia hiſpanica; Bocc. Muſ. v. 1. 82. t. 73. f. 3. Barrel. Ic. t. 1186. R. montana, foliis integris ſubrotundis; Buxb. Cent. 2. 30. t. 28. f. 2.)—Leaves ſimple, obovate. Stamens hairy. Germen without a creſt.—Native of Spain, Cyprus, and various parts of Greece. The plant of Buxbaum, gathered by him in fields, after harveſt, near Rodoſtro, in Thrace, as far as can be diſcerned from his imperfect figure, does not deſerve to be conſidered as even a variety. This agrees with the laſt in general habit, but is more robuſt, the *flowers* more numerous, and of a deeper yellow. *Leaves* much broader, leſs glaucous, and all ſimple and ſolitary. *Stamens* much dilated, and very hairy, in their lower part. *Germen* roundiſh, five-lobed, ten-furrowed, rough with ſmall granulations, but entirely deſtitute of the leafy creſt, which, though ſo remarkable in *R. patavina*, is not expreſſed by the generally exact Micheli. The name of *linifolia*, uſually alluding to the Common Flax, is not well adapted to the plant we have been deſcribing, except we underſtand it as referring to ſome of the broad-leaved yellow ſpecies of *Linum*, between which and this *Ruta* there exiſt indeed many points of reſemblance.

7. R. *fruticuloſa*. Narrow Flax-leaved Rue. Labillard. Syr. faſc. 1. 13. t. 4. Willd. n. 7. (R. orientalis, linariæ folio, flore parvo; Tourn. Cor. 19. Buxb. Cent. 2. 30. t. 28. f. 1.)—Leaves ſimple, ovato-lanceolate. Cluſters corymboſe, of few flowers. Stamens hairy at the baſe. Germen hairy, without a creſt.—Gathered in Syria, near Damaſcus, by our worthy friend M. Labillardiere, to

whom

whom we are obliged for a ſpecimen. This ſpecies is not known in gardens. The *ſtem* is ſhrubby, a ſpan high, much branched, particularly from the baſe, round, downy, leafy. *Leaves* ſcattered, ſeſſile, downy, about half an inch, or rather more, in length. *Flowers* ſmall, five-cleft, yellowiſh, four or five together, forming ſhort ſimple *cluſters* at the ſummit of each *branch*. *Calyx* fringed with hairs, like the lower part of the *ſtamens*. *Germen* deeply five-lobed, clothed with fine hairs. The *petals* have ſhort claws, more evident, as Willdenow obſerves, than in the preceding.

Ruta, in *Gardening*, contains plants of the under-ſhrubby evergreen kinds, of which the ſpecies cultivated are: the common rue (R. graveolens); the mountain rue (R. montana); the African rue (R. chalepenſis); and the three-leaved rue (R. patavina).

In the firſt ſort the varieties are; the common broad-leaved rue, the narrow-leaved rue, and the variegated-leaved rue.

And in the third kind there are varieties with broad leaves and with narrow leaves.

Method of Culture.—All the ſpecies and varieties of theſe plants may be readily increaſed by feeds, ſlips, and cuttings. The feed ſhould be ſown in the open ground in March or April, on a bed of light earth, raking it in: the plants ſoon come up, which, when two or three inches high, ſhould be planted out in nurſery-rows, and watered till freſh rooted. And from the ſcattered or ſelf-ſown ſeeds of the common ſort, many young plants often riſe in autumn and ſpring, which form good plants; but by ſlips or cuttings is the moſt expeditious method of raiſing all the ſorts, as every ſlip or cutting of the young wood will readily grow. It is the only method by which the different varieties can be continued diſtinct. The ſlips or cuttings ſhould be made from the young ſhoots ſix or eight inches long, and planted in a ſhady border, in rows half a foot aſunder, giving a good watering, and repeating it occaſionally; by which they will ſoon emit roots below and ſhoots at top, ſo as to form little buſhy plants by the autumn following. And they all afford variety in the borders and other parts of gardens and pleaſure-grounds, and the firſt ſort and varieties are alſo uſeful medicinal plants. The third ſort ſhould have a dry ſoil and ſheltered ſituation, otherwiſe it does not ſucceed well.

Some of theſe plants may be uſed for variety in the borders and other parts of pleaſure-grounds, gardens, &c.

Ruta, in the *Materia Medica*. See Rue.

Ruta Baga, in *Agriculture*, a plant of the turnip kind, which has lately been introduced into field culture with great benefit to the farmer, as affording a ſupply of green food for the ſupport and fattening of ſheep or other live-ſtock, between the common turnip and graſs ſeaſons. This root has been conſidered by ſome as a mere variety of the yellow turnip, but it is found to differ very materially from it both in texture and other properties. With reſpect to the top, or ſtem, it has ſomething of the appearance of the rape, or cabbage kind; and the bottom, or that part of the root-bulb which is above the ſurface of the ground, is covered by a thick, green, tough cuticle or ſkin, which in ſome is ſmooth, but in others quite rough, and the internal fleſhy part is of a denſe, cloſe, firm conſiſtence, having a yellowiſh tinge, nearly ſimilar to that of the horn carrot. It has indeed been ſuſpected by ſome that there are two varieties of this valuable plant, the one having a *white*, and the other a *yellow* root, the latter being conſidered as much the beſt; but this ſeems to have ariſen from their having been grown from feed collected in the neighbourhood of plants of the turnip or cole kinds, as is fully ſhewn in the Surveys of the North Riding of Yorkſhire and Nottinghamſhire.

But the great inducements for the farmer to enter freely into the culture of this root are, according to Mr. Young, 1. If he has the right ſort of feed, the root yellow in fleſh, and rough in coat, it laſts through all froſts, and may be depended on for ſheep quite through the month of April, though drawn two months before, and ſpread on a graſs field. 2. It is an excellent and nouriſhing food for ſheep, and alſo for any ſort of cattle. 3. It is equal to potatoes, in keeping ſtock ſwine: a point of very great conſequence. 4. It is, next to carrots, the very beſt food that can be given to horſes. 5. It is ſown at a ſeaſon which leaves ample time, in caſe of a failure, to put in common turnips, or cabbages.

And in regard to the ſoils moſt proper for this root, thoſe of the good, rich, loamy kinds are perhaps the beſt; but it may be grown to advantage on many of thoſe that are too moiſt and heavy for the common turnip; where the land has been brought into a tolerably perfect ſtate of pulverization and mellowneſs, and been well enriched with manure before the feed was put into the ground, or the plants ſet out upon it; as it has been perhaps from the want of this full preparation of the land, and the putting in the feed of a bad kind, and at too late a period, that cultivators of this uſeful root have been ſo frequently diſappointed in obtaining good crops.

Seed.—In procuring the feed, it ſhould always be collected from ſuch plants as have been tranſplanted, and which are the moſt perfect of their kind, as where this is not the caſe, the cultivator can never be certain of having his plants of the proper ſort. The writer of the Eaſt Lothian Report on Agriculture has indeed obſerved, that as no dependence can be placed on the feed purchaſed in the ſhops, every farmer ought to raiſe feed for himſelf: this may be done with very little trouble, and at no expence; it is only neceſſary that the feed-plants be carefully placed by themſelves, and not allowed to be near other plants bearing flowers or feed, while they are in the ſame ſtate. The danger ſeems to reſult from plants of kinds nearly related to each other mixing the farina of their flowers, when growing to feed. The ruta baga ſeems much liable to ſome adulteration of this kind, and unleſs farmers guard againſt it, by taking the trouble to preſerve their own feed, they need hardly expect it genuine.

With reſpect to the quantity or proportion of feed that is made uſe of where the broad-caſt method is employed, it is generally about two pounds to the acre; but where the drill plan is purſued, a ſomewhat ſmaller proportion may be ſufficient: however, as it is moſtly found difficult to produce a ſufficient plant of this crop, it may be adviſeable never to be too ſparing in the article of feed. In all caſes new feed is to be conſtantly preferred, and when the ſeaſon is hot and dry, it may be of utility to have it prepared by ſteeping a ſhort time before ſowing it.

In what regards the time of ſowing, as this plant is much ſlower in its vegetation than that of the common turnip, it ought to be ſown or put into the ground at an earlier period, by which circumſtance, it will not only be more forwarded for the hoe, and more fully fixed and eſtabliſhed in the ſoil, but better protected from the attacks of the fly, and the heats of the enſuing ſummer months. It has been the too common practice of farmers to ſow this crop at the ſame time with that of the common turnip, by which the crops have often failed. But if put in a month or ſix weeks ſooner, it will be found more advantageous, as from about the latter end of April to the middle of May, or perhaps a little later in the northern diſtricts, as is ſhewn by the agricultural ſurveys of theſe counties. In different places different

ferent methods are practised in raising these kinds of crops; sometimes, instead of sowing the seed over the land in either the broast-cast or drill manner, it is sown upon nursery beds of good rich earth, and after the plants are sufficiently advanced, as where they are about the size of small cabbage-plants, they are transplanted into the field, and set out on raised drills, at the distance of eight or nine inches or more from each other, and a foot or more in the rows. The business of transplanting should, if possible, be performed when the weather is in a moist state. And this may perhaps be the best mode of executing the work where such crops are cultivated only to a small extent; but where they are grown upon a more extensive scale, the former are probably to be preferred, as being more expeditious and convenient, as well as more certain of affording a sufficient plant for a full crop. From the danger of these crops being destroyed by the ravages of the fly, it has been suggested by Mr. Young, that the best culture of this plant is to sow it where it is to remain, broad-cast, from the 10th of May to the end of the month; and of all others, the best preparation to secure a crop is that of paring and burning, for the fly being the grand enemy, from its coming so very slowly to the hoe, this operation not only proves by far the best preservative against that enemy, but also pushes the plants on in an accelerated vegetation, and thereby doubly secures the crop. If the seed cannot be thus put in on land so prepared, the next best management is, to sow it after common turnips fed on the land by sheep. If neither method suits, it must be put in on well pulverized soil, very amply manured.

On a well cultivated farm near Hampstead, in the county of Middlesex, the method of culture and expences attending it were these.

Expences of Cultivation of an Acre of Land.

	£	s.	d.
Three ploughings, at 10s. - - -	1	10	0
Three harrowings, at 5s. - - - -	0	15	0
Cleaning by hand-picking - -	0	10	0
Making up drills - - - - -	0	5	0
Dung and labour of putting it in, half only allowed to this crop - - -	2	10	0
Covering it up in drills - - -	0	5	0
Seed 2lb. - - . -	0	7	6
Drilling in ditto - - - -	0	1	0
Horse-hoeing twice - - -	0	1	8
Hand-hoeing twice - - -	0	12	0
Moulding up rows - - -	0	1	0
	6	18	2

And in this mode the crop was very good, being capable of being sold in 1806 at 12*l.* *per* acre; the turnips averaging about five pounds weight each, and a large portion rising as high as twelve. The crop was put in upon land that had previously borne winter tares. And under this management the cultivator has no doubt of raising still larger crops.

After-culture.—It is evident, that in the after-culture of this plant, from its advancing more slowly to the hoe, that it must require greater attention to keep it clean and free from weeds than that of the common turnip. The business of hoeing, both in the horse and hand methods, must therefore be more diligently practised, repeating the operations as often as may be sufficient for the purpose, keeping the mould constantly well broken down, and applied to the roots of the plants.

And the plants of the Swedish turnip are liable to be affected by the same causes as those of the common turnip, the fly especially, being equally, if not more prejudicial to these crops than those of the common turnip kind. And besides, they are apt to be greatly injured or destroyed by rabbits, hares, and different sorts of birds, both in their tops and roots.

It may be noticed, that there is much difference in the statements in regard to the amount of the produce in this sort of crop; but when it is put in at a sufficient early period, and the ground prepared and managed in the manner that has been stated above, it will probably in general equal, if not surpass, that of the common turnip. And when it is considered that the flesh of the roots is much more solid and compact, and abounds more with nutritious matter, the *real* quantity of food which they afford must probably be much greater. In the trials of the above cultivator, they are found to go one-third further in the fattening of cattle or other animals, than the common turnip. And the Rev. Mr. Close, in the ninth volume of the Bath papers, has recorded an experiment in the transplanted method upon ridges of the same dimensions as those used for the common turnip, and the produce was found, after they had sustained the frosts, in the month of March, without either tops or tails, and when perfectly free from dirt, to be thirty-two tons on the acre. Mr. Daiken has stated in the Nottinghamshire Report, their advantage in the feeding of horses for a few acres to have been as high as thirty pounds the acre. And in the experiments of others, as detailed in the Agricultural Report of the North Riding of Yorkshire, they have likewise been found in common heavier than those of common turnips, though in appearance, from the closeness of their texture, they did not seem to equal them. This is, however, only conjecture, and is quite at variance with what has been the result in other cases, where actual weighing and measuring have been had recourse to. In common soils, and the ordinary modes of cultivation and application of these crops, the quantity of produce on the acre must probably be rated considerably lower, as well as their value as food for live-stock.

On actually weighing a square perch of each of these different sorts of turnip crops in the month of November, in 1808, which were grown together in the same field, on the very same kind of land, at Quarmer Park, near Lancaster, under the excellent management of Charles Gibson, esq. the respective weights were found to stand thus:

	Cwt.	qrs.	lbs.
Common turnip - - - - - -	4	2	10
Ruta baga, or Swedish turnip - - -	4	2	7
Difference	0	0	3

Which is a very trifling superiority in favour of the former; and on account of the earliness of the season for the growth of the latter, they would in all probability soon exceed it, as they are well known to increase in size and weight to a considerable later period.

It may be stated, that this sort of crop has been found of vast use in the support of sheep and other sorts of live-stock, in the more late winter and early vernal months, where the common turnip is liable to become rotten; or run up to seed: as being much more easily preserved in a sound condition, from its greater power of resisting the effects of the season, even when taken up, as well as while in the ground. In some situations, in very severe seasons, it is however sometimes a little injured, when left in the ground through the winter. Mr. Close has however found, that by having the tops and tails removed when they first begin to shoot, and being

being ftacked, they may be kept till the latter end of May, and later probably if neceffary; but which can rarely be the cafe. In this manner an ufeful fupply of cattle food is provided for that difficult and haraffing period, when turnips or other fimilar forts of food get fcarce, exhaufted, or unfit for being employed, and when the grafs is not in a ftate to be made ufe of by the ftock. On thefe accounts it is of courfe of admirable advantage for the farmer to be well provided with crops of this kind, to the full extent of his live-ftock, in bringing them through the difficult months of March, April, and the early part of May. Its application has been to almoft all forts of domeftic animals: with neat cattle, both in fattening, and as an ordinary article of food, it has long been in ufe, it is faid, with much greater effect than the common turnip. It is given after being cut or chopped into fmall pieces: when given to milch cows, it is found to increafe the milk confiderably, and render it more rich, as well as to give it a finer colour; but we are afraid it in fome meafure affects the flavour, though fome have denied its having this effect.

And fheep fucceed well upon it, gaining much more while upon it than on the common turnip, but it has been objected to in this application, from its hardnefs being fuppofed to injure their teeth, when the root is well grown: this is, we believe, from experience to be only imaginary.

Alfo, in the North Riding of Yorkfhire, in the ftore-feeding of hogs, it has been found equal to potatoes. And as a food for labouring horfes, it is faid to be highly beneficial, as rendering a fmaller proportion of oats requifite, not being of fo loofening a quality as moft other roots. In this application, the roots, after being wafhed and having their tails cut off, are put as below, and cut or chopped into large pieces by fome fort of fharp tool acting in a high fort of tub or box for the purpofe. In fome of the northern diftricts it is given both in its raw ftate, or boiled and mixed with barley duft or broken corn. But as the roots are liable to be greatly injured by expofure after being cut, for this ufe as well as that of fattening cattle, not more than are neceffary for the daily confumption fhould be prepared at a time.

It may be neceffary as well as advantageous after this account of the culture and ufes of thefe turnips, to ftate the facts refpecting them, as they are found in thofe diftricts where they are become an article of almoft general growth. In Hertfordfhire, according to the Agricultural Survey of that diftrict, they have fo rapidly made their way, as to be found in the ufual management of great numbers of the common farmers: no trivial proof, the writer fays, of their obfervation, knowledge, and good fenfe. He adds that Mr. Byde has this year (1804) 25 acres of them; a very regular plant, promifing a great produce. He finds that fheep will not touch the common turnip, if they can get at thefe; but they are apt to break their teeth, from the greater hardnefs and folidity of the root. He alfo finds that they do not taint the milk of cows, like the common turnip; and are an ufeful food for horfes. He fows them from the 13th of May to the 20th of June. When fown very early, as in May, they are fo difficult to keep clean, that he prefers June. Mr. Byde reaps better crops of barley after them than after common turnips. And Mr. Greg, at Weftmill, has 25 acres: he has cultivated this crop for fome years, and generally on a large fcale. He manures for them with yard-muck, or pulverized rape-cake, from fix to twenty bufhels an acre, according to the foil, ufually with about twelve, and fows the feed early in May. He ftates them, from his experience, to be much better than the common turnips; as they never rot, let the weather be as fevere as it may, nor are they ftringy, when confumed late in the fpring. He informs him that the barley after them is not fo good as after other turnips eat earlier, but much better than when thofe turnips are confumed as late as the Swedifh; that they do not coft more in cultivation, yet are of double the value. The farmers fow them very generally, fo that few are to be found who fow none. Mr. Wittington, at Broadwater, is a confiderable cultivator of this plant. He prefers them to common turnips, and would fubftitute them for the greateft part of that crop. He fows foon after the firft week in May: for the value in feeding, time of confumption, duration, &c. he knows nothing equally valuable. The Rev. Mr. Keate, at Hatfield, is alfo confiderably in this cultivation, and with much fuccefs: he has had crops of them for five years. His crop this year amounts to five acres, which he viewed with great pleafure—a fine regular plant, very luxuriant; equally fet out, and quite clean. They were well manured with yard-dung, and the land ploughed four times. He fows in the middle of June: they had been hoed at the expence of feven fhillings *per* acre: part of the field had yielded a crop of winter tares. They have ufually come to a large fize on Mr. Keate's farm. He has fed horfes with them, entirely to his fatisfaction; and cuts the roots with a very fimple, effective turnip-flicer: each horfe had a bufhel every day, with chaff, but no oats; they did their work very well, and became fat while they were eating this turnip. Cows alfo do well on it; nor does it give their milk or butter any tafte, but increafes their milk confiderably. They are excellent alfo for fattening fheep. The culture is become very general through this county: fo that there are few farmers in it who are without a field of this excellent plant. He likewife fays that the marchionefs of Salifbury has many acres in great perfection, and finds them of incomparable ufe. But Mr. Stephenfon remarks, that their moft important ufe is fo late in the fpring, that it is difficult to introduce them in a regular courfe, and fow fpring corn in time: he thinks them rather applicable to a few fields out of a regular rotation for fowing fome other crop than barley or oats after them; fuch, for inftance, as winter tares. He may add buck-wheat alfo. Cows do very well on Swedifh turnips without hay, and give much milk; and thefe roots laft longer for fheep in confumption than an equal quantity of common turnips, but the fheep do not thrive equally. Mr. Deerman, of Aftwich, is a great friend to them; but obferves, that they throw the land out of courfe: as they are moft ufeful fo late in the feafon, that fpring corn cannot be fown after them, he thinks the beft way is to fow common turnips for the next crop, by which means alfo the land would be brought into remarkably high order. Mr. Marfh, his neighbour, makes the fame obfervation, but has, however, always fown fpring corn after them.

On this fubject it is further ftated, that Mr. Clarke, of Sandridgbury, has cultivated them eight or nine years with great fuccefs; having generally from 20 to 25 acres annually. He fows the laft week in May, and finds no difficulty with the fucceeding crop, which is always barley, and as good as any, and often the beft on his farm. He has eat them fo late as the 6th of May. Mr. Cotton, at Hempftead, cultivates, and has the higheft opinion of them; and has only one objection to them, their flow growth, which retards their hoeing. His corn grown after them is good. Mr. Pickford, at Market-ftreet, has 30 acres this year, a beautiful regular crop. He has from experience a great opinion of them, when applied to the fatting of oxen and fheep, and to the feeding of hogs; in which laft application he thinks them

them superior to potatoes. He saw above 500 hogs on his farm. On finding these roots so profitable, he grew no more potatoes. But Mr. Chapman, of Hitchin, is of opinion that this root demands a richer and stronger soil than the chalks and loams about Hitchin; for they have been cultivated some years, dunged for, and twice hoed, but the success has not been great. The farmers entertain a high opinion of them. And Mr. Hale, of King's Walden, has cultivated them four years; he sows them the latter end of May broad-cast; hoes them twice always, picks charlock by hand, and uses all for sheep and lambs: they have been very valuable indeed. In the spring of 1800, he could have sold the crop, eight acres, at 10*l.* *per* acre. In the beginning of March, common turnips being over, 200 sheep and 200 lambs, and 140 other sheep, were kept on them near seven weeks. The same field was to have been sown with barley, and ploughed twice, but being late, was sown with Swedish turnips again, and the crop, without manure, except two cart-loads of pigeons' dung, was in every respect as good as the other. This year the land was ploughed once, and sown with white oats, and the crop was equal to full eight quarters *per* acre. Last year he had fifteen acres, and this year eleven, of this root. Mr. Roberts, the steward, who has a farm himself, has nine acres this year, and intends never to be without them; being perfectly convinced that they are a most useful crop. The writer has not seen many finer crops than Mr. Hale's, and all the parts of a full yellow colour. Lord Clarendon has five or six acres every year, and finds them of capital use. His lordship sows in May, on land, upon which, in autumn, the dung was ploughed in, as he thinks it very essential for this crop; he stirs the land in April, and ploughs it in May for sowing: he sows three pounds *per* acre: they are hand-hoed twice: he first uses them in the beginning of March: he did not eat them last year until the 24th of April, and had a large barley crop after them. They run very much to top, more than common turnips, and if his lordship had none, he would buy them for the spring at a much greater price than common. He feeds first with ewes and lambs, and then store sheep follow and eat clean. Good barley always grows after them. He has only gravels to sow them on. Mr. Parker, at Munden, has also cultivated them four years: he has twenty acres this year, and had sixteen last year; and as many the year before. The yellow-fleshed turnip is much the best. He sows in May, hand-hoes twice, and has always very good crops. He feeds them on the land with sheep; and draws them for horses, for which stock they are very useful: he uses them also for beasts of all sorts; they are of prodigious utility in point of duration, and excellent, late in the spring, for straw-fed beasts. He grows as good spring corn after them as after common turnips; but manures for them rather higher than for other sorts. They are best on loamy land; do well on good gravel; but, on very sharp gravel, they should not be sown. His twenty-acred field this year, for such an extent, is the finest crop that the writer ever saw, the earl of Winchelsea's at Burley alone excepted; yet this crop is from the second sowing in June. Mr. Calvert, at Albury, has had them four years; has now seven or eight acres: he sows them at the end of May; and finds that there is not any thing so good for every animal for which he has tried them. He once gave a few to some fattening wethers that were at common turnips, and after eating them, they would not take again to the common turnips without much starving. He has had Swedish turnips and common turnips on each side of them in the same field, and sheep turned into the field would not touch the common turnip, but seized on the Swedish immediately. The yellow-fleshed is much superior to the white; and the rough-coated to the smooth skins. His present plan is, to assign two fields, well situated for the cattle and sheep, and to have one every year under the Swedish, and the other in common turnips, to follow each other, by which means no inconvenience will result from not getting the Swedish off in time for barley. But Mr. Hill, of Whittle, thinks they injure the land by late keeping and running to seed. However, Mr. Foster, of Royston, has a high opinion of them; and observes that they are peculiarly valuable in a chalky district, where turnips *must* be fed very early, or the barley crop lost; Swedish then come in when most wanted.

It is noticed that the writer concludes on these statements, that the plant, where the soil is not sufficiently rich, may probably give way; but as to the more common objection of some, that barley cannot follow, not to speak of the success with which so many others sow that grain, it may be observed, that the right system, where the objection has really some foundation, is hinted at in the preceding notes: common turnips, winter tares, or buck-wheat, may properly succeed; and this double fallow can scarcely fail of answering in the uncommon degree of cleanness, which must be the consequence. Another plan is, to draw such as would remain too late, and strew them on grass for cattle or sheep. The objection is, therefore, in any case easily remedied. And in the Agricultural Survey of Norfolk, it is stated that Mr. Walker, of Harpley, has cultivated them for some years with great success, generally has from twenty to thirty acres annually; feeds them off with sheep and bullocks, and can depend on them when common turnips are all rotten. This crop in 1800, notwithstanding the drought, was very fine. And Mr. Coke, of Holkham, has thirty acres this year, has cultivated them for several years with the greatest success, and esteems them as a very valuable acquisition. Mr. Syble, of South Walsham, had last year a crop of these roots, which came to a good size, but they were so hard that no stock which he tried liked them. But Mr. H. Blythe, of Burnham, had a field of them of great use in the spring; this year he has ten acres.

It may be remarked, upon the whole, that as the objections to this root, on the score of its being difficult to take up, and of its hurtful and inconvenient effects in remaining upon the land to so late a period, seem not well founded, or to be capable of being readily obviated, there can be no doubt but that it must be found of great advantage on most farms where much live-stock is kept, as a food to succeed that of the common turnip late in the spring, when scarcely any other sorts are to be had in plenty for the feeding of live-stock.

In some other districts they are also cultivated to considerable extent, and with much success and advantage, as in those of Oxfordshire, Essex, &c.: their introduction is likewise attempting in many others, where their utility and value are beginning to be known. In the first of the above counties, Mr. Edwards, who cultivates them largely, has a great opinion of them as a resource, when nothing else is to be had, particularly as a spring feed: though they lose their leaves in the winter, what they produce in the spring is very great. As good barley is got after them, in his management, as after common turnips, but they are supposed to draw the ground rather more: it is not known what could be done without them. Mr. James Payne also grows them largely, and has the highest opinion of their utility. They are found by him to be the most profitable of all ways, when applied in the fattening of young pigs called porkers; which should run about as usual during the time of their becoming fat, only having as much of this kind of food as they

they can eat. Nine porkers fed in this way paid each fixpence in the day, for fix weeks together; which is a remarkable fact, and highly valuable for the cultivators of this root to be acquainted with. Others have had equally great fuccefs in the fame way of ufing this root. Mr. Salmon likewife cultivates this root with much fuccefs, putting in the crops of it in the latter end of May, or early in the following month: ufes his own feed, which produces roots which are fingle with yellow-coloured flefh, and quite round in form: three hoeings are given in raifing them. They are applied as food for calves, fheep, cows, and pigs, being extremely ufeful in each of fuch modes: the pigs, however, have only the hulls, after other cattle. They are made ufe of to the end of April, when fpring wheat is fown on the fame land after them, and as good crops are procured as after any other fort of crop. They are fuppofed to produce fo much fertility, by the abundant ftock which they keep, that barley, if fown after them, would be all ftraw.

In fact, the farmers of this diftrict are ftated to feel a thorough conviction of the importance which is attached to them, and to be well informed of the beft modes of applying them in their confumption. Their ufe in feeding fheep is well underftood, and great reliance is placed on them as a late feed in difficult fpring feafons. The improved practice of giving them fliced in troughs to penned fheep, is highly worthy of the farmer's attention; and their application in the fattening of oxen, from ftores laid up and preferved for that purpofe, is of great importance, and highly deferves to be imitated by different other diftricts. And the difcovery which has been made of the young pigs termed porkers being moft profitably fattened upon them, is alone of very great confideration: but it requires to be further and more fully afcertained, by a fet of experiments inftituted exprefsly for the purpofe; as, fhould the fame fact turn out to be well eftablifhed, not only in this cafe, but upon foils fuperior in fertility to the red fand lands in the north of this diftrict, it would be a moft valuable difcovery indeed to the farming interefts of the whole country.

The practical circumftance of fowing winter tares upon a rich and full manuring, eating them off upon the land, and then immediately putting in a crop of this fort, is likewife fuppofed a method of cultivation which can fcarcely be exceeded, on fuch foils as are of a good quality. The fact of the barley crops after this root being found full as good as thofe after common turnips, alfo deferves to be attended to; as the cultivators who maintain it are perfectly aware, that roots, ftanding in the ground late in the fpring, muft neceffarily tend to draw the land more than if they were confumed at an earlier period; but this circumftance is found to be compenfated by the fheep, or other ftock, remaining fo much longer upon the ground.

In cafes where this fort of crop is removed from the field, there is no more objection on that account than in the cafe of common turnips; but it may be done with the very fuperior advantage, that this root can be kept in any method with perfect fafety, which is well known cannot be done with common turnips.

And in the latter of the above counties, the farmers find them equally valuable and ufeful in feeding and fattening different forts of live-ftock. By fome they are thought to be uncommonly ufeful, and to feed ftock in a manner which fhews their quality to be very rich in nourifhment. But when kept late, fpring tares, it is thought, fhould be fown after them, as barley is hazardous; and others find them much better for fattening fheep and bullocks than common turnips. They are the grand ftaple article for the latter purpofe, in fome inftances; one bufhel of them being found worth three of common turnips, in fuch an application. The beafts and hogs, which have once tafted them, refufe other turnips afterwards. Eight or nine quarters of barley are taken from the acre, in fome cafes, after this root; but the manuring for it was large. The leaves of the crops have fometimes been fed off in the autumn, which did not in the leaft hurt them; and though the fheep ate into fome of the roots, the froft had no other effect than to cover the wound with a thin fkin of putrefcence, leaving the reft of the root perfectly found. Half the crop has been drawn for horfes, which are found to be very fond of them; and they were afcertained to be nearly as ufeful as carrots in this application. They are alfo excellent for feeding and rearing young calves. The beft crops here feem to be raifed by full manuring, efpecially with long, frefh, unftirred dung from the farm-yard.

This root is likewife beginning to be efteemed, and a favourite with fome farmers, in the county of Berks, where it is found to have feveral advantages over the common turnip, efpecially thofe of refifting the fevereft frofts, and of being as good and fit for ufe in the beginning of the new year, as the other kind is at the end of the old one, and thus forming a link in the fucceffion of feed for live-ftock, and faving the expence of hay and other articles. From its fweetnefs, fuperior firmnefs, and more nutritious juicy quality, it is found more quick in its fattening properties; but from its more flow growth, it is fuppofed to exhauft the land to a greater degree: yet, where there are rich, deep, loamy foils, it is undoubtedly entitled to a preference, on thefe and many other accounts.

In Devonfhire, in the practice of Mr. Exter, the relative produce between the tranfplanted root of this kind and the Norfolk green turnip, under precifely the fame circumftances as to the nature and condition of the land, is ftated by Mr. Vancouver as 628 to 851; giving a moft decided preference to the former, after amply defraying the additional expence of tranfplanting.

Ruta Muraria, in *Botany*, Wall Rue, a common little European Fern, fo called from its general place of growth, and the refemblance of its deep glaucous green fronds, to the leaves of Rue. See Ruta, and Asplenium, fpecies 21.

RUTACEÆ, fo named from the genus *Ruta*, which is one of the tribe, is a natural order of plants, the 81ft in the fyftem of Juffieu, or the 21ft of his 13th clafs. The characters of this important clafs are given under Gerania. Of the order now before us, Juffieu muft be confidered as the founder. We fhall, therefore, exhibit his own view of it, though that view is very incomplete, and capable of being much improved and elucidated by recent difcoveries.

Calyx of one leaf, often in five deep fegments. *Petals* moftly five, alternate with the fegments of the calyx. *Stamens* definite, diftinct, generally ten, alternately oppofite to the petals and to the calyx. *Germen* fimple; ftyle folitary; ftigma fimple, or rarely divided. *Fruit* either of many cells, or many capfules, the cells or capfules moftly five, each containing one or more *feeds*, inferted into the inner angle. *Corculum* flat, in a flefhy *albumen*. *Stem* either herbaceous or fhrubby, rarely arboreous. *Leaves* in fome alternate, naked; in others accompanied by *ftipulas*, in which cafe they are moft ufually oppofite. *Flowers* either axillary or terminal.

Sect. 1. *Leaves with ftipulas, and moftly oppofite.*

This fection confifts of *Tribulus*, *Fagonia*, *Zygophyllum*, and *Guaiacum*, all Linnæan genera.

Sect. 2. *Leaves alternate, without ftipulas.*

 Ruta,

Ruta, *Peganum*, and *Dictamnus*.

Sect. 3. *Genera akin to the Rutaceæ.*

Melianthus, *Diosma*, *Empleurum* of Solander, and *Aruba* of Aublet.

The author obferves that the plants of the firft fection are moft akin to his *Gerania*, but differ from that order in having a flefhy *albumen* and a ftraight *corculum*. Their habit is more like *Caffia*, and its allies, among the leguminous family, which have likewife abruptly pinnated leaves, attended by ftipulas, as well as ten ftamens with one ftyle; but thefe *Rutaceæ* differ in having oppofite leaves, a fruit of many cells, and efpecially ftamens inferted into the receptacle, beneath the germen. He inquires whether *Quaffia*, *Thryallis*, *Trigonia*, &c. be akin to them? Alfo whether his two fections are with propriety combined together, and whether they ought not rather to conftitute different orders, diftinguifhed by the fruit? However this may be, he adds, the *Rutaceæ* are diftinguifhed, by the definite number of their ftamens, from both *Tiliaceæ* and *Cifti*, while the alternate fituation of thofe organs with refpect to the corolla, diftinguifhes this order from the *Berberides*.

The true idea of the order before us muft be taken from Juffieu's fecond fection, compofed of *Ruta*, *Peganum*, and *Dictamnus*, to which are, moft indubitably, to be added from his third, *Diofma* and *Empleurum*; but fcarcely the *Aruba* of Aublet, and certainly not *Melianthus*. The difcoveries in the fouthern hemifphere have made botanifts acquainted with many new genera of this tribe. (See PHEBALIUM, CORRÆA, CROWEA, ERIOSTEMON, and MELICOPE.) *Tetratheca*, however, is erroneoufly mentioned, under the laft article, as belonging to the fame family. We have always been inclined to refer OXALIS to it, (fee that article,) rather than to the *Gerania*, on account of the elaftic *arillus* of its feeds, fo analogous to what occurs in many *Rutaceæ*; at leaft *Oxalis* is a connecting link between the two orders.

The *Rutaceæ* are nearly all fhrubby; their *leaves* without *ftipulas*, coriaceous, or flightly flefhy, moftly fmooth, full of refinous dots ftrongly fcented, fometimes acid; ufually alternate and fimple; in fome inftances oppofite, whorled, or compound. *Flower-ftalks* moftly axillary, either fimple, aggregate, or forked. *Calyx* in four or five deep fegments. *Petals* four or five. *Stamens* almoft always twice as many as the petals; their filaments often peculiar in ftructure, with fome fort of appendages; the anthers not always terminal, fometimes fupported on a partial ftalk. *Style* fimple, connected with the inner angle of each cell of the germen, either at the fummit or bafe. *Capfule* of four or five cells, each lined with a membranous or horny, more or lefs elaftic, tunic, ferving to fcatter the *feeds*. Moft of the flowers are regular, *Dictamnus* being perhaps the only exception. It is an obfervation of our learned friend Mr. Correa, that every natural order feems to afford one genus, at leaft, with an irregular flower.

Our ZIERIA, Tr. of Linn. Soc. v. 4. 216, belongs to this order, and we truft will appear, in its proper place, hereafter. So likewife does BORONIA, which, having been accidentally omitted by the Rev. Mr. Wood, in vol. v. we fhall here defcribe.

BORONIA was fo named, by the writer of the prefent article, in memory of his faithful fervant and friend Francis Borone, born at Milan, April 6, 1769, who devoted himfelf to botany with an ardour, which his fingular turn for obfervation, and acutenefs of difcrimination, even with regard to the technical characters of plants, promifed to render eminently advantageous to the fcience. This ardour induced him to vifit Sierra Leone, as affiftant to Dr. Adam Afzelius, with whom he returned, rich in difcoveries and information, in the autumn of 1793. The next year he attended the late profeffor Sibthorp to Greece, and unfortunately died, by an accidental fall, at Athens, in October, 1794.—Sm. Tracts, 287. Poiret in Lamarck Dict. v. 8. 503. Ait. Hort. Kew. v. 2. 348.—Clafs and order, *Octandria Monogynia*. Nat. Ord. *Rutaceæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, in four deep, equal fegments, permanent. *Cor.* Petals four, equal, alternate with the calyx and much longer, feffile, withering. Nectary a glandular ring, furrounding the bafe of the germen. *Stam.* Filaments eight, fhorter than the corolla, inferted into the receptacle, alternately oppofite to the petals and calyx, flat, tapering, fringed, terminating varioufly, four of them a little the fhorteft; anthers of two cells, roundifh, incumbent, inferted on the infide below the fummit of each filament. *Pift.* Germen fuperior, ftanding on the nectary, conical, with four furrows; ftyle vertical, fhort; ftigma roundifh, fmooth, with four notches. *Peric.* Capfule of four diftinct lobes, foon feparating, compreffed, each of one cell, and two equal valves, lined with a bivalve elaftic tunic. *Seeds* one or two, oblong, compreffed, fmooth, polifhed.

Eff. Ch. Calyx in four deep fegments. Petals four. Anthers ftalked, below the fummit of the filaments. Style terminal, very fhort. Stigma capitate. Capfule of four compreffed lobes. Seeds with an elaftic tunic.

Sect. 1. *Leaves compound.*

1. B. *pinnata*. Hawthorn-fcented Boronia. Sm. Tr. 290. t. 4. Ait. n. 1. Andr. Repof. t. 58. Venten. Malmaif. t. 38. Poiret n. 4.—Leaves pinnate, entire, fmooth. Flower-ftalks axillary, forked. Filaments obtufe and glandular at the fummit.—Found in the neighbourhood of Port Jackfon, New South Wales. Firft raifed in England by Meffrs. Lee and Kennedy in 1794. It proves a favourite, but not common, green-houfe fhrub, flowering throughout the fpring, and much admired for the beauty as well as fcent of its flowers, which laft refembles hawthorn, approaching to *Heliotropium peruvianum*. The plant is fmooth, fhrubby, two or three feet high, with many roundifh, reddifh, leafy branches. *Leaves* oppofite, rarely three together, without *ftipulas*, of from three to five pair of feffile, lanceolate, pointed, entire *leaflets*; the terminal one rather fmaller than the reft; the common ftalk jointed, channelled, flightly winged, fmooth. *Panicles* axillary, forked, fmooth, with fquare ftalks, fwelling upward. *Bracteas* fmall, thick, oppofite, acute. *Calyx* reddifh. *Corolla* of a delicate pink. *Filaments* fringed with white woolly hairs to the very top, which terminates in a blunt glandular body, fometimes flightly hairy alfo, rifing above the *anther*, whofe ftalk is curved downwards, over the *ftigma*. *Germen* fmall, with a hairy *ftyle*. *Seeds* folitary, black, in a white, polifhed, rigid, elaftic tunic. The dried *petals* retain fomewhat of an acid tafte.

2. B. *alata*. Wing-ftalked Boronia. Sm. Tranf. of Linn. Soc. v. 8. 283.—Leaves pinnate, crenate; their common ftalk hairy. Flower-ftalks forked. Filaments obtufe. Anthers nearly terminal.—Gathered by Mr. Menzies, at King George's found, on the weft coaft of New Holland. Rather larger, and more handfome, than even the preceding. The *branches* are hairy, as well as the under fide of the common *footftalks*, efpecially at their joints. Thefe ftalks have alfo a more dilated wing, refembling *Fagara* in that refpect. *Leaflets*, moftly five pair, broad, elliptical, revolute, and crenate, with a hairy rib beneath. *Panicles* axillary, but all crowded about the tops of the branches, hairy, with fringed *bracteas*. *Flowers* larger than in *B. pinnata*; their dried petals with an opaque whitenefs

on the upper fide, reddifh-brown beneath. *Filaments* fringed all the way up, each terminating in a round knob, nearly on the top of which ftands the capillary ftalk bearing the *anther.*

3. B. *pilofa.* Hairy Boronia. Labill. Nov. Holl. v. 1. 97. t. 124. Poiret n. 1.—Leaves pinnate; leaflets linear-lanceolate, hairy, entire. Flowers folitary, axillary, and terminal, on ftalks longer than the leaves.—Native of the cape of Van Diemen. *Labillardiere.* A fmaller fhrub than the two preceding, being only from nine to eighteen inches high. *Leaflets* from five to eleven, fmall and narrow, each about half an inch long; their ftalks jointed, not winged. *Flowers* erect, about half the fize of *B. pinnata,* folitary, on fimple ftalks, bearing two pair of awl-fhaped *bracteas. Filaments* fringed, each with a round hairy head, beneath which the capillary footftalk of the *anther* is inferted.

4. B. *tetrandra.* Tetrandrous Boronia. Labill. Nov. Holl. v. 1. 98. t. 125. Poiret n. 2.—Leaves pinnate; leaflets obtufe, fmooth. Flowers folitary, axillary, on fhort recurved ftalks. Four of the ftamens awl-fhaped, without anthers.—Gathered by the fame botanift in Lewin's land, on the fouth coaft of New Holland. This fhrub is a cubit high and hairy, except the *leaflets,* which are of a very narrow obovate figure, obtufe and entire, about the fize and number of the laft. *Flowers* drooping, on fhort axillary ftalks. Four of the *filaments,* oppofite to the petals, are fomewhat club-fhaped, and bear the *anthers* on ftalks below the fummit; the reft, oppofite to the *calyx,* are awl-fhaped, rather longer, deftitute of *anthers* or their ftalks.

Sect. 2. *Leaves fimple.*

5. B. *ferrulata.* Rofe-fcented Boronia. Sm. Tr. 292. t. 5.—Leaves rhomboid, acute; unequally ferrated in the upper part. Flower-ftalks aggregate, terminal. Filaments heart-fhaped and hifpid at the fummit.—Gathered near Port Jackfon, New South Wales, by John White, M.D., to whom we are obliged for fpecimens and coloured drawings. A very elegant, fmooth, much branched *fhrub,* four feet high, not yet introduced into our green-houfes, though few can be more worthy of cultivation. The *leaves* are oppofite, numerous, rather crowded, hardly an inch long, fomewhat oblique, entire, and tapering towards the bafe, fharply ferrated or toothed above; fmooth on both fides, minutely dotted, with fcarcely any traces of ribs or veins; their colour often purplifh; their flavour approaching to that of turpentine. *Flowers* of a beautiful red, many together, in terminal corymbofe clufters; their fize rather exceeding that of the firft fpecies, and their fcent faid to refemble the fragrance of a rofe. The *filaments* are red, fringed with pale hairs chiefly at the bafe, each terminating in a globular, emarginate knob, covered with white prominent hairs, and largeft in the four longer ftamens. The *anthers* ftand, each on a deflexed ftalk, below this knob. *Style* very fhort. *Seeds* two in each elaftic tunic.

6. B. *crenulata.* Small-leaved notched Boronia. Sm. Tranf. of Linn. Soc. v. 8. 284.—Leaves obovate, with a fmall point, finely crenate. Stalks fingle-flowered, axillary, and terminal. Filaments obtufe and glandular at the fummit.—Gathered at King George's found, by Mr. Menzies, with the fecond fpecies. This appears at firft like a flender delicate variety of the *ferrulata,* the *leaves* being about one-third the fize of that fpecies; but they are obovate, minutely crenate, not fharply toothed. The *flowers* effentially differ, being much fmaller, axillary, as well as terminal, and all folitary, on bracteated angular *ftalks,* fhorter than the leaves. *Calyx* fringed. *Filaments* denfely fringed throughout, obtufe, but not inverfely heart-fhaped, at the top, neither are they briftly, though glandular, there; below the fummit they are tumid and inflexed; and the footftalks of the *anthers* are nearly terminal.

7. B. *denticulata.* Narrow-leaved toothed Boronia. Sm. Tranf. of Linn. Soc. v. 8. 284.—Leaves linear, toothed. Flower-ftalks corymbofe. Filaments obtufe and glandular at the fummit.—Found by Mr. Menzies with the laft. A branched, fmooth, erect fhrub, with longer, and much narrower, *leaves* than in any other known fpecies of this genus, their margins regularly, and rather ftrongly, but obtufely, toothed; their bafe tapering down into a fort of *footftalk. Flowers* in axillary or terminal fmooth *corymbs,* with fmall deciduous *bracteas. Calyx* fmooth. *Petals* of a pale rofe-colour, with a dark red rib, their fize not much above half that of the *B. pinnata. Filaments* but flightly fringed, their fummits obtufe and glandular, but not hairy. *Anthers* on lateral horizontal ftalks.

8. B. *parviflora.* Pale-flowered Boronia. Sm. Tr. 295. t. 6.—Leaves obovato-lanceolate, obfcurely crenate. Stalks aggregate, terminal, fingle-flowered. Filaments oblong and glandular at the fummit.—Gathered near Port Jackfon, by Dr. White, who fent us fpecimens and drawings in 1795. A fmooth erect fhrub, a foot or more in height, moft branched and leafy at the top. *Leaves* obovate, or elliptic-lanceolate, oppofite, as in all the preceding fpecies of the prefent fection, hardly an inch long, flightly crenate, chiefly towards the end, fmooth dotted, veinlefs, a little aromatic. *Flower-ftalks* fmooth, fimple, club-fhaped, three together at the fummit of each branch, with two axillary ones occafionally from the adjoining pair of leaves. Sometimes one or two leafy branches are extended beyond the inflorefcence. *Bracteas* two or four, ovate, concave, fmooth, at the common bafe of the ftalks. *Flowers* fmall. *Calyx* purplifh, half as long as the *petals,* which are ovate, pointed, pale blufh-coloured, with a red mid-rib. *Filaments* pink, fringed with white hairs, and terminating in an oblong, obtufe, fmall, flightly glandular, but not hairy, appendage, below which the *anther* projects laterally, on a horizontal ftalk.

9. B. *pilonema.* Single-flowered Boronia. Labill. Nov. Holl. v. 1. 98. t. 126. Poiret n. 3.—Leaves elliptic-oblong, entire. Stalks terminal, folitary, fingle-flowered, without bracteas. Filaments fmooth, their fummit very fhort.—Found by Labillardiere, at cape Van Diemen. The *root* is knotty at the fummit, producing feveral upright, fimple, round, rather fhrubby, *ftems,* about half a foot high. *Leaves* oppofite or three together, dotted, not an inch long, entire, acute, without rib or veins. *Flower-ftalks* erect, fwelling upwards, longer than the leaves, naked. *Flowers* about the fize of the laft. *Calyx* fmooth, nearly as long as the *petals. Filaments* awl-fhaped, fmooth, fimple, their minute points hardly extended beyond the infertion of the little ftalk of the *anther,* which however is marginal, or lateral. The author fufpected this plant to be very nearly related to the laft, from which neverthelefs he rightly diftinguifhes it by the folitary *flowers,* unaccompanied by *bracteas,* and the fmooth *ftamens,* whofe points fcarcely project above the fpot where the *anther* is inferted, fo that the latter ftands above the *filament,* like a little hat, or cap; a circumftance perhaps alluded to in the name. The habit of this fpecies, particularly the *root,* feems moft to refemble the following.

10. B. *polygalifolia.* Milkwort-leaved Boronia. Sm. Tr. 297. t. 7.—Leaves linear-lanceolate, entire. Stalks axillary, folitary, fingle-flowered, much fhorter than the leaves. Filaments hairy, their fummit fhort and blunt.—Native of the neighbourhood of Port Jackfon. The *root* is woody and knotty like the laft, throwing up many *ftems,* which

which are ſimple and leafy, as in that ſpecies, and the ſame height, but appear to be herbaceous rather than ſhrubby. *Leaves* moſtly oppoſite, very rarely alternate, ſometimes three together, almoſt ſeſſile, an inch or more in length, acute at each end, entire, dotted, with one central rib; their under ſide paleſt. *Flower-ſtalks* erect, club-ſhaped, not a quarter the length of the leaves, angular, with a pair of ſmall *bracteas* about the middle. *Calyx* ſmall, green, ſmooth. *Petals* five times as long as the calyx, roſe-coloured, tipped with deeper crimſon. *Filaments* pale, fringed to the top, obtuſe, though ſcarcely extended beyond the point where the ſtalk of the drooping *anther* is laterally inſerted. *Style* about as long as the *germen*, firmly attached to its top, ſo as to ſplit into four parts with the ſeparating cells of the fruit. *Seeds* ſolitary. The various diſtribution of the *leaves* in this ſpecies is peculiar to it. The *ſtems* are very rarely branched.

RUTE, in *Geography*, a town of Spain, in the province of Cordova; 5 miles S. of Lucena.

RUTENI Provinciales, in *Ancient Geography*, a people of Gallia Narbonnenſis, according to Pliny. Cæſar (Bell. Gall. l. vii. c. 7.) mentions them. Theſe people inhabited the territory to the left of the Tarn.

RUTGERS, John, in *Biography*, an able critic and negociator, was born of an ancient family at Dordrecht, in 1589. He received a part of his early education under Gerard Voſſius, and in 1605 was ſent to Leyden, where he reſided with Dominic Baudius. Having completed his courſe, he travelled into France, and took the degree of licentiate in law at Orleans. While at Paris, he printed, at the office of Robert Stephens, an edition of Horace, with notes; which was afterwards reprinted by Burmann, at Leyden, in 1699. When he returned to Holland, he accepted the invitation of the Swediſh ambaſſador to accompany him to Sweden, where Guſtavus Adolphus, in 1614, conferred upon him the title of his counſellor. He was, after this, employed three times as envoy from that prince to Holland upon very important affairs, in which he acquitted himſelf with great credit, and quite to the ſatisfaction of his majeſty, who ennobled him in 1619. He viſited Bohemia, Denmark, and ſeveral German courts, in the ſame quality; and laſtly he reſided at the Hague, as miniſter from Guſtavus to that republic, where he died in 1625, at the age of 36. He had publiſhed in 1618 ſix books, entitled "Variæ Lectiones;" and after his death, Heinſius publiſhed his Latin poems in conjunction with his own.

RUTH, in *Biblical Hiſtory*, a ſacred book of ſcripture, admitted into the canon, and placed in our bibles between the book of Judges and thoſe of Samuel, as being the ſequel of the former and an introduction to the latter. St. Jerome informs us, that the Jews added it to the book of Judges, becauſe the tranſactions which it records happened in the time of the judges of Iſrael (Judges, ii. 1.); and ſeveral of the ancient fathers make but one book of the Judges and Ruth. But the modern Jews place in their bibles, after the Pentateuch, the five megilloth, *viz.* the Song of Songs, Ruth, the Lamentations of Jeremiah, Eccleſiaſtes, and Eſther. Ruth is ſometimes placed the firſt of the five, ſometimes the ſecond, and ſometimes the fifth.

The ſcope of the author of this book is to relate the genealogy of David; and hence it has been conjectured, that the firſt book of Samuel was compoſed by the ſame author; in which book he could not conveniently place the genealogy of David, and he therefore choſe to give it by itſelf. The writer obſerves, at the beginning of his work, that the hiſtory he propoſed to relate happened when the judges governed Iſrael; and, therefore, they ceaſed to govern it when he wrote. He alſo ſpeaks of David at the end of his book; which ſhews, that the earlieſt period that can be aſſigned to it muſt be the time of David. Beſides, there are two modes of expreſſion in it, which occur only in the books of Samuel and of the Kings. The firſt is, "The Lord do ſo to me, and more alſo," Ruth, i. 17. Compare 1 Sam. iii. 17. xiv. 44. xx. 23. 2 Sam. iii. 9. 35. xiv. 13. 1 Kings, ii. 23. xix. 2. xx. 10. 2 Kings, vi. 31. The ſecond phraſe is, "I have diſcovered to your ear," for "I have told you," Ruth, iv. 4. Compare 1 Sam. xx. 2. 2 Sam. vii. 27. The canonicalneſs of this book was never diſputed. Ruth the Moabiteſs occurs in the genealogy of our Saviour, Matt. i. 5.

Ruth had married the ſon of Elimelech and Naomi, who had ſettled for ſome time in Moab; but being deſirous of returning to Bethlehem, her own country, after having loſt her huſband and two ſons, was accompanied by her daughter-in-law Ruth. This event happened, according to Uſher, about 120 years after the time of Joſhua. When Naomi came to Bethlehem, Ruth went to the fields in order to glean for their ſupport; and by chance entering the field of a rich citizen of Bethlehem, named Boaz, who was related to Elimelech, her father-in-law, received from him civilities, which indicated his affection for her. In proceſs of time, Ruth became the wife of Boaz, by whom ſhe had a ſon called Obed, who was father to Jeſſe, and grandfather to king David. Such is an outline of the hiſtory contained in the book of Ruth.

RUTHE, in *Commerce*, a long meaſure at Amſterdam, which is equal to 13 feet, or 143 inches, the Amſterdam foot being = $11\frac{1}{7}$ inches; the Rhineland foot of 12 inches being = $12\frac{1}{3}$ Engliſh inches. At Berlin the ruthe is = 12 Rhineland feet = $148\frac{2}{7}$ Engliſh inches. At Hamburgh the ruthe or perch is of two ſorts: one is 7 ells, or 14 feet; the other 8 ells, or 16 feet, Hamburgh meaſure. The Rhineland ruthe (12 Rhineland feet) is $13\frac{1}{7}$ Hamburgh feet, or $12\frac{1}{10}$ Engliſh feet. A Hamburgh mile contains 2000 Rhineland ruthes, or 8244 Engliſh yards: hence $14\frac{4}{5}$ ſuch miles anſwer nearly to a degree of the meridian, and 16 Hamburgh miles to 75 Engliſh miles. A ſcheffel of corn-land contains 200 ſquare ruthes, each 256 Hamburgh ſquare feet, which gives 166 Engliſh ſquare perches, or 1 acre 6 perches. A morgen or acre of land contains 600 ſquare ruthes, each ruthe being 196 Hamburgh ſquare feet, which equal 2 acres $6\frac{1}{7}$ perches, Engliſh meaſure. See Measure. Kelly's Un. Camb.

RUTHERFORD, in *Geography*, a county of Morgan diſtrict, in North Carolina, bounded N. by Burke, and S. by the ſtate of South Carolina. It contains 13,202 inhabitants.

Rutherford, the capital of the above county, which has a court-houſe, gaol, and a few houſes.

RUTHERFORTH, Thomas, in *Biography*, was born at Papſworth-Everhard, in Cambridgeſhire, in 1712. Having paſſed through the elementary parts of his education, he was entered at St. John's college, in the univerſity of Cambridge, where he took his degrees in the arts, and obtained a fellowſhip in the college. He was afterwards appointed regius profeſſor of divinity in the univerſity, and created D.D. Being attached to, and well verſed in, mathematics and natural philoſophy, he was elected a fellow of the Royal Society, and was afterwards appointed a chaplain to his royal highneſs the prince of Wales. In the church he was rector of Barley in Hertfordſhire, and of Shenfield in Eſſex, and an archdeacon. He died in October, 1771, having nearly completed his 59th year. He was author of

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on the upper fide, reddifh-brown beneath. *Filaments* fringed all the way up, each terminating in a round knob, nearly on the top of which ftands the capillary ftalk bearing the *anther*.

3. B. *pilofa*. Hairy Boronia. Labill. Nov. Holl. v. 1. 97. t. 124. Poiret n. 1. — Leaves pinnate; leaflets linear-lanceolate, hairy, entire. Flowers folitary, axillary, and terminal, on ftalks longer than the leaves.—Native of the cape of Van Diemen. *Labillardiere*. A fmaller fhrub than the two preceding, being only from nine to eighteen inches high. *Leaflets* from five to eleven, fmall and narrow, each about half an inch long; their ftalks jointed, not winged. *Flowers* erect, about half the fize of *B. pinnata*, folitary, on fimple ftalks, bearing two pair of awl-fhaped *bracteas*. *Filaments* fringed, each with a round hairy head, beneath which the capillary footftalk of the *anther* is inferted.

4. B. *tetrandra*. Tetrandrous Boronia. Labill. Nov. Holl. v. 1. 98. t. 125. Poiret n. 2. — Leaves pinnate; leaflets obtufe, fmooth. Flowers folitary, axillary, on fhort recurved ftalks. Four of the ftamens awl-fhaped, without anthers.—Gathered by the fame botanift in Lewin's land, on the fouth coaft of New Holland. This fhrub is a cubit high and hairy, except the *leaflets*, which are of a very narrow obovate figure, obtufe and entire, about the fize and number of the laft. *Flowers* drooping, on fhort axillary ftalks. Four of the *filaments*, oppofite to the petals, are fomewhat club-fhaped, and bear the *anthers* on ftalks below the fummit; the reft, oppofite to the *calyx*, are awl-fhaped, rather longer, deftitute of *anthers* or their ftalks.

Sect. 2. *Leaves fimple.*

5. B. *ferrulata*. Rofe-fcented Boronia. Sm. Tr. 292. t. 5.—Leaves rhomboid, acute; unequally ferrated in the upper part. Flower-ftalks aggregate, terminal. Filaments heart-fhaped and hifpid at the fummit.—Gathered near Port Jackfon, New South Wales, by John White, M.D., to whom we are obliged for fpecimens and coloured drawings. A very elegant, fmooth, much branched *fhrub*, four feet high, not yet introduced into our green-houfes, though few can be more worthy of cultivation. The *leaves* are oppofite, numerous, rather crowded, hardly an inch long, fomewhat oblique, entire, and tapering towards the bafe, fharply ferrated or toothed above; fmooth on both fides, minutely dotted, with fcarcely any traces of ribs or veins; their colour often purplifh; their flavour approaching to that of turpentine. *Flowers* of a beautiful red, many together, in terminal corymbofe clufters; their fize rather exceeding that of the firft fpecies, and their fcent faid to refemble the fragrance of a rofe. The *filaments* are red, fringed with pale hairs chiefly at the bafe, each terminating in a globular, emarginate knob, covered with white prominent hairs, and largeft in the four longer ftamens. The *anthers* ftand, each on a deflexed ftalk, below this knob. *Style* very fhort. *Seeds* two in each elaftic tunic.

6. B. *crenulata*. Small-leaved notched Boronia. Sm. Tranf. of Linn. Soc. v. 8. 284.—Leaves obovate, with a fmall point, finely crenate. Stalks fingle-flowered, axillary, and terminal. Filaments obtufe and glandular at the fummit.—Gathered at King George's found, by Mr. Menzies, with the fecond fpecies. This appears at firft like a flender delicate variety of the *ferrulata*, the *leaves* being about one-third the fize of that fpecies; but they are obovate, minutely crenate, not fharply toothed. The *flowers* effentially differ, being much fmaller, axillary, as well as terminal, and all folitary, on bracteated angular *ftalks*, fhorter than the leaves. *Calyx* fringed. *Filaments* denfely fringed throughout, obtufe, but not inverfely heart-fhaped, at the top, neither are they briftly, though glandular, there; below the fummit they are tumid and inflexed; and the footftalks of the *anthers* are nearly terminal.

7. B. *denticulata*. Narrow-leaved toothed Boronia. Sm. Tranf. of Linn. Soc. v. 8. 284.—Leaves linear, toothed. Flower-ftalks corymbofe. Filaments obtufe and glandular at the fummit.—Found by Mr. Menzies with the laft. A branched, fmooth, erect fhrub, with longer, and much narrower, *leaves* than in any other known fpecies of this genus, their margins regularly, and rather ftrongly, but obtufely, toothed; their bafe tapering down into a fort of *footftalk*. *Flowers* in axillary or terminal fmooth *corymbs*, with fmall deciduous *bracteas*. *Calyx* fmooth. *Petals* of a pale rofe-colour, with a dark red rib, their fize not much above half that of the *B. pinnata*. *Filaments* but flightly fringed, their fummits obtufe and glandular, but not hairy. *Anthers* on lateral horizontal ftalks.

8. B. *parviflora*. Pale-flowered Boronia. Sm. Tr. 295. t. 6.—Leaves obovato-lanceolate, obfcurely crenate. Stalks aggregate, terminal, fingle-flowered. Filaments oblong and glandular at the fummit.—Gathered near Port Jackfon, by Dr. White, who fent us fpecimens and drawings in 1795. A fmooth erect fhrub, a foot or more in height, moft branched and leafy at the top. *Leaves* obovate, or elliptic-lanceolate, oppofite, as in all the preceding fpecies of the prefent fection, hardly an inch long, flightly crenate, chiefly towards the end, fmooth dotted, veinlefs, a little aromatic. *Flower-ftalks* fmooth, fimple, club-fhaped, three together at the fummit of each branch, with two axillary ones occafionally from the adjoining pair of leaves. Sometimes one or two leafy branches are extended beyond the inflorefcence. *Bracteas* two or four, ovate, concave, fmooth, at the common bafe of the ftalks. *Flowers* fmall. *Calyx* purplifh, half as long as the *petals*, which are ovate, pointed, pale blufh-coloured, with a red mid-rib. *Filaments* pink, fringed with white hairs, and terminating in an oblong, obtufe, fmall, flightly glandular, but not hairy, appendage, below which the *anther* projects laterally, on a horizontal ftalk.

9. B. *pilonema*. Single-flowered Boronia. Labill. Nov. Holl. v. 1. 98. t. 126. Poiret n. 3. — Leaves elliptic-oblong, entire. Stalks terminal, folitary, fingle-flowered, without bracteas. Filaments fmooth, their fummit very fhort. — Found by Labillardiere, at cape Van Diemen. The *root* is knotty at the fummit, producing feveral upright, fimple, round, rather fhrubby, *ftems*, about half a foot high. *Leaves* oppofite or three together, dotted, not an inch long, entire, acute, without rib or veins. *Flower-ftalks* erect, fwelling upwards, longer than the leaves, naked. *Flowers* about the fize of the laft. *Calyx* fmooth, nearly as long as the *petals*. *Filaments* awl-fhaped, fmooth, fimple, their minute points hardly extended beyond the infertion of the little ftalk of the *anther*, which however is marginal, or lateral. The author fufpected this plant to be very nearly related to the laft, from which neverthelefs he rightly diftinguifhes it by the folitary *flowers*, unaccompanied by *bracteas*, and the fmooth *ftamens*, whofe points fcarcely project above the fpot where the *anther* is inferted, fo that the latter ftands above the *filament*, like a little hat, or cap; a circumftance perhaps alluded to in the name. The habit of this fpecies, particularly the *root*, feems moft to refemble the following.

10. B. *polygalifolia*. Milkwort-leaved Boronia. Sm. Tr. 297. t. 7.—Leaves linear-lanceolate, entire. Stalks axillary, folitary, fingle-flowered, much fhorter than the leaves. Filaments hairy, their fummit fhort and blunt.—Native of the neighbourhood of Port Jackfon. The *root* is woody and knotty like the laft, throwing up many *ftems*, which

which are simple and leafy, as in that species, and the same height, but appear to be herbaceous rather than shrubby. *Leaves* mostly opposite, very rarely alternate, sometimes three together, almost sessile, an inch or more in length, acute at each end, entire, dotted, with one central rib; their under side palest. *Flower-stalks* erect, club-shaped, not a quarter the length of the leaves, angular, with a pair of small *bracteas* about the middle. *Calyx* small, green, smooth. *Petals* five times as long as the calyx, rose-coloured, tipped with deeper crimson. *Filaments* pale, fringed to the top, obtuse, though scarcely extended beyond the point where the stalk of the drooping *anther* is laterally inserted. *Style* about as long as the *germen*, firmly attached to its top, so as to split into four parts with the separating cells of the fruit. *Seeds* solitary. The various distribution of the *leaves* in this species is peculiar to it. The *stems* are very rarely branched.

RUTE, in *Geography*, a town of Spain, in the province of Cordova; 5 miles S. of Lucena.

RUTENI Provinciales, in *Ancient Geography*, a people of Gallia Narbonnensis, according to Pliny. Cæsar (Bell. Gall. l. vii. c. 7.) mentions them. These people inhabited the territory to the left of the Tarn.

RUTGERS, John, in *Biography*, an able critic and negociator, was born of an ancient family at Dordrecht, in 1589. He received a part of his early education under Gerard Vossius, and in 1605 was sent to Leyden, where he resided with Dominic Baudius. Having completed his course, he travelled into France, and took the degree of licentiate in law at Orleans. While at Paris, he printed, at the office of Robert Stephens, an edition of Horace, with notes; which was afterwards reprinted by Burmann, at Leyden, in 1699. When he returned to Holland, he accepted the invitation of the Swedish ambassador to accompany him to Sweden, where Gustavus Adolphus, in 1614, conferred upon him the title of his counsellor. He was, after this, employed three times as envoy from that prince to Holland upon very important affairs, in which he acquitted himself with great credit, and quite to the satisfaction of his majesty, who ennobled him in 1619. He visited Bohemia, Denmark, and several German courts, in the same quality; and lastly he resided at the Hague, as minister from Gustavus to that republic, where he died in 1625, at the age of 36. He had published in 1618 six books, entitled "Variæ Lectiones;" and after his death, Heinsius published his Latin poems in conjunction with his own.

RUTH, in *Biblical History*, a sacred book of scripture, admitted into the canon, and placed in our bibles between the book of Judges and those of Samuel, as being the sequel of the former and an introduction to the latter. St. Jerome informs us, that the Jews added it to the book of Judges, because the transactions which it records happened in the time of the judges of Israel (Judges, ii. 1.); and several of the ancient fathers make but one book of the Judges and Ruth. But the modern Jews place in their bibles, after the Pentateuch, the five megilloth, *viz.* the Song of Songs, Ruth, the Lamentations of Jeremiah, Ecclesiastes, and Esther. Ruth is sometimes placed the first of the five, sometimes the second, and sometimes the fifth.

The scope of the author of this book is to relate the genealogy of David; and hence it has been conjectured, that the first book of Samuel was composed by the same author; in which book he could not conveniently place the genealogy of David, and he therefore chose to give it by itself. The writer observes, at the beginning of his work, that the history he proposed to relate happened when the judges governed Israel; and, therefore, they ceased to govern it when he wrote. He also speaks of David at the end of his book; which shews, that the earliest period that can be assigned to it must be the time of David. Besides, there are two modes of expression in it, which occur only in the books of Samuel and of the Kings. The first is, "The Lord do so to me, and more also," Ruth, i. 17. Compare 1 Sam. iii. 17. xiv. 44. xx. 23. 2 Sam. iii. 9. 35. xiv. 13. 1 Kings, ii. 23. xix. 2. xx. 10. 2 Kings, vi. 31. The second phrase is, "I have discovered to your ear," for "I have told you," Ruth, iv. 4. Compare 1 Sam. xx. 2. 2 Sam. vii. 27. The canonicalness of this book was never disputed. Ruth the Moabitess occurs in the genealogy of our Saviour, Matt. i. 5.

Ruth had married the son of Elimelech and Naomi, who had settled for some time in Moab; but being desirous of returning to Bethlehem, her own country, after having lost her husband and two sons, was accompanied by her daughter-in-law Ruth. This event happened, according to Usher, about 120 years after the time of Joshua. When Naomi came to Bethlehem, Ruth went to the fields in order to glean for their support; and by chance entering the field of a rich citizen of Bethlehem, named Boaz, who was related to Elimelech, her father-in-law, received from him civilities, which indicated his affection for her. In process of time, Ruth became the wife of Boaz, by whom she had a son called Obed, who was father to Jesse, and grandfather to king David. Such is an outline of the history contained in the book of Ruth.

RUTHE, in *Commerce*, a long measure at Amsterdam, which is equal to 13 feet, or 143 inches, the Amsterdam foot being = $11\frac{1}{7}$ inches; the Rhineland foot of 12 inches being = $12\frac{1}{3}$ English inches. At Berlin the ruthe is = 12 Rhineland feet = $148\frac{2}{7}$ English inches. At Hamburgh the ruthe or perch is of two sorts: one is 7 ells, or 14 feet; the other 8 ells, or 16 feet, Hamburgh measure. The Rhineland ruthe (12 Rhineland feet) is $13\frac{1}{7}$ Hamburgh feet, or $12\frac{1}{10}$ English feet. A Hamburgh mile contains 2000 Rhineland ruthes, or 8244 English yards: hence $14\frac{4}{5}$ such miles answer nearly to a degree of the meridian, and 16 Hamburgh miles to 75 English miles. A scheffel of corn-land contains 200 square ruthes, each 256 Hamburgh square feet, which gives 166 English square perches, or 1 acre 6 perches. A morgen or acre of land contains 600 square ruthes, each ruthe being 196 Hamburgh square feet, which equal 2 acres $6\frac{1}{2}$ perches, English measure. See Measure. Kelly's Un. Camb.

RUTHERFORD, in *Geography*, a county of Morgan district, in North Carolina, bounded N. by Burke, and S. by the state of South Carolina. It contains 13,202 inhabitants.

Rutherford, the capital of the above county, which has a court-house, gaol, and a few houses.

RUTHERFORTH, Thomas, in *Biography*, was born at Papsworth-Everhard, in Cambridgeshire, in 1712. Having passed through the elementary parts of his education, he was entered at St. John's college, in the university of Cambridge, where he took his degrees in the arts, and obtained a fellowship in the college. He was afterwards appointed regius professor of divinity in the university, and created D.D. Being attached to, and well versed in, mathematics and natural philosophy, he was elected a fellow of the Royal Society, and was afterwards appointed a chaplain to his royal highness the prince of Wales. In the church he was rector of Barley in Hertfordshire, and of Shenfield in Essex, and an archdeacon. He died in October, 1771, having nearly completed his 59th year. He was author of a thin a thin quarto in Latin, entitled "Ordo Inſtitutionum Phyſicarum in privatis Lectionibus," of which the ſecond edition was publiſhed at Cambridge in 1756; alſo of "A Syſtem of Natural Philoſophy," in 2 vols. 4to., which for many years was held in high eſtimation; "Inſtitutes of Natural and Political Law," being the ſubſtance of a courſe of lectures on Grotius, read in St. John's college in Cambridge, in 2 vols. 8vo. 1756; "A Letter to Dr. Middleton, in defence of Biſhop Sherlock's Diſcourſe on Prophecy," and divers other theological works. Dr. Rutherforth communicated to a philoſophical ſociety at Spalding, a curious correction of Plutarch's deſcription of the inſtrument uſed to renew the veſtal fire, as relating to the triangle with which the inſtrument was formed.

RUTHERGLEN, or Ruglen, in *Geography*, a royal borough and market-town in the lower ward of the county of Lanark, Scotland, is ſituated on the ſouth bank of the river Clyde, at the diſtance of $2\frac{1}{2}$ miles S.E. from Glaſgow, and 9 miles W. from Hamilton. It is a town of high antiquity, and was conſtituted a royal borough by king David I., whoſe charter was ſubſequently confirmed by his ſucceſſors, king Robert Bruce, James V., and James VI. At that period the river Clyde was much deeper in the lower part of its courſe than at preſent, and Rutherglen was not only a conſiderable ſea-port, but was in fact the firſt mercantile town in the valley of Clyde. When the city of Glaſgow, now the emporium of Scottiſh commerce and manufactures, conſiſted but of a few private houſes attached to the cathedral, this town was comparatively a buſy ſpot, whoſe inhabitants devoted themſelves to civil and commercial employments. Glaſgow, indeed, appears even to have been within the bounds, over which the corporation of Rutherglen claimed juriſdiction; for a charter is yet extant, bearing date in 1226, whereby a grant is made to the biſhop of Glaſgow, and his ſucceſſors, that no toll nor cuſtom ſhall be levied in that city by the inhabitants of Rutherglen. All the mercantile importance of this place, however, is now loſt, and it is alſo reduced in extent and population. It ſtill retains, neverthelefs, all the privileges of a royal burgh, and is governed by a provoſt, two baillies, a dean of guild, and fifteen counſellors, who are elected annually at Michaelmas. The principal branch of trade carried on here is the weaving of muſlins for the Glaſgow manufacturers. The market-day is Wedneſday, weekly; and there are, beſides, ſix annual fairs, famous for the ſale of horſes. Since the union, this burgh has joined with Glaſgow, Renfrew, and Dumbarton, in ſending a repreſentative to the Britiſh ſenate.

The town of Rutherglen conſiſts chiefly of one principal ſtreet, and a lane, called the Back-Row, both lying parallel in a direction nearly eaſt and weſt. The main ſtreet, which is very ſtraight and well paved, extends about half a mile in length, and is about 100 feet in breadth. From both ſides of it, ſeveral lanes go off; and at the diſtance of about 150 yards to the ſouthward is another lane, known by the name of Din's-Dykes, which is characterized with an indelible mark of opprobrium from the following circumſtance. The unfortunate Mary, queen of Scots, having viewed the battle of Langſide from an eminence near this town, no ſooner ſaw her army defeated than ſhe fled to the ſouth. Din's-Dykes unfortunately lay in her way. Two ruſtics, who were at that inſtant cutting graſs cloſe by, ſeeing her majeſty flying in haſte, rudely attempted to ſtop her, and threatened to cut her to pieces with their ſcythes if ſhe preſumed to proceed a ſtep further. Neither beauty, nor even royalty itſelf, can at all times ſecure the unfortunate, when they are aſſailed by the unfeeling or revengeful. Relief, however, was luckily at hand, and her majeſty was reſcued from her barbarian oppoſers.

The church of this town, which is the only public edifice worthy of notice, is very ancient, and is in a ſtyle of architecture ſuperior to moſt churches in Scotland. But what renders it particularly intereſting is the circumſtance of its having been the ſcene of two tranſactions, in which the fate of ſir William Wallace, and of the kingdom of Scotland, were deeply concerned. It was within the walls of this church that peace was concluded between England and Scotland in the year 1297, and it was here alſo that ſir John Monteith contracted with the Engliſh to betray the greateſt of Scottiſh heroes.

Rutherglen, in ancient times, was a place of ſtrength, and had a caſtle attached to it, which was conſidered to be one of the moſt important Scottiſh fortreſſes. In the diſpute between Bruce and Baliol for the poſſeſſion of the throne, it fell, with many others, into the hands of the Engliſh. It was beſieged by Robert Bruce in 1309; but he appears to have been compelled to abandon the enterpriſe by the approach of an Engliſh army. In 1313, however, it was taken by Edward Bruce, the king's brother; and ſeems ever after to have belonged to the Scotch. This caſtle was kept in good repair till a ſhort time after the battle of Langſide, when it was burnt by the orders of the regent, Murray, out of revenge againſt the Hamilton family, in whoſe cuſtody it then was. One of the principal towers was, however, afterwards repaired, and having been enlarged by ſome modern improvements, became the ſeat of the Hamiltons of Elliſton, lairds of Shawfield. At length, on the decline of that family, it was for about a century wholly neglected, and, by frequent dilapidations, was ſoon levelled with the ground. Its ſcite is now converted into a kitchen-garden; but many of its ſculptured ſtones may be ſeen built into the walls adjoining the town.

In Rutherglen the cuſtom of riding the marches of the borough is ſtill obſerved. On the day appropriated to this purpoſe, the magiſtrates and council aſſemble at the croſs, whence they proceed, in martial order, with drums beating, &c. round the boundaries of the royalty, to ſee if any encroachment has been made. Theſe boundaries are diſtinguiſhed by march-ſtones ſet up at ſmall diſtances from each other, which are ſhaped at the top in the form of a man's head; but the lower part is ſquare. This peculiar form was originally deſigned to repreſent the god Terminus, of whom they are ſo many rude images. Every new burgeſs is bound to provide a march-ſtone at his own expence, and to cut upon it the initials of his name, and the year in which it is ſet up. It has been a cuſtom, time out of memory, for the riders of the marches to deck their hats and drums with broom, and to combat with one another at the newly-erected ſtone, out of reſpect perhaps to the deity whoſe image they had ſet up, or that they might the more firmly impreſs on their minds the preciſe boundary of that place. This ceremony has of late been deferred till the company return to the croſs, when the broom engagement commences with great fury, and laſts as long as the weapons will endure. Rutherglen is likewiſe famous for the ſingular cuſtom of baking, what are called, four cakes, previous to St. Luke's fair. The operators are women only, and they ſeldom begin till after ſunſet, and a night or two before the fair. A large ſpace of the houſe is marked out by a line drawn upon it. The area is conſidered as ſacred, and if paſſed by any of the bye-ſtanders, he or ſhe incurs the penalty of a fine, which is expended in drink for the uſe of the company. This hallowed ſpot is occupied by ſix or eight women, all of whom, except the toaſter, ſeat

ſeat themſelves on the ground in a circular form, having their feet turned towards the fire. Each of them is provided with a baking-board about two feet ſquare, which they hold on their knees. The perſon who toaſts the cake, which is done on an iron-plate, ſuſpended over the fire, is called the queen or bride, and the others her maidens. She neareſt the fire on the eaſt is named the todler, and her companion on the left-hand the hodler. The remainder have arbitrary names given them by the bride. The buſineſs is commenced by the todler, who takes a ball of the dough, forms it into a ſmall cake, and then caſts it on the bake-board of the hodler, who beats it out a little thinner, and then throws it on the board of her next neighbour, and thus it goes round from eaſt to weſt till it comes to the toaſter, by which time it is as thin and ſmooth as a ſheet of paper. The firſt cake caſt on the girdle is uſually named as a gift to ſome well-known cuckold, from a ſuperſtitious notion that thereby the reſt will eſcape that miſchance. As the whole operation is performed by the hand, conſiderable noiſe is made; but as the bakers generally beat time to ſome air ſung by one or more of the company, it is far from being diſagreeable. Great dexterity is requiſite in the performance of this cuſtom, particularly in throwing the cakes from one board to another, without ruffling or breaking them; and as the toaſting requires great ſkill, the moſt experienced perſon is always choſen for that part of the work. One cake is ſent round in quick ſucceſſion after another, ſo that none of the individuals engaged are ſuffered to be idle. The whole is a ſcene of activity, mirth, and diverſion. There being no account, even by tradition, of the origin of this cuſtom, it is preſumed to be very ancient, and probably took its riſe in the days of paganiſm, as it is fraught with ſeveral of the ſacred rites peculiar to heathen worſhip; ſuch as the leavened dough, the mixing with ſugar and ſpices, the conſecrated ground, &c.; but the particular deity for whoſe honour theſe cakes were firſt made, is a point of difficult ſolution. According to the population cenſus of 1811, the borough and pariſh of Rutherglen contain 756 houſes, and 3529 inhabitants. The Hiſtory of Glaſgow and its Suburbs, by James Denholm, 1 vol. 12mo. Glaſgow, 1798. Beauties of Scotland, vol. iii. 8vo. Lond. 1806.

RUTHIN. See Rhuthyn.

RUTHSBOROUGH, a village in queen Anne's county, Maryland, on Tuckahoe creek; 6 miles S.E. of Centerville.

RUTHWELL, a market-town and pariſh in the county of Dumfries, Scotland, is ſituated on the northern bank of the Solway frith. The town, which ſtands on the high road from Port-Patrick to Carliſle, was formerly a long ſtraggling place, but has of late years been much improved, and almoſt entirely rebuilt, chiefly at the expence of the earl of Mansfield, who is proprietor of the greater part of the pariſh. It is a burgh of barony, and has the privileges of a weekly market, and ſeveral annual fairs. The pariſh extends about ſix miles along the ſhore of the Solway frith, and is nearly three miles in breadth. In virtue of an ancient charter from one of the kings of Scotland, all the inhabitants were entitled to manufacture ſalt duty free; conſequently a large quantity of that article was formerly made here; and the trade is ſtill followed by many perſons, though the exemption from duty has been diſcontinued ſince the union. About forty years ago a ſingular road was diſcovered leading through a deep moraſs. It was formed of ſtrong oak planks, eight feet in length, faſtened down by ſtakes driven through the boards into the earth. At the time it was thrown open, it lay ſix feet beneath the ſurface of the earth.

The church of Ruthwell, one of the oldeſt eccleſiaſtical buildings in Scotland, was formerly remarkable for an ancient obeliſk which ſtood within its walls, and fragments of which are ſtill viſible in the church-yard. This monument was demoliſhed by order of the General Aſſembly in 1644, under pretence of its being an object of ſuperſtition among the vulgar. When entire, according to Pennant, it meaſured about twenty feet high, excluſive of pedeſtal and capital, and was of a ſquare form, but the ſides were of unequal breadth. Two of theſe were ornamented with foliage and figures of animals, and had Runic inſcriptions round the margin. On one of the broader ſides was a very rude figure of our Saviour, and beneath were two other figures, one bearded, and the other not, deſigned to repreſent ſome of the apoſtles. The oppoſite ſide alſo diſplayed a figure of the Saviour, with Mary Magdalen waſhing his feet. Theſe ſculptures, ſays the author above-mentioned, were probably "the work of different times and nations; the firſt, that of Chriſtian Saxons, the other of the Danes, who either found thoſe ſides plain, or, defacing the ancient carving, replaced it with ſome of their own." In the cemetery is a monument to the memory of Mr. Gawin Young, the Scottiſh vicar of Bray, who was ordained miniſter of this pariſh in 1617, and maintained his poſt for fifty-four years, notwithſtanding the many changes from Preſbyterianiſm to Epiſcopacy, and from Epiſcopacy to Preſbyterianiſm, which occurred during that revolutionary period. The inſcription has, among others, theſe words:

"Far from our own; amidſt our own we ly;
Of our dear bairns thirty and one us by."

Within this pariſh ſtands Comlorgan caſtle, an ancient manſion, belonging to the earl of Mansfield. It is ſurrounded by extenſive parks and plantations, and commands a fine view of the Solway frith, and of the adjacent country. There are likewiſe ſome remains of an ancient caſtle at Cockpool.

According to the population cenſus of 1811, Ruthwell pariſh contained 231 houſes, and 1184 inhabitants. Pennant's Tour in Scotland, vol. i. 4to. Lond. 1776. Carliſle's Topographical Dictionary of Scotland, 4to. 1813.

RUTICILLA, in *Ornithology*, a ſpecies of *Muſcicapa*; which ſee.

Ruticilla, the *Red-Start*; which ſee. See alſo Motacilla *Phœnicurus*.

RUTIDEA, in *Botany*, a genus ſo named by Decandolle, from ῥυτὶς, ῥυτίδος, *a wrinkle*, alluding to the ruggedneſs of its ſeeds. Annales du Muſée d'Hiſt. Nat. v. 9. 219. *De Theis.*

RUTIGLIANO, in *Geography*, a town of Naples, in the province of Bari; 8 miles S.W. of Monopoli.

RUTILE, in *Mineralogy*, *Titane Ruthile* of Brongniart, an oxyd of titanium: it is of a dark blue-red colour, inclining to brown, with a degree of metallic ſplendour: the longitudinal fracture is foliated; the croſs fracture conchoidal and unequal. It is opaque or ſlightly tranſlucent, and ſometimes ſufficiently hard to ſcratch quartz. The ſpecific gravity is from 4.18 to 4.24. Rutile is infuſible by the blowpipe, but with the addition of borax it melts into a yellow glaſs. It is found cryſtallized: the primitive form of the cryſtals is a right-angled priſm. Sometimes two cryſtals are united by their extremities, forming a kind of twin-cryſtal. It alſo occurs in extremely minute capillary cryſtals,

cryſtals, which are either divergent or reticulated, but ſometimes ſingle, and are imbedded in quartz and rock-cryſtal. From the analyſis of Klaproth, it appears to be a pure oxyd of titanium. This mineral is found near Limoges in France, in Hungary, at St. Gothard in Switzerland, on the Carpathian mountains, near Burgos in Spain, in Siberia, on the ſummit of Sierra de Avilla, in New Granada in South America, and in South Carolina in North America.

RUTILITE, called by Klaproth *Sphen*. Its colour is a brown, inclining to red, yellow, grey, or black. It is found both cryſtallized and amorphous. The cryſtals are ſmall, oblique, four-ſided priſms, which are acutely bevelled at both extremities, but are ſometimes terminated by tetrahedral pyramids. The longitudinal fracture is radiated or foliated, the croſs fracture flatly conchoidal, paſſing into even. The luſtre is gliſtening, or faintly glimmering; it is more or leſs tranſlucent on the edges. Rutilite ſcratches glaſs, is very brittle, and nearly infuſible by the blowpipe, without the addition of borax or an alkali. The ſpecific gravity is from 3.1 to 3.5. According to Klaproth it conſiſts of

Oxyd of titanium - -	35
Silex - - - - -	35
Lime - - - - -	33

It is found at Paſſau, in the diſtrict of the Inn, in a rock compoſed of felſpar, hornblende, and quartz. It alſo occurs in ſeveral Norwegian mines.

RUTILIUS, Numatianus, in *Biography*, a Latin poet, probably a native of Toulouſe, and advanced to high employments at the Roman court, was a military tribune, and about the year 414 A. D. was prefect of Rome. The empire at this time, as we have ſeen in the article Rome, was over-run by the Viſigoths, under the furious Alaric and his ſucceſſors; and Rutilius, for the purpoſe of ſuccouring his diſtreſſed native country, took a journey from Rome to Gaul, of which he wrote a deſcription in elegiac verſe. It conſiſted of two books, of which the latter is loſt. The work gives a favourable impreſſion of the writer, who was a Pagan, though it has been greatly cenſured by Catholic authors, on account of the following remarks which it contains on the monks of the iſland of Capraria. "The whole iſland," ſays Rutilius, "is filled, or rather defiled, by men who fly from the light. They call themſelves monks, or ſolitaries, becauſe they chooſe to live without any witneſſes of their actions. They fear the gifts of fortune, from the apprehenſion of loſing them; and leſt they ſhould be miſerable, they embrace a life of voluntary wretchedneſs. How abſurd is their choice; how perverſe their underſtanding, to dread the evils, without being able to ſupport the bleſſings, of the human condition. Either this melancholy madneſs is the effect of diſeaſe, or elſe the conſciouſneſs of guilt urges theſe unhappy men to exerciſe on their bodies the tortures which are inflicted on fugitive ſlaves by the hand of juſtice." For theſe and ſome other remarks on the Jewiſh ſabbath as a commemoration "Laſſati Dei," Rutilius and his adherents are ſtyled, by his commentator, Barthius, *rabioſi canes diaboli;* but Tillemont remarks, that the unbelieving poet praiſes where he means to cenſure. The verſe of Rutilius is ſaid to be more elegant than the common ſtandard of the age; and though the ſubject does not admit of poetry, he diſplays much taſte and ingenuity. The "Itinerarium" was diſcovered in 1494 at a monaſtery, and has been ſeveral times printed. The beſt editions are thoſe of 1582, and 1687. It is inſerted in Burmann's "Poetæ Minores," and in Mattaire's "Corpus Poetarum."

RUTILUS, Roach, in *Ichthyology*, a ſpecies of *Cyprinus;* which ſee.

Rutilus *Latior*, a name given by many authors to the fiſh called in Engliſh *rud*, or *finſcale*, and *rubellus*. See Cyprinus *Erythrophthalmus*.

RUTINIUM, in *Ancient Geography*, a town of the iſland of Albion, upon the route from the Portus Rutupæ, between Mediolanum and Urioconium in the Itinerary of Antonine. Camden, Gale, and Baxter agree in opinion, that Rutinium was ſituated at Rowton caſtle; but Mr. Horſley is poſitive, that it was really at Wem, on the banks of the river Roden.

RUTKIN, in *Geography*, a town of Bohemia, in the circle of Konigingratz; 8 miles E. of Gitſchin.

RUTLAM, a town of Hindooſtan, in the Malwa country; 48 miles W. of Ougein. N. lat. 23° 23′. E. long. 74° 58′.

RUTLAND, *Firſt Duke of*, in *Biography*. The words of the opera of Tamerlane, written by Nicola Haym, and ſet by Handel in 1724 for the Royal Academy of Muſic, were dedicated to the duke of Rutland, not only as one of the directors of the Royal Academy of Muſic, and a liberal patron of ſcience, but as a nobleman who, by ſtudy and application, had rendered himſelf a moſt intelligent judge both of the theory and practice of the art of muſic. And it is well known that the firſt duke of Rutland was an excellent performer on the violin; that his grace brought Carbonelli hither from Italy, when he returned from his tour through that country; and that the ſolos which this muſician dedicated to him, were compoſed expreſsly for his uſe.

Rutland, in *Geography*, one of the Andaman iſlands, in the Eaſt Indian ſea. N. lat. 11° 24′. E. long. 92° 27′.

Rutland, a county of Vermont, bounded N. by Addiſon county, E. by Windſor, S. by Bennington, and W. by New York. This county is watered by Otter creek and other ſtreams. It abounds with lakes or ponds ſtored with fiſh; the principal are lakes Bombazan and St. Auſtin, the former in Hubbarton and Caſtleton, and the latter in Wells. It contains 25 townſhips, and 29,486 inhabitants. In this county are 14 forges, 3 furnaces, and a ſlitting-mill.—Alſo, a poſt-town of Vermont, the capital of the above county, ſituated on Otter creek; 55 miles from its mouth in lake Champlain, 45 miles W. by N. from Windſor. It contains a congregational church, a court-houſe, and 2379 inhabitants. The mean heat of this place is 43°.6, the leaſt 21°, and the greateſt 92°. Durable crucibles are wrought of the pipe-clay found here. N. lat. 43° 34′ 30″. W. long. 72° 50′ 10″.—Alſo, a townſhip of Worceſter county, Maſſachuſetts; 14 miles N.W. of Worceſter; incorporated in 1722, and containing 1231 inhabitants. It is ſituated on the height of land between Connecticut river and Merrimack. The proſpects from the centre of the town are extenſive and delightful. It is a curious circumſtance, that the water which drops from the eaſtern roof of a barn in this town runs to the Merrimack, and that which falls from the weſtern ſide runs to the Connecticut. In this town are two conſiderable ponds, which furniſh ſtreams in different directions, ſome of which are large enough for mills.

Rutland, a poſt-town of Ireland, in the county of Donegal, built in one of the cluſter of iſlands called North iſles of Arran, in the diſtrict of the Roſſes. The late colonel Burton Conyngham procured a grant from parliament to eſtabliſh a ſettlement here, as a ſituation peculiarly adapted to the herring fiſhery. This town, ſo called from the duke of Rutland, who was viceroy at the time, has very fine ſtores and accommodations for drying and ſalting the fiſh, but,

but, like moſt undertakings which owe their origin to parliamentary grants, it has proved unſucceſsful, and remains a monument of the folly of expecting to force trade by ſuch means. The ſum expended was 20,000*l.* by parliament, and as much more raiſed by mortgage on the eſtate of colonel Conyngham; a man who, however he might be miſtaken in his calculations of advantage, was too honourable and patriotic to be ſuſpected of an intention to miſlead. Rutland is 153 miles N.W. from Dublin. N. lat. 54° 56′. W. long. 8° 18′. Journals of the Houſe of Commons.

RUTLANDSHIRE, one of the central counties of England, is bounded on the north, north-weſt, weſt, and ſouth-weſt, by Leiceſterſhire; on the ſouth and ſouth-eaſt by Northamptonſhire; and on the eaſt and north-eaſt by the county of Lincoln. It is the ſmalleſt ſhire in the kingdom, extending only about 18 miles in length and 15 in breadth; its circumference being 60 miles, which gives an area of 200 ſquare miles, or 128,000 acres. According to the parliamentary returns of 1811, it contains 3417 houſes and 16,380 inhabitants.

The *hiſtory* of this county, in remote times, is ſo intimately connected with that of the ſurrounding counties, that they can ſcarcely be ſeparated. Previous to the arrival of the Romans it formed part of the territories of the Coritani; and after the latter were forced to ſubmit to the imperial authority, it was included in the province of Flavia-Cæſarienſis. During the Saxon heptarchy it formed part of the kingdom of Mercia, under eighteen ſucceſſive monarchs; and when the Saxon kingdoms became united into one, it ſeems to have belonged to the crown; as we find that Edward the Confeſſor bequeathed it to his queen Edith, and after her demiſe to Weſtminſter Abbey. His will, which is ſtill extant, ſays, "I will, that after the deceaſe of queen Eadgith my conſort, Rotelond, with all its appurtenances, be given to my monaſtery of St. Peter, and be ſurrendered, without delay, to the abbot and monks there ſerving God, for ever." So anxious, indeed, was the king to ſecure this obituary grant to the abbey, that he endeavoured to render more certain the obſervance of his will by a kind of anterior deed of gift, bearing date in the 25th year of his reign. This grant, however, was but of ſhort duration, for when William the Conqueror aſcended the throne, he reſumed poſſeſſion of Rutlandſhire as crown land, and merely allowing the monaſtery to receive the tithes, divided it among ſome of his neareſt relatives, and his moſt powerful adherents. Theſe firſt Norman grantees were Robert Malet, great chamberlain of England; Gilbert de Gaunt; earl Hugh; Aubrey, the clerk, and ſeveral others. Some manors were likewiſe granted to the conqueror's niece Judith, afterwards counteſs of Huntingdon; and to Maud, counteſs of Albemarle, his half ſiſter. Conſiderable poſſeſſions, however, were reſerved to the crown; and in the reign of Edward II. it poſſeſſed the hundreds of Martinſley, Alſto, and Eaſt hundred, all of which that monarch granted to the lady Margaret, wife of Piers de Gaveſton, duke of Cornwall, to be held by her during the royal pleaſure. The hundred of Wrangdyke was then the property of Guy de Beauchamp, earl of Warwick, but his ſon Thomas being a minor at his father's death, Edward gave that eſtate to Hugh Spencer the elder, on the pretence of its being in ſatisfaction of a debt due to him of 6770*l.* During thoſe tranſactions, the preſent hundred of Oakham-Soke is never mentioned: it is therefore conjectured to have formed part of Martinſley hundred.

The aſpect of the country in Rutlandſhire is, generally ſpeaking, very beautiful, being much diverſified by gently riſing hills, running eaſt and weſt, with vallies about half a mile in breadth intervening, ſo that every three or four miles preſents a new view to the eye of the traveller. The principal vale is that of Catmoſe, in the centre of the county, which Camden deſcribes as "a pleaſant and fertile valley, perhaps from Coet Maes, which ſignifies in Britiſh, a woody plain." On the north ſide of this vale the ground riſes, and level with its ſummit a flat tract extends for ſeveral miles to the northward, forming a kind of table land, looking down upon the fertile and well-wooded plains of Leiceſter, Nottingham, and Lincoln-ſhires. The ſouthern diſtrict conſiſts, in a great meaſure, of one widely expanded vale, moſtly open land, which ſtretches into Northamptonſhire; and on the weſtern borders, the remains of the old foreſt of Liefield are well wooded, and ſink in the diſtance into the Leiceſterſhire plains.

The climate of this county is generally reckoned good and healthy, but has no peculiarity demanding notice. The ſoil is various, but is, upon the whole, fertile. The moſt prevalent kind is a ſtrong reddiſh loam, intermixed with keal, lying upon an under-ſtratum of blue clay; but almoſt every farm has a mixture of poor clay, hazel earth, white ſtony land, black clay and gravelly clay. This great variation of ſoils within a ſmall ſpace cauſes each ſort to be much more valuable than it would be, were one kind prevalent throughout an entire lordſhip.

The modes of agriculture adopted here differ, as may be ſuppoſed, in ſome degree on the different ſoils, and alſo on the incloſed and unincloſed lands. Upon the unincloſed arable lands, except upon ſome of the light ſoils, the old courſe of two crops and a fallow is yet practiſed. On the light ſoil, a turnip crop is ſubſtituted for the fallow, and barley is ſown inſtead of wheat for the enſuing crop. The ſecond crops on both ſoils are peas, or peas and beans. A few farmers in the eaſtern diſtrict ſow barley and broad clover after fallow, mowing the clover for a ſecond year's crop, and feeding it off with ſheep when it is conſidered as proper for a courſe of wheat. The farmers have an idea that winter ploughing is hurtful to the land, and conſequently they lay their manure on the fallows, where it remains till the ſpring.

The incloſed lands conſiſt moſtly of the light ſoils, on limeſtone baſes; and of the heavy red loam. Theſe are principally under the Norfolk huſbandry of four years' rotation, and without feeding off, except in the turnip crops; but another mode is likewiſe practiſed, of taking two crops of ſpring corn after breaking up the clover, then turnips, next barley with rye-graſs and clover, after which there are three or four years' ſheep-feeding, when it is broken up again for ſpring corn. The firſt of theſe methods is beneficial for raiſing a large crop of wheat, and the ſecond is equally advantageous for ſheep ſtock, and hence each has its warm advocates among the farmers.

Tenures in this county are various; freehold, leaſehold, and copyhold, but freehold is moſt general. A few farmers hold their lands by leaſes of ſeven or twenty-one years' duration; but by far the greater proportion of land is held at will from year to year. Rents, in 1806, averaged about 1*l.* 1*s.* *per* acre, but they are now much increaſed. Above three-fourths of the pariſhes are exonerated from tythes, either by modus, or being made free. Farms differ much in ſize, running from 15 to 640 acres, but the large farms are few in number.

Reſpecting the mineralogy of Rutlandſhire there is nothing worthy of notice, except that there is at Ketton "a kind of ſtone very proper and famous for buildings;" and in ſeveral places lime-ſtone, conſiſting of a hard and ſoft ſpecies,

ſpecies, and containing a great number of marine ſubſtances. The exiſtence of chalybeate ſprings in different parts of the county, however, ſeems to prove the preſence of iron-ſtone, but that mineral has not yet been diſcovered, at leaſt in any quantity.

The only rivers of note, connected with the county, are the Guaſh and the Welland. The former, which is popularly called the Waſh, interſects the county nearly in the centre, croſſing it from eaſt to weſt. It takes its riſe in Leiceſterſhire, and is conſidered to be an excellent fiſhing river. The Welland alſo has its ſource in Leiceſterſhire, and forms the boundary for many miles between this county and Northamptonſhire. The other Rutlandſhire ſtreams are the Chater, which croſſes the county to the ſouthward of the Guaſh, and the Little Eye, or Lytelee, which bounds it on the ſouth-weſt. Rutlandſhire does not boaſt of a ſingle lake; but it has the more important advantage of a canal, denominated the Oakham canal. This branch of a more extended line begins in the vicinity of Melton Mowbray, in Leiceſterſhire, enters Rutlandſhire near Teigh, and paſſes by Market Overton, Barrow, Cotſmore, and Burley, until it approaches Oakham on the north ſide in the level of the vale of Catmoſe.

The roads in this county are tolerably good, but are not generally formed on a good plan, being raiſed too high before the materials are laid upon them, and the ſtones being much too large. No manufactures of any import are carried on here, owing to the deficiency of water and the ſcarcity of fuel. Rutlandſhire may, therefore, be conſidered as entirely an agricultural county; and it is worthy of remark, that notwithſtanding the improvements in huſbandry, population has not increaſed during the laſt thirty years; while in manufacturing counties it has almoſt doubled itſelf within the ſame period.

Politically ſpeaking, Rutlandſhire is divided into five hundreds, *viz.* Wrangdyke, Alſto, Oakham, Eaſt, and Martinſley, which contain fifty-three pariſhes and two market towns, Oakham and Uppingham. There are no boroughs in the county, ſo that it is repreſented in parliament only by two knights of the ſhire. In judicial affairs it is in the Midland circuit, and in eccleſiaſtical juriſdiction is ſubject to the biſhop of Peterborough. Rutland was an earldom at a very early period, and the honour was uſually a branch of the royal family. It is now a dukedom in the family of Manners. This county is altogether devoid of objects of antiquarian curioſity. Beauties of England and Wales, vol. xvii. by Mr. Laird, 8vo. 1814. General View of the Agriculture of the County of Rutland, by Richard Parkinſon, London, 8vo. 1808. A portion of a hiſtory of this county has been recently publiſhed by Thomas Blore, folio. This ſpecimen is ſo well executed, that every lover of topographical hiſtory, as well as the inhabitants of the county in general, muſt regret that the whole work is not completed in the ſame ſtyle and manner.

RUTLEDGE, the ſhire-town of Grainger county, in the ſtate of Teneſſee, ſituated in Richland valley: it contains a few dwelling-houſes, and is merely a handſome flouriſhing village.

RUTLINGEN. See Reutlingen.

RUTNAGHERI, a hill-fort of Hindooſtan, in Myſore, taken in the year 1799 by the Britiſh; three miles W.S.W. of Oudeadurgam.

RUTSHA, a town of Imiretta; 38 miles N.E. of Cotatis.

RUTTAGURRA, a town of Hindooſtan, in Malwa; 30 miles E.N.E. of Bilſah.

RUTTANGUR, a town of Hindooſtan, in Baglana; 25 miles N.W. of Junere.

RUTTEE, a weight uſed in the Eaſt Indies, one hundred of which make eighty-eight caracts. See Caract.

RUTTENSTEIN, in *Geography*, a town of Auſtria; 9 miles N.N.W. of Grein.

RUTTUNGUNGE, a town of Bengal, 47 miles S.S.E. of Nattore. N. lat. 23° 53′. E. long. 89° 43′.—Alſo, a town of Bengal; 10 miles S. of Boglipour.

RUTTUNPOUR, a circar of Hindooſtan, bounded on the N. by Surgooja and Juſhpour, on the E. by Gangpour, on the S. by a country unknown to Europeans, and on the E. by Goondwanah. Its chief towns are Ruttunpour, Raypour, and Dumdah. It is traverſed towards the ſouth by the river Mahanada.—Alſo, the capital of the fore-mentioned circar, in the country of Oriſſa; 326 miles W. of Calcutta, lying in the road from Bahar to Nagpour. N. lat. 22° 16′. E. long. 82° 36′.—Alſo, a town of Hindooſtan, in Bahar; 12 miles N.W. of Durbungah.

RUTUBA, in *Ancient Geography*, a river of Italy, in Liguria, according to Pliny, lib. iii. c. 5.

RUTULI, a people of Italy, in Latium, who inhabited the country near the ſea-coaſt. Their origin is uncertain; but it ſeems, according to Virgil, that at the arrival of Æneas, Turnus was their king. This prince, in his attempt to oppoſe the eſtabliſhment of the Trojans, was killed in the combat. The Rutuli, in proceſs of time, were often confounded with the Latins. Their capital was called Ardea.

RUTULUS, in *Roman Antiquity*, the barrier of the cavea, or place where the wild beaſts uſed in amphitheatrical ſports were ſhut up. It was made of iron bars, which turned upon hinges, and all at once flew open with great ſwiftneſs.

RUTUNIUM, in *Ancient Britiſh Geography*. See Rutinium.

RUTUPIÆ Portus, in *Ancient Geography*. See Richborough.

RUTY-PUNDOC, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a peculiar ſpecies of yellow orpiment, which they find on the tops of the mountains there; and, after ſeveral calcinations, give internally in coughs and colds. The ancient Greeks uſed this orpiment in the ſame manner. We have of late run into an opinion of its being a fatal poiſon; but Dr. Boerhaave, in his Chemiſtry, affirms, on his own trials, that it is innocent and harmleſs. Theſe people, who have not the uſe of chemiſtry, give us a hint of the virtues of great numbers of our own foſſils, which are common alſo to their country. The ſelenitæ, fibroſe tails, ſpars, and many other foſſils, which we wholly neglect, are in common uſe with them, and great cures are often performed by them.

RUTZDORF, in *Geography*, a town of Brandenburg, in the New Mark; eight miles N. of Cuſtrin.

RUTZEN, a town of Sileſia, in the principality of Wolau; 18 miles N. of Wolau. N. lat. 51° 37′. E. long. 16° 32′.

RUUN, Runo, or *Runeholm*, an iſland of the Baltic, belonging, in an extenſive ſenſe, to the province of Oeſel, and lying in the middle of the gulf of Riga, at the diſtance of 95 verſts from the town of that name, and rather more than 51 verſts from Oeſel. It is diſtinguiſhable far off at ſea by a foreſt of birch trees, which occupies one of its ſides. It is entirely the property of the crown, and is inhabited by Swediſh boors. Here is a church, to which belongs a preacher, whoſe congregation is ſmall, but income very decent, conſiſting of the tythe of all the products of the iſland, together with a portion of land. In this iſland is a light-a light-houfe, for the fupply of which the boors are obliged to buy the fuel on the continent, the crown allowing them towards it 40 dollars. There is no farm on the ifland except that of the paftorate. Among the inhabitants, it is faid, there are fome remains of the old Livonians, who fpeak the Runic language, alfo the Efthnic, the Lettifh, the Swedifh, and moft commonly the German and Rufs, each with facility, from their frequent intercourfe with others. In the labours of the chace, and the capture of the fea-dog, they are indefatigable, by which they gain an opulent fubfiftence. They live in great harmony, and only intermarry among their own fociety. Tooke's Ruffia, vol. ii.

RUVO, a town of Naples, in the province of Bari, the fee of a bifhop; 5 miles S. of Trani. N. lat. 41° 12'. E. long. 16° 28'.—Alfo, a town of Naples, in Bafilicata; 18 miles S.W. of Venofa.

RUY, a town of France, in the department of the Ifere; 20 miles E. of Vienne.

RUYSCH, Frederic, in *Biography*, a celebrated anatomift and phyfician, was born at the Hague, in the month of March 1638. His father was commiffary of the States-general, and defcended from a family of confiderable wealth and importance at Amfterdam, where they had occupied places of public truft for two centuries, until the Spanifh war, which began in 1576, occafioned a great revolution in their fortunes. The celebrity of the name, however, is built upon the talents and perfonal merits of Frederic. He commenced his academical ftudies at Leyden, after being grounded in grammatical learning in his native city, and applied himfelf with great affiduity to the ftudy of anatomy, botany, and chemiftry, efpecially to the practical inveftigation of thefe fciences, having conceived an early bias to the profeffion of medicine. His zeal and curiofity were fo much excited by the new objects which opened before him, that he allowed nothing to interfere with his labours, and at length the habit of experimental refearch rendered the moft laborious inquiries a mere agreeable recreation. He repaired alfo to Franeker, for the farther purfuit of his ftudies; but received the degree of doctor at Leyden, in 1664. Even during his pupillage at Leyden, he was applied to by Sylvius and Van Horne, to affift them in combatting the vanity of Bilfius, who came thither to exhibit his boafted method of preferving dead bodies.

After his graduation, young Ruyfch returned to the Hague, where he married, and fettled fo heartily to the practice of his profeffion, as even to neglect every purfuit which had not fome relation to it. In the following year, 1665, he publifhed his treatife on the lacteal and lymphatic veffels, which contained the refult of his inquiries while engaged in the difpute with Bilfius. In this work he does not deny that the exiftence of valves in the lymphatic had been noticed before, but he claims the honour of having firft demonftrated them, and taught the method of difcovering them. This ingenious tract immediately procured him reputation; and he was invited, the year after, to the chair of anatomy at Amfterdam; an invitation which he gladly accepted, on account of the great opportunities which it was likely to afford for the profecution of his favourite refearches. Anatomy, in fact, both human and comparative, henceforth conftituted the principal object of his life: he fpared neither time, labour, nor expence, for the attainment of his purpofes; he was almoft continually employed in diffection, and not only examined with the moft minute exactnefs every organ of the human body, but devifed means by which to facilitate the detection and demonftration of the different parts, and to preferve and exhibit them thus demonftrated. If he were not the difcoverer of the ufe of injections, for the difplay of vafcular and other ftructure, he contributed, together with the fuggeftions of De Graaf and Swammerdam, by his own ingenuity and induftry, to introduce that important practice among anatomifts. His collection of injected bodies is defcribed, indeed, as marvellous; the fineft tiffue of capillary veffels being filled with the coloured fluids, fo as to reprefent the frefhnefs of youth, and to imitate fleep rather than death. In this way he had preferved fœtufes in regular gradation, as well as young and adult fubjects, and innumerable animals of all forts and countries. His mufeum, indeed, both in the extent, variety, and arrangement of its contents, became ultimately the moft magnificent that any private individual had ever accumulated, and was the refort of vifitors of every defcription; generals, ambaffadors, princes, and even kings, were happy in the opportunity of examining it. The czar Peter, in his journey through Holland in 1698, frequently dined at the frugal table of Ruyfch, in order to fpend whole days in his cabinet; and in 1717, on his return to Holland, the czar purchafed it of him for 30,000 florins, and fent it to Peterfburg. The indefatigable anatomift immediately commenced the labour of fupplying its place by a new collection.

When we confider the advantages which Ruyfch poffeffed, his ingenuity in devifing the means of minute inveftigation, and the *improbus labor* by which he manufactured two collections of anatomical preparations, and inveftigated fuch a multitude of fubjects, it will be expected that he muft have been the author of fome difcoveries. He claims, indeed, and probably made many; which, however, were not all unknown to other anatomifts: for his fault was a neglect of reading, which rendered him often ignorant of the difcoveries of others; and therefore he fometimes gave, as new, what other writers had defcribed. Among other parts which he inveftigated minutely, were the pulmonary circulation, (in which he claims the difcovery of the bronchial artery,) the ftructure of the ear, of the brain, of the lymphatic and glandular fyftem.

Ruyfch was appointed profeffor of phyfic in 1685, a poft which he filled with honour and reputation until the year 1728, when he unhappily broke his thigh by a fall in his chamber. He was alfo nominated fuperintendant of the midwives at Amfterdam, in the exercife of which office he introduced fome improvements in the practice of thefe good women; efpecially the abolition of the habit of fpeedily extracting the placenta, which he believed to be expelled by an orbicular mufcle at the fundus. He was a member of the Royal Society of London, and of the Academy of Sciences of Paris, having fucceeded fir Ifaac Newton, in the latter body, in 1727. In the fame year he had the misfortune to lofe his fon, Henry Ruyfch, alfo doctor of phyfic, who, like himfelf, was an able practitioner, well fkilled in anatomy and botany, and was fuppofed to have materially affifted him in his publications, inventions, and experiments. This lofs was the more feverely felt, on the occurrence of the accident juft mentioned, as it deprived him of his beft affiftance in completing the fecond collection of rarities, which he was occupied in making. His youngeft daughter, however, who was ftill unmarried, and had been initiated into all the myfteries of his anatomical experiments, was fully qualified for the tafk of affiftance which fhe now undertook, and he proceeded with his new mufeum; retaining his general health until the commencement of the year 1731, when he was carried off by a fever, in the ninety-third year of his age.

Ruyfch was the author of many publications, feveral of which were controverfial; for his want of reading, and confequent differences with fome of the learned of his profeffion, led him into frequent difputes. His firft work, which originated

ginated in his defence of Sylvius and Van Horne againſt Bilſius, was entitled "Dilucidatio valvularum in Vaſis Lymphaticis et Lacteis, cum figuris æneis," Hague, 1665. His ſecond was "Obſervationum Anatomico-Chirurgicorum Centuria. Accedit Catalogus rariorum in Muſæo Ruyſchiano," Amſt. 1691; containing ſome curious facts and engravings. His third publication was an anſwer to Bidloo, who had attacked ſeveral of his doctrines, and was entitled "Reſponſio ad Godef. Bidloo Libellum, cui nomen Vindiciarum, &c." 1694. In addition to this, he publiſhed no leſs than fourteen controverſial works, in anſwer to profeſſor Gaubius, to C. Wedelius, and others, which were entitled "Epiſtolæ Anatomicæ Problematicæ, unâ cum Reſponſionibus," and were printed between the years 1696 and 1700 incluſive, and in many of which conſiderable acrimony appears on both ſides.

In addition to theſe numerous tracts, Ruyſch alſo publiſhed a ſeries of anatomical eſſays, to the number of twelve, under the title of "Theſaurus Anatomicus primus, ſecundus, &c." between the years 1701 and 1728, containing the reſults of his minute inveſtigations into the ſtructure of the different organs and textures of the body, and, in the laſt, obſervations on the anatomy of vegetables. He publiſhed alſo "Theſaurus Animalium," in 1710, with plates; three decades of "Adverſaria Anatomico-Chirurgico-Medico," in 1717—20, and 23. And a tract "De Fabricâ Glandularum ad Boerhaavium," 1722, in anſwer to an attack from that celebrated profeſſor. A collection of all his works was printed at Amſterdam in 1721, 4to. entitled "Opera omnia Anatomico-Medico-Chirurgica;" but this is neceſſarily leſs complete than the edition of 1737, in five volumes, 4to.

Henry Ruyſch, the ſon of the preceding, who died in 1727, publiſhed a "Theatrum univerſale omnium Animalium, &c. 240 Tabulis ornatum," 1718, in two vols. folio. He is ſaid to have been the ſole depoſitary of the ſecret of his father, by which thoſe beautiful preparations were made, which retained the appearance of life; and Ruyſch was reproached for allowing the contrivance to periſh with his family. But the modern improvements in the art of injection do not probably fall ſhort of his expedients, in the demonſtration of the vaſcular ſtructure of the different organs of the body. See Eloy Dict. Hiſt. de la Med.; Eloge de Fenelon; Hutchinſon, Biographia Medica.

RUYSCHIA, in *Botany*, received that appellation from Jacquin, in memory of profeſſor Frederick Ruyſch, the celebrated anatomiſt; another plant, which had borne his name, being referred to *Dracocephalum*. He is noticed by Haller, Bibl. Bot. v. 2. 98, for having directed his anatomical ſkill to the maceration and diſſection of leaves, as well as for his fondneſs for exotic plants. He appears as the editor, commentator, and tranſlator into Latin, of Commelin's valuable *Hortus Amſtelodamenſis*.—Jacq. Amer. 75. Schreb. Gen. 144. 823. Willd. Sp. Pl. v. 1. 1116. Mart. Mill. Dict. v. 4. Swartz Ind. Occ. 501. t. 11. Juſſ. 428. Lamarck Illuſtr. t. 135. (Souroubea; Aubl. Guian. 244. t. 97. Juſſ. 428.)—Claſs and order, *Pentandria Monogynia*. Nat. Ord. uncertain. Juſſ.

Gen. Ch. *Cal.* Perianth inferior, double; the outermoſt longeſt, in three deep unequal ſegments, coloured; the inner of five roundiſh, concave, obtuſe, converging, permanent leaflets. *Cor.* Petals five, ovate, flattiſh, obtuſe, reflexed, thrice as long as the inner calyx. *Stam.* Filaments five, awl-ſhaped, flat, ſpreading, ſhorter than the petals; anthers oblong, incumbent. *Piſt.* Germen ſuperior, roundiſh-ovate; ſtyle none; ſtigma quadrangular, cruciform, flat, *Peric.* Berry of two cells. *Seeds* numerous.

Eſſ. Ch. Calyx double; the outer in three deep unequal ſegments; inner of five leaves. Petals five, reflexed. Style none. Berry of two cells, with many ſeeds.

Obſ. Aublet deſcribes the ſtigma as of five angles or points, and the germen of five cells.

1. R. *cluſiæfolia*. Purple Ruyſchia. Jacq. Amer. 75. t. 51. f. 2. Willd. n. 1. Swartz Ind. Occ. 502.—Leaves obovate, obtuſe, without tranſverſe veins. Two ſegments of the outer calyx ſhorter than the inner one.—Native of the vaſt boggy foreſts in the interior parts of Martinico, where Jacquin found it flowering in April. Nobody elſe ſeems to have gathered this ſpecies. The *ſtem* is rather ſhrubby, two feet high, growing paraſitically upon trees. *Leaves* alternate, on ſhort ſtalks, obovate, obtuſe, entire, coriaceous, ſhining, ſmooth, four inches long, with a ſolitary mid-rib, and no lateral veins. *Cluſters* terminal, quite ſimple, ſolitary, erect, many-flowered; cylindrical, nine inches long; the common ſtalk cylindrical, thick and ſmooth; partial ones ſcattered, ſimple, ſhort, ſpreading. *Flowers* between the ſize of a lauruſtinus and hawthorn bloſſom, inodorous, with purple petals. *Filaments* alſo purple, uſually five, often ſeven, ſometimes ſix. Jacquin did not ſee the ripe *fruit*, but conjectured it to be a berry.

2. R. *Souroubea*. Red and yellow Ruyſchia. Swartz Ind. Occ. 504. Willd. n. 2. (Souroubea guianenſis; Aubl. Guian. 244. t. 97.)—Leaves obovate, emarginate, with a ſmall point, and many tranſverſe veins. All the ſegments of the outer calyx longer than the inner one.—Gathered by Aublet, on the banks of the river *du Gallion*, in Guiana, flowering in October. The *ſtems* are ſhrubby, but brittle, long and trailing, ſupporting themſelves on the neighbouring buſhes, but drooping at the ends; their outer bark aſh-coloured, eaſily peeling off. *Leaves* alternate, on ſhort thick ſtalks, ſmooth, fleſhy, four inches long, marked with numerous, tranſverſe, not very evident, veins. *Cluſters* terminal, ſolitary, long and drooping, of numerous *flowers*, much larger than thoſe of the firſt ſpecies; their partial ſtalks an inch long. The *outer calyx*, as we chooſe to call it, rather than a *bractea*, conſiſts of three diviſions, each near an inch long, of a coral red, one of whoſe ſegments is a tube, cloſed at the end, the other two obovate, or ſpatulate, concave above. *Inner calyx* of five or ſix yellowiſh leaves, firm, folding over each other. *Corolla* of a golden yellow, deſcribed by Aublet as monopetalous; but Swartz, who examined this author's ſpecimens, ſays otherwiſe. *Stamens* yellow. Ripe *fruit* not ſeen by Aublet. No other perſon appears to have gathered this plant. The habit of the genus, and in ſome meaſure the peculiar conformation of the outer *calyx*, reſemble MARCGRAVIA; ſee that genus, and ASCIUM.

RUYSCHIANA. See TUNICA and EYE.

RUYSDAEL, JACOB, in *Biography*, was born at Haerlem in 1636, and at firſt ſtudied ſurgery as his profeſſion, although he had given early proofs of a fine taſte in the art of painting; to which, at length, his attention was entirely directed by Nicholas Berghern, with whom he lived in habits of intimacy. He is ſaid by ſome writers to have improved his taſte in Italy, but ſcarcely a particle of Italian taſte is to be found in his works. Nature was the ſchool in which he ſtudied; her pure etherial tints, her peculiar forms, the freſhneſs of the morning, the brilliancy of mid-day, and the ſpirit-ſtirring tone of twilight, were the foundation of the principles by which he was governed, and in the contemplation of which he laid the baſis of that perfection of locality to which he ſucceſsfully aſpired.

His landſcapes are generally ſcenery in the neighbourhood of his reſidence, or occaſionally taken from the rocky borders of of the Rhine, varied with cascades, which he composed and treated in a manner till then unknown, and till now unrivalled, as mere matters of imitation.

The talents of Ruysdael were not confined to landscape, he painted sea-pieces with equal success; and he has seldom been surpassed in the truth, the brilliancy, and variety, with which he pursued that branch of the art, particularly fresh breezes and gales of wind.

He frequently obtained assistance in his figures from the pencils of Ostade, Vander-Velde, and sometimes from Wouvermary, which adds considerably to the prices obtained for his works, and they are in general of a considerable magnitude. Indeed a fine specimen of this master may be regarded as current coin, such is the general estimation of his talent. He died in 1681, at the age of 45.

His elder brother, Solomon Ruysdael, was also a landscape painter in the same style, but with indifferent success. He gained more credit as a decorative artist.

RUYSDAL, in *Geography*, a town of Holland; five miles E. of Naerden.

RUYSSELADE, a town of France, in the department of the Lys, and chief place of a canton, in the district of Bruges. The place contains 5281, and the canton 10,071 inhabitants, on a territory of 65 kiliometres, in two communes.

RUYTER, Michael-Adrian de, in *Biography*, a celebrated Dutch admiral, born at Flushing in 1607, entered into the naval service of his country very early. From the situation of cabin-boy he rose through all the commands to the rank of captain, in which he distinguished himself both among his own countrymen and foreigners. Much of the early part of his life was spent in the service in the West Indies, to which he is said to have made eight voyages, and two to Brasil. In 1641 he was sent to the assistance of the Portuguese, who had thrown off the yoke of Spain, and on this occasion he was raised to the rank of rear-admiral. His conduct obtained for him the applause of the king of Portugal, and he afterwards rendered some important services on the Barbary coast, entering the road of Sallèe in a single ship, although five Algerine corsairs disputed the passage. When war broke out, in 1652, between the English and Dutch, Van Tromp having been disgraced, De Ruyter was appointed to the command of a separate squadron, for the purpose of convoying home a rich fleet of merchantmen. He fell in with the English admiral Ayscough, with whom he had an engagement off Plymouth, in the month of August, which lasted two days, and terminated so far to the advantage of the Dutch, that he brought his convoy safe into port. In the following October De Ruyter and De Witte had an action with Blake and Ayscough on the Flemish coast, which was severely contested; but De Ruyter, being deserted by some of his captains, found it adviseable to retreat to his own coast, the loss having been nearly equal on both sides. Van Tromp was now restored to the chief command, and De Ruyter had a squadron under him in the battle of December off Folkstone, in which Blake was obliged to take shelter in the Thames. De Ruyter likewise distinguished himself in the terrible battle of three days, fought in February 1653, between Tromp and Blake, near the mouth of the Channel. In the month of June, Tromp and De Ruyter engaged Monk and Dean off Nieuport; and after a battle of two days, in which the two Dutch admirals successively rescued each other from imminent danger, the Dutch confessed their inferiority by retiring behind their own sand-banks. The commanders thence sent a warm remonstrance to the States concerning the necessity of a reinforcement, and at length they were enabled to attack the English under Monk and Lawson, near Scheveling. In the final battle between the two republics, Tromp was killed; and though De Ruyter made every effort to restore the day, returning to the combat after he had been obliged to shift his flag to a frigate, yet he was at length compelled to withdraw his shattered ships to the Meuse. The peace with England, which was concluded the following year, gave a respite to this terrible service, and De Ruyter was sent to cruize in the Mediterranean. He was to reinforce Opdam, who was laying siege to that town, and this service being effected, he returned to his station. The Dutch trade was at this time much molested by French privateers, but the vigorous conduct of De Ruyter put an end to this predatory warfare. A dispute with Portugal brought this Dutch admiral again into action, and he exhibited his vigilance, taking several Portuguese ships at the mouth of the Tagus, and made several prizes from the Brasil fleet, till a want of provisions obliged him to return to Holland. War having recommenced between the Swedes and Danes in 1658, De Ruyter was sent with a fleet to the assistance of the latter. He made a descent on the island of Funen, defeated the Swedes, and forced them to surrender at discretion in Nyborg, whither they had retired. He then wintered at Copenhagen, where the king of Denmark ennobled him for his good services. In 1662 he was sent with a strong squadron to curb the insolence of the Barbary states, who had exercised their piracy upon the Dutch shipping, and succeeded entirely to the satisfaction of his employers. At the commencement of the disputes between Charles II. and the United Provinces, De Ruyter had a command on the coast of Africa, where he recovered the forts which had been taken from the Dutch by the English, and made prizes of some merchant ships. After the defeat of the fleet of Opdam by the duke of York, in 1665, De Ruyter returned, and was raised to the rank of lieutenant-admiral-general of the Dutch navy. In the parties into which Holland was at this time divided, De Ruyter was considered as attached to the republican cause, while the younger Tromp, his rival, was a warm adherent to the house of Orange: they, however, went to sea together. The first service of De Ruyter was to convoy home a fleet of merchantmen; and in June 1666, the great fleets of the two maritime powers met in the Downs; the Dutch commanded by De Ruyter and Tromp, the English by prince Rupert (see his article) and Monk, now the duke of Albemarle. In the three days fight which ensued the Dutch had the advantage, though the valour of the English rendered the contest very severe. Both De Ruyter and Tromp were obliged several times to shift their flags from ship to ship, and the latter, having borne down to the centre of the English, was reduced to the utmost extremity, when he was nobly rescued by his rival and political foe. The action was renewed on the fourth day, and in the end the English, who had been the greatest sufferers, withdrew to their harbours.

In the following August the duke of Albemarle and prince Rupert fell in, near the coast of Essex, with De Ruyter and Tromp, and in the ensuing action, Tromp, eagerly pursuing a defeated division of the English fleet, left De Ruyter alone to contend with the main body of the enemy, who, after a long and most severe contest, was obliged to retreat, exclaiming, how wretched he was that not one bullet of so many thousands would free him from the disgrace. He gained, however, additional glory by the good order in which he drew off his shattered ships, and in no action were his skill and courage more distinguished.

The year 1667 was memorable for the disgrace which the reign of Charles II. incurred by the triumphant entrance of the Dutch into the Thames. Negociations for peace had been carrying

carrying on at Breda, which De Witte had protracted, while he haftened the naval preparations. The Dutch fleet appeared in the Thames under the command of De Ruyter, which threw the Englifh into the utmoft confternation. A chain was thrown acrofs the Medway, and fome new fortifications were added to Sheernefs and Upnore caftle: but thefe preparations were unequal to the urgency of the cafe. Sheernefs was foon taken, though defended with the utmoft valour by fir Edward Sprague. Having the advantage of a fpring tide and an eafterly wind, the Dutch, with fix men of war and five fire-fhips, preffed on and broke through the chain, and burnt feveral Englifh men of war in their courfe: among thefe was the Royal Oak, the commander of which, captain Douglas, perifhed in the flames, though he might readily have efcaped. "Never was it known," faid he, "that a Douglas left his poft without orders." The peace which foon after followed gave fome repofe to De Ruyter, till the alliance between Charles II. and Lewis XIV. for the ruin of the Dutch republic, again called him to the defence of his country. With a fleet of 91 fail, in June 1672, De Ruyter attacked the combined fleets of 130 fail, commanded by the duke of York, lord Sandwich, and count d'Eftrées, in Solebay; and after an engagement, which he reprefented as the moft obftinate that he ever witneffed, night parted the adverfaries, each claiming the victory. Lord Sandwich and count d'Eftrées loft their lives, and the other loffes were nearly equal, but De Ruyter kept the fea, and fafely convoyed home a large fleet of merchantmen. The French kept aloof, and fuffered very little.

De Ruyter was now doomed to fuffer danger from a different caufe. During the popular fury againft the oppofers of the houfe of Orange, which proved fatal to the De Wittes, De Ruyter, as one of the party, notwithftanding the great fervices which he had rendered his country, was attacked in the ftreets of Amfterdam with all forts of weapons, but efcaped without much injury. When William was raifed to the ftadtholderfhip, the fervices of this great admiral were too important to be flighted through party difputes, and in 1673 he was fent to fea with a ftrong fleet in queft of the combined Englifh and French, who were on the Dutch coaft, under the command of prince Rupert. An indecifive engagement enfued on the 7th of June, in which De Ruyter difengaged Tromp from the French fquadron which had furrounded him. The battle was partially renewed on the 14th, and in Auguft, as we have feen in the article RUPERT, a more fevere engagement took place, in which an Englifh and two Dutch admirals were killed, and both parties claimed the victory. De Ruyter, however, received the thanks of the ftadtholder for his good conduct on this occafion. Peace between England and the Dutch foon after followed, and never fince have the two nations contefted the empire of the ocean with fuch mighty force, and fo determined a fpirit. France, at this time, was rifing faft to be a maritime power, and Holland, in alliance with Spain, had to contend with her for the fuperiority. De Ruyter, in 1674, made a fruitlefs expedition to the French Caribbee iflands. In the beginning of 1676 he was fent with a fleet to Sicily, which had been encouraged by the French to revolt from the Spaniards. He fell in with the French fleet under the duke de Vironne, and an action enfued, which lafted the whole day, with no decifive advantage to either fide. De Ruyter repaired to Leghorn to refit, and then, forming a junction with the Spanifh fleet, they proceeded towards Meffina. The French came out to meet them, led on by the celebrated Du Quefne, and a fecond battle took place on the 21ft of April. The Spaniards kept at a cautious diftance, but De Ruyter, like himfelf, rufhed to the centre, broke the French line, and was in the act of chafing, when a cannon-fhot wounded him in the left heel and right leg. A fever fupervened, which within a week put an end to his life in the port of Syracufe, at the age of 69, deeply regretted by his country and admired by all Europe. The king of Spain had, only a few days previoufly to this, conferred upon him the title of duke, with a penfion. His remains were magnificently interred at Amfterdam at the public expence, and a fuperb monument was erected to his memory. Univer. Hift. Hume. Campbell's Lives of the Admirals, edit. 1813.

RUZA, in *Geography*, a town of Ruffia, in the government of Mofcow; 48 miles W.N.W. of Mofcow. N. lat. 55° 46'. E. long. 36° 2'.

RUZASUS, ZAFFOONE, in *Ancient Geography*, a port in the eaftern part of Mauritania Cæfarienfis, fituated E. of Rufcurium.

RY, in *Geography*, a town of France, in the department of the Lower Seine; nine miles E. of Rouen.

RYACOTTA, a town of Hindooftan, in Myfore, ftrong, and well furnifhed with guns, ammunition, and provifion for its defence, but taken by the Britifh in July 1791; 75 miles S. of Seringapatam. N. lat. 12° 26'. E. long. 78° 5'.

RYADER. See RIADER.

RYAL. See RIAL.

RYAL, a name given to the noble, which, on account of the fcarcity of gold in the time of Henry V. of England, was diminifhed in fize, whilft it retained its former value, but was reftored by Henry VI. to its original fize, and caufed to pafs for 10*s*. under this appellation. (See ROSE-*noble*.) This ryal of 10*s*., and alfo the angel of 6*s*. 8*d*., with their divifions of half and quarter, were the fole gold coins, till, in 1485, Henry VII. publifhed the double ryal, or fovereign of 20*s*. accompanied by the double fovereign of 40*s*. James I. of England iffued rofe-ryals of 30*s*., and fpur-ryals of 15*s*.; angels of 10*s*., and angelets of 5*s*.; till his ninth year, when gold was raifed in the proportion of 1*s*. in 10*s*.

RYALCHERY, in *Geography*, a town of Hindooftan, in the Carnatic; 10 miles N.W. of Bomrauzepollam.

RYAN, LOCH, an arm of the fea, which extends itfelf in a S.E. direction into Wigtonfhire, Scotland, forming, with the bay of Glenluce, the peninfula denominated the Rinns of Galloway. It is about ten miles in length from its entrance to Stanraer, which is fituated at its head, and varies in breadth from two to four miles. On its eaftern fide ftands the little village of Cairn, contiguous to which is a very fafe and commodious bay, with good anchoring ground, and depth of water fufficient for fhips of any burthen. King William's fleet anchored here on their paffage to Ireland. Oppofite to this village a fand-bank runs a confiderable way acrofs the loch, but few accidents ever happen upon it, and it even contributes to the fafety of the fouthern part of the bay, by breaking the force of the tides, which flow ftrongly in the direction in which it lies. This bank abounds with oyfters of a moft excellent quality. Befides Cairn bay, there are feveral other excellent anchoring bays in the loch, called Portmore bay, the Wig bay, the bay of Soleburn, and the bay of Dalmennock. In fhort, the anchoring is good and fafe in almoft every part of the loch. For fome further remarks relative to this arm of the fea, fee STANRAER. Sinclair's Statiftical Account of Scotland, vol. i. 8vo. Edin. 1791. Carlifle's Topographical Dictionary of Scotland, 4to. 1813.

RYANIA, in *Botany*, was named by Vahl in juft commemoration of John Ryan, M.D. F.R.S., a very active and

and intelligent correfpondent, to whom he was indebted for many fpecimens of rare plants from the iflands of Santa Cruz, Montferrat, &c.—Vahl. Eclog. fafc. 1. 51. Willd. Sp. Pl. v. 2. 1164. Mart. Mill. Dict. v. 4.—Clafs and order, *Polyandria Monogynia*. Nat. Ord. *Tiliaceæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of five lanceolate, tapering, fpreading, finely ribbed, coloured, permanent leaves. *Cor.* Petals none. Nectary between the germen and ftamens, the height of the former, pitcher-fhaped, very villous. *Stam.* Filaments numerous, about 60, in a double row, awl-fhaped, a little fhorter than the calyx, fmooth, except a few hairs at the bafe; anthers erect, awl-fhaped, one-third the length of the filaments, pointed, corrugated, naked, finally waved at the edge. *Pift.* Germen fuperior, ovate, very villous; ftyle fmooth, the length of the ftamens; ftigmas four, convex. *Peric.* Berry dry, corky, nearly globular, of one cell, with five longitudinal tuberculated receptacles, from its inner coat. *Seeds* numerous, ovate, nearly globular, brown, befprinkled with a few minute hairs, and each half enclofed in a membranous tunic, with three double wings.

Eff. Ch. Calyx inferior, of five coloured permanent leaves. Petals none. Nectary pitcher-fhaped, between the ftamens and piftil. Berry corky, of one cell, with many tunicated feeds.

1. R. *fpeciofa*. Vahl. Eclog. t. 9.—Found by Dr. Ryan, in the ifland of Trinidad. A *tree*, with afh-coloured round *branches*, finely downy towards the ends. *Leaves* alternate, ftalked, elliptic-oblong, pointed, entire, fmooth on both fides, except a mealinefs on the mid-rib beneath. *Stipulas* awl-fhaped, hoary, rather longer than the footftalk, deciduous. *Flowers* axillary, moftly folitary, on fhort fimple ftalks. *Leaves* of the *calyx* an inch and half long. *Berry* double the fize of a walnut. *Seeds* rather bigger than thofe of Coriander. Vahl conceived this genus to be allied to *Laetia*, but diftinct in the nectary, permanent calyx, four ftigmas, awl-fhaped (not round) anthers, and other particulars.

RYCKE, Theodore de, in *Biography*, a learned critic, born at Arnheim in 1640; was firft an advocate at the Hague, and then profeffor of hiftory at the univerfity of Leyden. In 1681 he delivered an oration "De Gigantibus," which, with a differtation "De Primis Italiæ Colonis et Æneæ adventu," he added to an edition of Stephanus Byzantinus and Scymmus Chius, Lugd. Bat. 1684. He alfo publifhed a valuable edition of Tacitus, with notes and illuftrations, in 1687, in two vols. 12mo. He died in 1690.

RYCQUIUS, Justus, was born at Ghent in 1587, and educated at Douay. From this place he travelled into Italy, and was for fome time librarian to count Lodovico Sahero. Returning to the Low Countries, he was made canon of Ghent, and refided fome time at Louvain. In 1624 he was appointed by Urban VIII. to the chair of eloquence in the univerfity of Bologna, where he died in 1627. He publifhed a number of Latin poems, and other works, but is chiefly known by his treatife "De Capitolio Romano," 1617, containing a defcription of the works of art, ancient and modern, preferved in that relic of antiquity. This performance obtained for him the title of a Roman citizen. It was reprinted at Leyden by Gronovius in 1696, with notes and plates. Gen. Biog.

RYD, in *Geography*, a town of Sweden, in the province of Upland; 20 miles S. of Upfal.—Alfo, a town of Sweden, in the province of Smaland; 22 miles E.S.E. of Jonkioping.

RYDAHOLM, a town of Sweden, in the province of Smaland; 22 miles W.N.W. of Wexio.

RYDAL Head, a mountain of England, in Weftmoreland; two miles N. of Amblefide.

Rydal Water, a lake of England, in Weftmoreland, which communicates with the Windermere lake.

RYDALL, a river of Wales, which runs into the fea at Aberyftwith.

RYDDA, in *Ancient Geography*, a city which the Jews conquered from the Arabians, under Alexander Jannæus. Jofeph. Antiq. lib. xiv. cap. 2.

RYDER, *Sir* Dudley, in *Biography*, was born in the year 1691, and having received a good elementary education, he was brought up to the profeffion of the law. It may be obferved, that the family from which the fubject of this article was defcended, had been very long eftablifhed in Yorkfhire, and took their name from Ryther, in the hundred of Barkfton, in that county, hence the name has been written differently at different periods, as Rythre, Ryther, or Ryder. It appears from Dugdale's Baronage, that William de Ryther was fummoned to parliament among the barons of the realm, from the 21ft of Edward I. till the 1ft of Edward II., and that he was fucceeded by John de Rythre, governor of Shipton caftle. Sir Dudley Ryder was appointed folicitor-general to his majefty George II. in 1733; in 1736 he was advanced to the office of attorney-general, and in 1754 he was appointed to the high office of lord chief juftice of the court of king's bench. In the year 1756 his majefty, as a reward for his long and very faithful fervices, determined to advance him to the dignity of the peerage, by the title of lord Ryder, baron of Harrowby in Leicefterfhire, and a warrant was accordingly figned by the king for that purpofe, on the 24th of May; but fir Dudley died on the following day, before the patent could be completed. He left a fon, Nathaniel, the firft lord who was fo created in 1776. He died in 1803, and was fucceeded by his eldeft fon, Dudley, the prefent lord.

Ryder, or *Ruyder*, in *Commerce*, a gold coin in Holland. The new ftand-pennings, or ryders, are fixed by the regulation of 1749 at 14 florins, and the half ditto at 7 florins. The affay and value, &c. are as follow:

	Affay.	Weight.	Contents in pure Gold.	Value in Sterling.
	car. gr.	oz. dwt. gr.	grains.	*L.* *s.* *d.*
Double ryder	ftandard.	0 12 21	284.2	2 10 $3\frac{1}{2}$
Ryder -	ditto.	0 6 9	140.2	1 4 10
Half ryder -	ditto.	0 3 $4\frac{1}{2}$	70.1	0 12 5
Ducat -	B. 1 $2\frac{1}{4}$	0 2 $5\frac{3}{4}$	52.8	0 9 4

Impreffions.—The ryder has on the front, an armed horfeman, with a drawn fword; the legend expreffes the province in which it has been coined, thus: MO. AUR. PRO. CONF. BELG. ZELAND, that is, *Moneta aureæ provinciæ confæderationis Belgicæ Zelandiæ* (gold coin of Zeland, a province of the Belgic confederacy), with the arms of the province at bottom: reverfe, the arms of the United Provinces, with 14 Gl. (14 guilders or florins); legend, CONCORDIA RES PARVÆ CRESCUNT (fmall things increafe by concord). The half ryder bears the fame impreffions, except that it is marked 7 Gl.

The ducat has a foot foldier with a drawn fword, and a bundle of arrows in his left hand; legend, CONCOR. RES PAR. CRES., that is, *Concordia res parvæ crefcunt*, as above, and the letters, HOL. or ZEL. &c. to diftinguifh the province: reverfe,

reverfe, a fquare, with ornaments and the following words in five lines, MO. ORD. PROVIN. FŒDER. BELG. AD LEG IMP.; that is, *Moneta ordinarea provinciarum fœderatarum Belgicarum ad legem Imperii,* (the common coin of the confederated Belgic provinces, according to the law of the empire).

RYDER, or *Rider, to a bill.* See PARLIAMENT.

RYDRAIRE, in *Geography*, a town of Hindooftan, in Baramaul; 28 miles N. of Namacul.

RYDROOG, a town and fortrefs of Hindooftan, in Myfore; 128 miles N. of Seringapatam. N. lat. 14° 40′. E. long. 76° 52′.

RYE, in *Botany*. See SECALE.

RYE, in *Agriculture*, a fpecies of corn much cultivated in fome of the northern diftricts. It is a fort of crop that approaches the neareft to that of wheat of any that is at prefent in cultivation. There are two varieties of this grain, the *winter* and *fpring* rye, or what is often diftinguifhed into the *black* and *white*, or Dantzic fort, but the former is the largeft and the moft plump and hardy, confequently the moft frequently grown by the farmer, however the fpring kind may often be employed with fuccefs and advantage. This kind of grain is fo capable of fuftaining the effects of the weather, that when fown in the autumn it is feldom injured by the moft fevere winters; it is likewife more early in the fpring than wheat, and though not equally valuable, is more certain of producing a good crop in general than that grain is.

Soil.—This is a fort of crop which is capable of being grown on moft kinds of land, but the light dry fandy foils that cannot be converted to the purpofe of wheat or barley, are probably the only ones on which it can be cultivated to advantage, from being the moft adapted to it, and from few of them being fo light or poor as not to afford good crops. It can, of courfe, only be introduced with fuccefs on fuch lands as are incapable of producing other forts of corn to advantage. And from fowls being lefs fond of it than moft other forts of grain, it may be the moft proper to be cultivated on thofe portions of ground that are fituated clofe around the farm-houfes and yards.

It is a crop which is moftly grown after early fed turnips, clover, peas, and other fimilar products, as well as after naked fallows. In particular cafes, when grown on the cold and heavy kinds of foil, the grain is found to be much later in becoming ripe than on fuch as are dry and light in their quality.

This is alfo a kind of crop which, as in that of wheat, requires the land to be brought into a tolerable ftate of mellownefs, and to be perfectly cleared from weeds. In many diftricts where intended to ftand for a crop, it is the cuftom to put it in upon fome fort of fallow, but where it is only to be fed off by fheep, feldom more than one ploughing is given, the land being broken up and fallowed for turnips, immediately after the green rye has been fufficiently eaten down by fheep or other animals. And it is the practice in fome places to apply manure immediately for this crop; but where the foil is in a fuitable ftate of tillage, and has not previoufly been too much exhaufted by the growth of grain crops, it may be more proper, efpecially where it is not to be fed off, to defer the application of the manure, in order that it may be employed for the turnip or other green crop that is to fucceed, the ufe of manure being apt to bring up weeds, and render it difficult to be kept clean.

Seed and Sowing.—In refpect to the time of fowing this fort of grain, it is, in general, pretty much the fame as that for wheat where a crop is intended, but when cultivated for green food for animals, it may be advantageous to fow it more early, as in Auguft and September, but it may be fown in October, and during the winter months, until the beginning of March, in particular cafes, as where the early fowings have failed, or there is an intention of having a fucceffion of this feed for fheep. In which cafes, according to Mr. Bannifter, it is ufually fown on one ploughing on a wheat or other ftubble where the field is to come in courfe for turnips in the following year. And the above writer fays that the general allowance of feed, where the crop is defigned to remain for grain, is, in moft fituations, from about two bufhels to two and a half; but when the intention is to feed it off, three, or even more, may be a better proportion, as the plants, in fuch cafes, fhould ftand confiderably thicker upon the ground, in order that the largeft poffible quantity of green food may be provided for the animals. And as the vegetation of this fort of crop is rather flow, it may be proper to put it into the ground when it is in a tolerably dry condition, otherwife much of it may perifh, efpecially in wet feafons, and where the land is rather heavy.

It is likewife ftated in the Report of Yorkfhire, that it was formerly a prevailing cuftom to blend feveral other forts of feeds with that of rye, and the practice ftill continues in fome diftricts, in refpect to wheat and winter tares, but it is by no means either advifeable or ufeful, in Mr. Donaldfon's opinion, fince, in the firft cafe, the rye is in a ftate fit for reaping long before the wheat, confequently much lofs muft be fuftained by the farmer, and in the latter it is moftly in a ftate to be cut as green food, fome weeks before the tares, and becomes ripe at much too early a period for them.

And in cafes where wheat is blended with rye, it is often termed meflin, the proportion of the latter to that of the former being regulated by the nature of the foil, and the opinion of the grower, the general principle being that of giving the largeft proportion of rye to the lighteft kinds of ground.

After-culture.—In cafes where this crop is grown for the purpofe of the grain, it will be neceffary to keep it as clean as poffible in the early ftages of its growth by horfe and hand weedings, and hoeings according as it is fown, when they may appear requifite; but where the intention is merely that of affording a fupply of green food, for the ufe of fheep or other animals in the more early fpring months, no further culture will be wanted after the crop has been put into the ground. This fort of crop is known to be ready to cut by the ftraw of the ftems becoming of a yellowifh colour, the ears hanging down in a bending manner, and the grain feeling hard and in a plump and full condition.

On the poor fandy foils of Suffolk good crops of this fort are feldom produced, and on thofe of a better quality the produce is rarely more than from two to three quarters on the acre. But in the north riding of Yorkfhire it is ftated, by the author of the Agricultural Report of that diftrict, to amount to from three to fix quarters to the acre of land.

In cafes where this fort of grain is free from weeds, and cut when the weather is fine, it may be fecured in the ftack as faft as the reaping proceeds, without its being endangered by it. And the ftraw of this fort of grain is found to be fuperior to that of wheat, for the purpofe of thatch, as well as for the ufe of the collar-makers, who require much of it.

The practice of farmers is fometimes, where rye is intended to ftand for a crop, to feed it with fheep in the early fpring, as in the beginning of March; but this fhould never be done

 except

except where the crop is very luxuriant, and at fo early a period as that there may be no danger of deftroying the new formed ear of the grain. This kind of crop is alfo cultivated in particular cafes, as where the ground is fufficiently light and dry to be turned down as a manure: where this is the cafe, the crop fhould always be turned in while in its moft green and fucculent ftate, and when the weather is moderately dry, in order that it may be more quickly reduced by putrefaction into a manure. And, in the more fouthern diftricts, it is not unfrequently grown for the purpofes of the tanners, who have recourfe to it in the preparation of leather.

Application.—The moft ufual application of this crop is as a green food for fheep in the early fpring, before the turnip crops are ready. When grown in this view it is neceffary, the author of Practical Agriculture fays, to have attention to different circumftances, in order to derive the utmoft advantage from the crops. As this grain begins to fhoot out, or fpindle, as it is termed by farmers, much earlier than wheat, care fhould be taken that the feeding of it down is begun at a fufficiently early period before the ear is formed in the *hofe*, as the latter end of February or beginning of March, otherwife the ftem or blade becomes firm and fticky, and the fucceffion of green feed after the firft eating extremely fmall. Indeed this may be done earlier than the firft of thefe periods, in cafes where the feafon is mild and open, and perfevered in till the end of April. In all cafes it is, however, adviſeable to let the crop be fo advanced in its growth as to cover the ground tolerably before the fheep are turned in. As this fort of green food is faid to have much effect in promoting the flow of milk in fuch ewes as have lambs, probably from its fucculency, and its ftimulant properties being applied immediately after the feverity of the winter feafon, when the bodies of animals are known to be more capable of being excited by the action of ftimuli, and when there is fcarcely any other fort of green feed that can leffen its operation by being taken along with it, the culture of it muft be the moft advantageous, it is fuppofed, where fheep hufbandry is extenfively combined with that of tillage, efpecially that department of it which relates to the feeding of lambs. As by this means, from the quantity of fucculent nutritious food that is provided, the lambs are prevented from being ftinted in their growth while young, which is a matter of the utmoft importance in their future feeding. And that in thus feeding the crop off by fheep it will conftantly be neceffary to keep the fields properly divided by means of hurdles, as in this way the lofs of food will be much lefs, and fome parts will become frefh while the others are eating down, which are advantages not to be difregarded in cafes of this kind.

But Mr. Bannifter thinks, that, notwithftanding what has been urged in favour of a rye pafture, it is fcarcely worth the while of any farmer to attempt the cultivation of this grain, who does not keep large numbers of ewes and lambs; for as the feed ufually fetches a high price, every advantage attending the crop will be more than balanced by the fuperior charges in the cultivation, except in the inftance above-mentioned, where no expence fhould be fpared to maintain the lambs in a thriving way, and to prevent their growing hard and fticky, as the butchers term it; for if lambs once fink in flefh, it is beyond the art of man to reftore them to their former thriving ftate again.

Rye is, in many parts of the country, ufed for bread, either alone, or mixed with wheat.

Rye is alfo a grain which is much ufed in the diftilleries, where it can be procured in large quantity, and alfo by the ginger-bread bakers. In the Rural Economy of Yorkfhire it is obferved, that before the ufe of lime was prevalent, much rye was grown on the lighter lands upon the margin of the vale, and in the moor-lands fcarcely any other crops than rye and oats were attempted. Now rye is principally confined to the moorland dales; and even there the alteration of foils by lime has been fuch, that wheat is become the more prevalent crop. Neverthelefs, on light fandy moorland foils, rye is generally more profitable than wheat; and the bread which is made from a mixture of the two grains is here efteemed more wholefome to perfons in general, than that which is made from wheat alone.

It is cultivated in many diftricts as a good fpring green feed for fheep, particularly ewes and lambs. This is greatly the cafe on the South Downs, in the county of Surrey. It is there fown in the late fummer months, or the very beginning of thofe of the autumn, the more early the better. When other food is fcarce in the fpring and in the lambing feafon, the ewes and lambs are turned upon it, proper portions being hurdled off for the purpofe.

Some fuppofe it prepares well for turnips, and that on many accounts it may be raifed with much ufe and advantage on open expofed fandy foils, where wheat crops will not fucceed, for being fed off, and infure far better crops of the above roots, than are commonly met with in fuch foils and fituations. There would, in thefe cafes, it is faid, be the benefit of an increafed quantity of food, and of courfe an increafe in the number of live-ftock, which would produce a greater abundance of manure, and, confequently, of grain crops ultimately. The trouble and expence of adopting fuch a method of practice would be but trifling, infomuch as the ground would be broken up only in the autumn inftead of the fpring; in return for which fheep-feed would be procured, and, at the fame time, the land be well dreffed for the further crop, which fhould conftantly have a full fupply of manure when the feed is put into the land.

This crop, on the whole, deferves more attention than it has commonly met with, as it forms one of the links in the chain of green food, by which live-ftock, on arable farms, can be fed and fupported the whole year round.

In many parts of France there have been certain years in which this grain, from no apparent caufe, has proved noxious, and fometimes even poifonous. M. Perrault travelling through Sologne, was informed that the rye of that province was fometimes fo corrupted, that thofe who eat of the bread that had much of the corrupted grain in it, were feized with gangrenes in different parts of the body, which were not preceded by any fever, inflammation, or any confiderable pain; and that the gangrened parts ufually fell off after a time of themfelves, without the affiftance of chirurgical inftruments. The grains of rye thus degenerated, are black on the outfide, and tolerably white within; and when they are dry, they are harder and clofer than the natural good grain; they have no ill tafte, but fometimes they have a vifcous metallic-like honey hanging to one end of them. They grow longer than the other grains in the fame ear, and are found from one or two to feven or eight in the fame ear. Some have fuppofed that thefe were not the proper feeds of the plant, but fome other extraneous bodies that got in among them; but it is evident, from a clofe infpection, that they are really the genuine feeds, only altered by fome accident; the coats, and the furrow, and even the germen for the young plant, being entirely the fame as in the natural feeds.

The places where the rye is found to degenerate in this manner, are all a dry and fandy foil. In thefe places there is fcarcely any foil in which more or lefs of thefe large feeds are not found among the others, but where there are but few of them, the ill effects are not perceived. The feafons when the degeneracy is greateft, and the effects the worft of of all, are, when there have been excessive rains in the spring, and there come on excessive heats in the succeeding summer.

The bread which is made of the rye that holds ever so much of this bad corn, is not distinguishable from other rye-bread by the taste, and seldom produces its ill effect, till some considerable time after it is taken. Beside the gangrenes already mentioned, it not unfrequently brings on other bad consequences, such as drying up the milk of women who give suck, and occasioning sometimes malignant fevers, accompanied with drowsiness, ravings, and other dangerous symptoms. The part usually seized by the gangrene is the legs, and this often in a very frightful manner. The arms are the next part most subject; but all the other parts of the body are subject to it.

The first symptom of this approaching gangrene is a stupefaction and deadness in the part; after this there comes on some pain, though not violent, and the skin becomes livid; sometimes the skin shews no mark of it, but the pain and swelling increase; and it is necessary to make an incision into the flesh, to find the gangrened part. In the more desperate cases, the only remedy is, the taking off the part; and if this is neglected, the flesh is all wasted, and the skin becomes black, and clings round the bones, and the gangrene appears again in the shoulders.

The poorer people are only subject to this disease; and, as they principally eat the rye-bread, and as those years when there is most of this bad grain among the ears of rye, produce most of these disorders, it has been judged certain that the rye is the occasion of it. It may deserve enquiry, however, whether that grain may not be innocent of the mischief, and its degeneracy and the distemperature attributed to it may not both be the effect of the same bad constitution of the air. If it proves, on enquiry, that only those who eat of the rye are subject to the disease, it will seem a proof of its being really owing to it; and in this case the mischief may be prevented by the sifting the grain before it is ground, the degenerated grains being so long that they will all remain in the sieve that lets the others through. The experiment has been made on the spot, by giving the flour of the corrupted grains alone to animals, and it is said they have been killed by it. Philos. Trans. N° 130.

Rye-*Grass*, the common name of a particular sort of grass. See Ray-*Grass*.

It has been observed, from the trials made at Wooburn, under the care of Mr. G. Sinclair, that sheep eat this grass, when it is in the early stage of its growth, in preference to most others; but after the seed approaches towards perfection, they leave it for almost any other kind. A field in the park at the above place was laid down in two equal parts, one part with rye-grass and white clover, and the other part with cock's-foot and red clover: from the spring till midsummer the sheep kept almost constantly on the rye-grass; but after that time they left it, and adhered with equal constancy to the cock's-foot during the remainder of the season.

Rye, or *West Rye*, in *Geography*, a borough, market-town, and cinque-port, under the title of "ancient port and town," in the hundred of Gostrow, rape of Hastings, and county of Sussex, England, is situated on the coast of the British Channel, at the distance of 76 miles E. by W. from Chichester, and 62 miles S.E. by E. from London. It is of very high antiquity, but its early history is little known. It seems clear, however, that it was one of the original cinque-ports, and is mentioned as a member of them generally, in a charter granted by king Henry III. In the reign of Edward III. the whole town was environed with a strong wall, and guarded by towers, under the superintendance of William d'Ypres, earl of Kent. At that period Rye was so considerable a port, that it furnished no fewer than nine armed vessels to the royal fleet, when the king undertook the invasion of France; but it suffered materially in the next reign, having been plundered and burnt by the French, who took advantage of the then distracted state of the country, to attack such of the coast-towns as were least capable of resistance. It soon, however, recovered from this disaster, and became a port of considerable consequence; but the rise of others on the same coast has rendered it for the last century comparatively unimportant. The harbour, which lies to the south-east of the town, is at present in a neglected state, notwithstanding it admits vessels of a large size to come quite up to the town-quay, about a mile and a half from its entrance. At spring tides the sea rises so high, and spreads itself so much, that two-thirds of the town are surrounded by water. The mackarel and herrings caught here in their seasons are reckoned the finest of the kind brought to the London market.

Rye is a borough of itself by prescription, as well as by charters granted in confirmation of its privileges. The corporation consists of a mayor, bailiff, jurats, and freemen. The mayor and bailiff are chosen from among the jurats on the Monday after St. Bartholomew's day, by the votes of a majority of freemen. When a vacancy occurs among the jurats, the mayor nominates a freeman to supply it, but he must be approved of by the jurats before his appointment becomes valid. Rye sends two members to parliament, who are ostensibly elected by the mayor, jurats, and freemen inhabiting the borough, and paying scot and lot; but, in fact, they are returned through the influence of the treasury, which is paramount in all the cinque-ports. The principal articles of trade here are, hops, wool, timber, kettles, cannon, chimney-backs, and other iron goods, from the works at Bakeley and at Breed. There are two weekly markets, on Wednesday and Saturday; and two annual fairs, on Whit-monday and the 10th of August.

The town of Rye occupies a considerable eminence, and is, generally speaking, regular and well built. In the centre of the principal street stands the market-house, the higher story of which is appropriated as a town-hall, for the use of the corporation. The church is constructed of stone, and is one of the largest parochial edifices of the kind in England, but does not otherwise claim particular attention. Here is besides a chapel, which was lately appropriated to the French refugees, who settled in the town and its vicinity during the late war; also meeting-houses for Methodists, Quakers, and other Dissenters. Here are likewise two free-schools, one of which was erected and endowed by a Mr. Peacock in the year 1644; and the other by a Mr. Saunders, at a later period. The only monastic establishment in Rye was a priory of Augustine friars, which existed previous to the time of Edward III. and continued to flourish till the general dissolution of religious houses by king Henry VIII. The church formerly belonging to this monastery is still standing, having been converted into a store-house for mercantile goods. Some remains of the ancient walls of the town may yet be traced, but the ditches are entirely filled up.

According to the parliamentary returns of 1811, this town and out-liberty contain 476 houses, and 2681 inhabitants. Camden's Britannia, by Gough, Sussex, folio, 1789. Beauties of England and Wales. vol. xiv. 8vo.

Rye, a town of Denmark, in North Jutland, formerly important, but now much reduced. The church at Rye, in in popish times, was reckoned to be a very sacred place; 16 miles W. of Aarhuys.

Rye, a township of New Hampshire, in America, on the sea-coast of Rockingham county, opposite the isle of Shoals, and 8 miles S. of Portsmouth: incorporated in 1719, and containing 1020 inhabitants.—Also, a township of New York, in West Chester county, in Long Island sound; 36 miles N.E. of New York city.—Also, a township in Cumberland county, Pennsylvania, containing 1356 inhabitants. —Also, a township in Cumberland.

RYECHUNGA, a town of Bengal; 13 miles N.W. of Beyhar.

RYEGATE. See Reygate.

Ryegate, the south-easternmost township of Caledonia county, in the state of Vermont, separated from Bath in New Hampshire by Connecticut river; containing 812 inhabitants.

RYELAND Sheep, a breed of fine-woolled sheep, originally met with in the greatest perfection in a district of Herefordshire, termed the Ryelands. See Sheep.

RYER, Andrew du sieur de Malezais, in *Biography*, was born at Marcigni, in Burgundy. Little is known of his history, but he became gentleman in ordinary of the king's bed-chamber, and knight of the Holy Sepulchre. He resided a considerable time at Constantinople in the king's service, and was consul for the French nation in Egypt, from which opportunities he derived a knowledge of the Arabic, Turkish, and other Oriental languages. He died in France, about the middle of the 17th century. His chief works as a literary man are, "A Turkish Grammar;" "A French Translation of the Koran," and another of the "Gulistan" of Saadi. His version of the Koran is in no great estimation, as he is said to have mixed the reveries of Mohammedan commentators with the original text.

Ryer, Peter du, a dramatic and miscellaneous writer, was born of a good family at Paris, in 1605. He procured a place of secretary to the king in 1626, which his poverty obliged him to sell, and he afterwards served in the same capacity Cæsar, duke of Vendome. In order to support his family he employed his pen in prose and verse. He composed nineteen pieces for the theatre, which were successful at the time of their appearance. Two or three of his tragedies obtained the applause of maturer criticism. His "Alcyonèe" so much delighted queen Christina, that she had it read to her three times in one day. His "Scævole" still keeps its place on the stage. Du Ryer was admitted into the French Academy in 1646. A short time before his death he obtained the office of historiographer royal, with a pension. He died in 1658.

RYES, in *Geography*, a town of France, in the department of the Calvados, and chief place of a canton, in the district of Bayeux. The place contains 650, and the canton 10,510 inhabitants, on a territory of 147½ kiliometres, in 29 communes.

RYEWATER, a river of the county of Kildare, Ireland, which passing by Carton, falls into the Liffey, near Leixlip.

RYKOWICZA, a town of Lithuania, in the palatinate of Brzesc; 25 miles S.E. of Brzesc.

RYKSDALER, in *Commerce*. See Rixdollar.

RYKSORT, a Danish silver coin, reckoned at twenty-four shillings. See Rixdollar.

RYMABAD, in *Geography*, a town of Hindoostan, in Mysore; 15 miles E.S.E. of Chinna Ballabarum.

RYMAROW. See Romerstadt.

RYME. See Rhyme.

RYMENAUT, in *Geography*, a town of France, in the department of the Two Nethes, situated on the Dyle; five miles E. of Malines.

RYMER, Thomas, in *Biography*, a critic and antiquary, was born in the north of England, and educated at the grammar-school of Northallerton. He was admitted a scholar at Cambridge, then became a member of Gray's Inn, and at length was appointed historiographer to king William, in place of Mr. Shadwell. He wrote "A View of the Tragedies of the last Age," and afterwards published a tragedy named "Edgar." For the office of a critic he was certainly not well qualified, for he wanted candour; nor is his judgment much to be relied on, as he could condemn Shakspeare with such rigid severity. His tragedy will shew, that his talents for poetry were by no means equal to those whose poems he has publicly censured. But though he has no title to the appellation of poet or critic, as an antiquarian and historian his memory will long be preserved. His "Fœdera," which is a collection of all the public transactions, treatises, &c. of the kings of England with foreign princes, is esteemed one of our most authentic and valuable records, and is oftener referred to by the best English historians than perhaps any other book in the language. It was published at London in the beginning of the last century, in 17 vols. folio. Three volumes more were added by Sanderson after Rymer's death. The whole were reprinted at the Hague, in 10 vols. 1739. They were abridged by Rapin in French, and inserted in Le Clerc's Bibliotheque, a translation of which was made by Mr. Stephen Whatley, and printed in one vol. folio. &c. 4 vols. 8vo. 1731, under the title of *Acta Regia*. Mr. Rymer died the 14th of December 1713, and was buried in the parish church of St. Clement's Danes. Some specimens of his poetry are preserved in the first volume of Mr. Nichols's Select Collection of Miscellaneous Poems, 1780.

RYNABAD, in *Geography*, a town of Bengal; 35 miles S.E. of Moorley.

RYNCHOPS, *the Skimmer*, in *Ornithology*, a genus of birds of the order Anseres, of which the generic character is, that the bill is straight, the upper mandible is much shorter than the under, the latter truncated at the apex; the tail is forked and shorter than the wings, nostrils linear, and the back toe small.

Species.

Nigra; Black Skimmer, or Cut-water. The specific character is blackish, beneath white; bill red at the base; the lower mandible grooved; the front and chin are white; wings with a transverse white band; the two middle tail-feathers are black, the next edged with white; the legs are red, and it is about twenty inches long. It is found in divers parts of Asia and America. This bird is ever on the wing, sweeping the surface of the water, dipping its bill, or at least its under mandible, to scoop out the smaller fishes, on which it feeds. In stormy weather it frequents the shores, and is contented with oysters, and other shell-fish. There is a variety of a tawny colour, with a black bill.

RYNNTO, in *Geography*, a small island in the gulf of Bothnia, near the coast of Finland. N. lat. 60° 37′. E. long. 21° 46′.

RYNOORT, a town of Holland, on the Rhine; seven miles E. of Leyden.

RYOTS, the modern name by which the renters of land are distinguished in Hindoostan. In every part of India, where the native Hindoo princes retain dominion, these Ryots hold their possession by a lease, which may be considered as perpetual, and at a rate fixed by ancient surveys

 and

and valuations. This arrangement has been fo long eftablifhed, and accords fo well with the ideas of the natives, concerning the diftinctions of cafts, and the functions allotted to each, that it has been inviolably maintained, in all the provinces fubject either to Mahometans or Europeans; and to both it ferves as the bafis on which their whole fyftem of finance is founded. In a more remote period, before the original inftitutions of India were fubverted by foreign invaders, the induftry of the hufbandman, on which every member of the community depended for fubfiftence, was as fecure, as the tenure, by which he held his lands, was equitable. Even war did not interrupt his labours or endanger his property. It was not uncommon, we are informed, that while two hoftile armies were fighting a battle in one field, the peafants were ploughing or reaping in the next field in perfect tranquillity. (Strabo, lib. xv.) Under a form of government, which paid fuch attention to all the different orders of which the fociety is compofed, particularly the cultivators of the earth, it is not wonderful that the ancients fhould defcribe the Indians as a moft happy race of men; and that the moft intelligent modern obfervers fhould celebrate the equity, the humanity, and mildnefs of Indian policy. A Hindoo rajah refembles more a father prefiding in a numerous family of his own children, than a fovereign ruling over inferiors fubject to his dominion. He endeavours to fecure their happinefs with vigilant folicitude; they are attached to him with the moft tender affection and inviolable fidelity. We can hardly conceive men to be placed in any ftate more favourable to their acquiring all the advantages derived from focial union. It is only when the mind is perfectly at eafe, and neither feels nor dreads oppreffion, that it employs its active powers in forming numerous arrangements of police, for fecuring its enjoyments and increafing them. Many arrangements of this nature the Greeks, though accuftomed to their own inftitutions, the moft perfect at that time in Europe, obferved and admired among the Indians, and mention them as inftances of high civilization and improvement. There were eftablifhed among the Indians three diftinct claffes of officers, one of which had it in charge to infpect agriculture, and every kind of country work. They meafured the portions of land allotted to each renter. They had the cuftody of the *tanks*, or public refervoirs of water, without a regular diftribution of which, the fields in a torrid climate cannot be rendered fertile. They marked out the courfe of the highways, along which, at certain diftances, they erected ftones, to meafure the road and direct travellers. To officers of a fecond clafs was committed the infpection of the police in cities; their functions of courfe were many and various; fome of which only we fhall fpecify. They appropriated houfes for the reception of ftrangers; they protected them from injury, provided for their fubfiftence, and, when feized with any difeafe, they appointed phyficians to attend them; and, on the event of their death, they not only buried them with decency, but took charge of their effects, and reftored them to their relations. They kept exact regifters of births and of deaths. They vifited the public markets, and examined weights and meafures. The third clafs of officers fuperintended the military department; but, as the objects to which their attention was directed are foreign from the fubject of this article, it is unneceffary to enter into any detail with refpect to them.

There is ftill the fame attention to the conftruction and prefervation of tanks, and the diftribution of their waters. The direction of roads, and placing ftones along them, is ftill an object of police. *Choultries*, or houfes built for the accommodation of travellers, are frequent in every part of the country, and are ufeful, as well as noble monuments of Indian munificence and humanity.

The precife mode, however, in which the Ryots of Hindooftan held their poffeffions, is a circumftance in its ancient political conftitution, with refpect to which gentlemen of fuperior difcernment, who have refided long in the country, and filled fome of the higheft ftations in government, have formed very different opinions. Some have imagined, that grants of land were made by the fovereign to villages or fmall communities, the inhabitants of which, under the direction of their own chiefs or heads-men, laboured it in common, and divided the produce of it among them in certain proportions. (Defcript. de l'Inde, par M. Bernouilli, tom. ii. 223, &c.) Others maintain, that the property of land has been transferred from the crown to hereditary officers of great eminence and power, denominated *Zemindars*, who collect the rents from the Ryots, and parcel out the lands among them. Others contend, that the office of the Zemindars is temporary and minifterial, that they are merely collectors of revenue, removeable at pleafure, and the tenure by which the Ryots hold their poffeffions is derived immediately from the fovereign. This laft opinion is fupported, with great ability, by Mr. Grant, in an Inquiry into the Nature of Zemindary Tenures in the landed Property of Bengal, &c. This queftion ftill continues to be agitated in Bengal, and fuch plaufible arguments have been produced in fupport of the different opinions, that although it be a point extremely interefting, as the future fyftem of Britifh finance in India appears likely to hinge, in an effential degree, upon it, perfons well acquainted with the ftate of India, have not been able to form a final and fatisfactory opinion upon this fubject. (Captain Kirkpatrick's Introd. to the Inftitutes of Ghazan Khan. New Afiatic Mifcell. N° II. p. 130.) Though the fentiments of the Committee of Revenue, compofed of perfons eminent for their abilities, lean to a conclufion againft the hereditary right of the Zemindars in the foil, yet the Supreme Council, in the year 1786, declined, for good reafons, to give any decifive judgment on a fubject of fuch magnitude.

Mr. Roufe, in his ingenious and inftructive Differtation concerning the landed property of Bengal, adopts an opinion contrary to that of Mr. Grant, and maintains, with laudable candour and liberality of fentiment, that the Zemindars of Bengal poffefs their landed property by hereditary right. Dr. Robertfon, in his "Hiftorical Difquifition concerning India," fuggefts, that the poffeffion of land was granted at firft during pleafure, afterwards for life, and at length became perpetual and hereditary property. But even under this laft form, when land is acquired either by purchafe or inheritance, the manner in which the right of property is confirmed and rendered complete, in Europe by a charter, in India by a "Sunnud" from the fovereign, feems to point out what was its original ftate. According to each of the theories above-mentioned, the tenure and condition of the Ryots nearly refemble the defcription which our author has given of them. Their ftate, we learn from the accounts of intelligent obfervers, is as happy and independent as falls to the lot of any race of men employed in the cultivation of the earth. The ancient Greek and Roman writers, whofe acquaintance with the interior parts of India was very imperfect, reprefent the fourth part of the annual produce of land as the general average of rent paid to the fovereign. Upon the authority of a popular author, who flourifhed in India prior to the Chriftian era, we may conclude, that a fixth part of the people's income was, in his time, the ufual portion of the fovereign. (Sacontala, act v. p. 53.) It is now known,

known, that what the sovereign receives from land varies greatly in different parts of the country, and is regulated by the fertility or barrenness of the soil, the nature of the climate, the abundance or scarcity of water, and many other obvious circumstances. By the account given of it, Dr. Robertson imagines that, in some districts, it has been raised beyond its due proportion. One circumstance with respect to the administration of revenue in Bengal merits notice, as it redounds to the honour of the emperor Akber, the wisdom of whose government has often been conspicuous. A general and regular assessment of revenue in Bengal was formed in his reign. All the lands were then valued, and the rent of each inhabitant and of each village ascertained. A regular gradation of accounts was established. The rents of the different inhabitants who lived in one neighbourhood being collected together, formed the account of a village; the rents of several villages being next collected into one view, formed the accounts of a larger portion of land. The aggregate of these accounts exhibited the rent of a district, and the sum total of the rents of all the districts in Bengal, formed the account of the revenue of the whole province. From the reign of Akber to the government of Jaffeer Ali Cawn, A.D. 1757, the annual amount of revenue, and the modes of levying it, continued with little variation. But in order to raise the sum which he had stipulated to pay the English on his elevation, he departed from the wise arrangements of Akber; many new modes of assessment were introduced, and exactions multiplied. Robertson's India.

RYOZ, in *Geography*, a town of France, in the department of the Upper Saône; 11 miles N. of Besançon.

RYPOUR, a town of Hindoostan, in the circar of Gohud; 10 miles S.S.E. of Gwalior.—Also, a town of Hindoostan, in Bahar; 24 miles S.S.E. of Bahar.

RYPTICS, in *Medicine*. See RHYPTICS.

RYR, in *Geography*, a town of Sweden, in West Gothland; seven miles N.E. of Uddevalla.

RYS, a lake of Denmark, in Norland.

RYSAGON, in the *Materia Medica*, a name by which some authors have called the *cassumunar root*.

RYSBY, in *Geography*, a town of Sweden, in the province of Samland; 10 miles N. of Calmar.

RYSEMSEH, a town of Norway; 48 miles E.N.E. of Romsdal.

RYSEN, or RYSSEN, a town of Holland, in the department of Overyssel, on the river Regge; 20 miles N.E. of Zutphen.

RYSSADIUM, in *Ancient Geography*, a town and port of Africa, in Mauritania Tingitana, on the coast of the Iberian ocean, between Sestiaria Extrema and the promontory Mesagonites, according to Ptolemy. It is named by Antonine Rusarder Colonia, and Rusardir by Pliny, who places it near the promontory "Solis."

RYSSADIUM, a promontory of Africa, in the Interior Libya, near the promontory Arsinarium, according to Ptolemy.

RYSSADIUS MONS, a mountain of Africa, in the Interior Libya, in which Ptolemy places the source of the river "Stachier."

RYSWICK, in *Geography*, a large village in Holland, situated between the Hague and Delft, where the prince of Orange had a palace; and remarkable for a treaty concluded here in 1697 between England, Germany, Holland, France, and Spain; 30 miles S.W. of Amsterdam, and two S.E. from the Hague.

RYVES, THOMAS, in *Biography*, born in the latter end of the 16th century, and educated at Winchester school, from whence he was sent to Oxford. He became celebrated as a civilian in Doctors' Commons, and in the court of Admiralty. At the accession of Charles I. he was made king's advocate, and was knighted. He died in 1651. He wrote several works, among which were "The Vicar's Plea;" "Historia Navalis Antiqua;" "Historia Navalis Media."

RYVES, BRUNO, an English divine, and near relation of the preceding. At the restoration of Charles II. he had the deanery of Windsor conferred on him. He was also secretary to Garter king at arms. He was author of "Mercurius Rusticus," or "The Country's Complaint," and divers other works, which were popular in their day.

RYVORDEN, in *Geography*, a small island in the North sea, near the coast of Norway. N. lat. 59° 27′.

RZECZYCA, a town of Lithuania, in the palatinate of Minsk, on the Dnieper; 140 miles S.E. of Minsk. N. lat. 52° 10′. E. long. 31° 24′.

RZEMIEN, a town of Poland, in the palatinate of Sandomirz; 36 miles S.S.W. of Sandomirz.

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